Investigation of Pre-Service Science Teachers' Opinions about Using GoAnimate to Create Animated Videos*

Fen Bilgisi Öğretmen Adaylarının Animasyon Oluşturmada GoAnimate Kullanımına İlişkin Görüşlerinin İncelenmesi

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Abstract
This study aims to investigate the process of animated video creation by pre-service science teachers and analyze their opinions about how this technology can be used for science instruction. Fifteen pre-service science teachers participated in this study. During the study, students learned how to prepare animated videos using GoAnimate program, then they were required to prepare their own animations related to their middle school science subjects. This research is designed as a qualitative case study. Sample of the study was selected using criterion and easily accessible sampling methods to determine the participants. The data was collected through the face-to-face individual interviews. A semi-structured interview form that contains the questions related with the animated video creation process and pre-service teachers' opinions about this technology has been prepared by the researchers. The duration of the interviews was around 15 minutes. Content analysis was used for the data analysis. According to the findings: the pre-service science teachers who participated in the study did not have any prior experience with animation technology, they had some difficulties to use this technology for the first time; most of them stated that animated videos would be engaging and could be endearing, but they had concerns about that students would be more interested in visuals instead of deeper understanding; they perceived animated videos being more helpful for middle school level and also suggested GoAnimate should have more characters available for science animations. In line with the research findings, several suggestions were given for the use of visual materials in science education.

Keywords: *Pre-service science teachers, animated video creation, GoAnimate, science education*

Öz
Bu çalışmada fen eğitiminde animasyonların kullanım süreci incelenmiştir. Çalışmanın amacı fen bilgisi öğretmen adaylarının animasyon videoları hazırlama sürecini incelemek ve fen derslerinde bu teknolojinin nasıl kullanılabileceklerine ilişkin öğretmen adaylarının görüşlerini analiz etmektir. Çalışmaya onbeş fen bilgisi öğretmen adayı katılmıştır. Çalışma kapsamında öğretmen adaylarına GoAnimate programı kullanılarak animasyon hazırlama süreci öğretilmiştir. Sonrasında öğrencilerden fen konularıyla ilişkilendirilmiş animasyon hazırlamaları beklenmiştir. Araştırma nitel

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durum çalışması yöntemiyle desenlenmiştir. Örneklem seçiminde ölçüt örneklem ve kolay ulaşılabilir örnekleme teknikleri kullanılmıştır. Görüşmeler bireysel olarak yüz yüze gerçekleştirilmiştir. Yarı yapılandırılmış görüşmeler için animasyon videoları hazırlama sürecine ve öğretmen adaylarının bu teknolojileri kullanım süreçlerine yönelik sorular yöneltilmiştir. Görüşmeler yaklaşık olarak 15 dakika sürmüştür. Verilerin analizinde betimsel analiz kullanılmıştır. Araştırmadan elde edilen bulgular incelendiğinde öğretmen adaylarının GoAnimate programı kullanılarak hazırlanan eğitsel animasyonların görsel olduğunu, ilgili çekici olduğunu ve öğrencilere feni sevdirebileceği yönünde görüş belirttikleri görülmüştür. Bununla birlikte öğretmen adayları GoAnimate kullanılarak eğitsel animasyon hazırlarken zorlandıkları ve hazırlanan eğitsel animasyonların her konuya uyarlamasının zor olabileceğini belirtmişlerdir. Ayrıca öğretmen adayları seviyeye uygun karakter olması yönünde animasyonların geliştirilmesine yönelik önerilerini dile getirmişlerdir. Araştırmanın sonuçlarına dayalı olarak fen eğitiminde görsel araçların kullanımına yönelik olarak öneriler geliştirilmiştir.

Anahtar Kelimeler: *Fen Bilgisi öğretmen adayları, animasyonlu video oluşturma, GoAnimate, fen eğitimi*

Introduction

It is undeniable that today's students are surrounded by and using computers, videogames, and all the other types of digital technologies (Horzum, 2011; Prensky, 2001a; 2001b). Learning activities that are parallel with the technology literacy skills are suggested as resulting higher learning outcomes and motivation (Conole & Alevizou, 2010). Web 2.0 technologies are only the most recent in a long line of tools used in education and to develop learning objects. Multimedia, video, and animation have existed for some time. All have been used to bring technology to education with the intent of improving learning. The number of Web 2.0 tools available are increasing and their collaborative and contribution-based nature offers various opportunities for the future of education (Bower, Hedberg & Kuswara, 2010). 21st century educators are required to utilize student-centred and interactive approaches in accordance with contemporary technologies.

In this context, Turkish Ministry of Education makes significant investments for the Project called "Movement of Enhancing Opportunities and Improving Technology", known as FATIH. Some aims of this project are to equip classrooms with wireless Internet, smart boards, and provide tablets to teachers and students. It is anticipated that these Technologies will be available in 40 thousand schools with 620 classrooms in 5 years (MEB, 2012). Development of required e-content for instruction is another aspect of FATIH project. This content includes educational materials such as e-books, animations, videos, presentations, educational games and so on.

Along with the recent improvements in technology; utilization of multimedia with voice, graphic, and text components and animations is increasing as well (Daşdemir & Doymuş, 2012). These new types of learning materials support improved learning through various rich teaching settings. Studies (Burke & Greenbowe, 1998; Kıyıcı & Yumuşak, 2005) specifically state the importance of information and communication technologies to enhance science teaching and learning. The abundance of sciencific concepts and principles makes science courses hard to understand for students (Taber, 2002). The main purpose of science courses is not making students memorize the definitions and formulas, instead it aims to improve critical and reflective thinking skills among students (Lind, 2005). It is suggested that teachers have a critical role to offer this effective teaching in schools through preparation of appropppriate learning environments (Kara & Özgün Koca, 2004). Güvercin (2010) suggests computer technologies among the most powerful educational materials.

One of the widely used computer-assisted multimedia environments is animation. Use of animations can have an important effect in teaching abstract or complex topics and can be more effective than

traditional teaching methods in terms of enhancing students' achievement (Aksoy, 2013; Pekdağ, 2010; Rohendi, 2012). There is a substantial body of literature on multimedia, video, and animation for some time and the main issue in most of them is integrating technology into education for the improvement of learning (Lerma, 2007; Rosado Feger & Thomas, 2011). When applied properly, animation presents information in a more intriguing and easier way to understand than static media (Ali & Madar, 2010; Dancy & Beichner, 2006; Madar & Hashim, 2011). The contributions of animations with audial and visual components to learning were summarized as: enhancing comprehension, increasing motivation, reinforcement of the material, recalling information, offerring more engaging learning environments, and providing timely feedback (Rieber, 1990a; 1990b; 1991; Rieber & Kini, 1991). Animations can have positive effects on learning, since they have a dynamic view and having the feature of simulating abstract events (Lewalter, 2003; Lowe, 2003).

Animation creation platforms usually have several procedures such as coding or detailed control on movements of objects or characters (Kourik, 2012). However, with current improvements in technology easier animation creation tools, like GoAnimate have been developed. The current technologies are more accessible and easy to use, which carries educational animations to a higher stage in instruction process. Animation creation offers alternative ways of learning through increased visualization and intercation. Particularly in science education, teaching with animations can increase the visual aspect of the materials and provide alternative ways of learning scientific concepts through simulating abstract concepts.

GoAnimate is one of the new generation of animation technologies. It is an online platform where users are allowed to create animations using themes that are equipped with backgrounds, characters and props that you can combine to make your animations; or users can start from scratch, select a background and drag and drop backgrounds, characters and props from the menus available on the side (Stratton, Julien and Schaffer, 2014). While some features are commercial, it also has a lot of features for free non-commercial use.

Perez (2011) suggests the following as the advantages of using GoAnimate: no download and installation is needed, the option of selecting the template, character features and adding your own scripts to the animation to create a rich animation video as a storytelling platform for self-expression and creativity. GoAnimate can be used as a tool to share researched information about specific topics, promotes creativity for students and educators while engaging in learning and teaching more, can be used as an alternative way of information presentation. It can be used in so many fun ways in the classroom and would be a great tool for learning.

It is suggested that faculties related to teacher education need to ensure preparing pre-service teachers to teach effectively incorporating ICT into their teaching and learning strategies (NPADC, 2001; Lim, Chai, & Churchill, 2010). As being one of the contemporary technologies, Xiao (2013) reports that animation in the classroom is becoming more and more popular in education from teachers to students. In our current study, pre-service science teachers created educational animations using GoAnimate about science subjects. According to Hoban (2007), when learners create animations to teach a subject, they concentrate on the subject more and a deeper understanding occurs. In this context, pre-service science teachers could be more engaged in the learning of science concepts, while at the same time they are preparing educational materials. Additionally, if they could share those materials with their peers, their engagement would be even higher. To be able to create animations, pre-service teachers need to demonsrate and reflect on their content knowledge, which encourages them to learn the content more deeply and critically. When we search the literature, we see a significant amount of studies on animations and their effects on learning (Daşdemir & Doymuş, 2012; Elmstrom Klenk, 2011; Iskander & Curtis, 2005; Santos, 2009). Most of those studies are at

primary or secondary education level and they are more about effects on student achievement. On the other hand, in the literature there is no example of qualitative research in which teachers' or pre-service teachers' opinions about animations have been examined. Teachers need animations to be used for the classroom teaching. Therefore, the process of animation preparation should be taught to pre-service teachers during their teacher education. In addition, within the scope of FATIH project, the Ministry of Education supports visual teaching-learning tools and the use of computers in classroom practice. This study is valuable in terms of teaching animation preparation process to pre-service teachers during their teacher education. A review of the literature reveals that there are no studies about preparation of educational animations associated with science topics using GoAnimate software. In addition, according to the studies related to animation are at theoretical level (Lowe, 2003; Pekdağ, 2010; Stratton, Julien, & Schaffer, 2014; Xiao, 2013). Studies on teachers (Genç, 2013) and pre-service teachers are expected to contribute to the field. Different than the reviewed literature, in our current study, we investigate pre-service science teachers' animation creation processes about 5th grade science and technology topics. Additionally, their opinions were analyzed about how the educational animations can be used in science classes.

This study aims to investigate the process of animated video creation by pre-service science teachers and analyze their opinions about how this technology can be used for science instruction. For this purpose, the following questions were addressed:

- What are the pre-service science teachers` opinions about the process of animated video creation using GoAnimate?
- What are the pre-service science teachers` opinions about pros and cons of using animated videos that were created using GoAnimate in science education?
- What are the pre-service science teachers` suggestions about using animated videos that were created using GoAnimate in science education?

Method

Research Model

This research is designed using qualitative phenomenology approach. Phenomenology is the discipline studying appearances of things, or things as they appear in our experience, or the ways we experience things, thus the meanings things have in our experience. Phenomenology deals with how people perceive a phenomenon, describe, memorize, evaluate and communicate it with other people (Patton, 2001). Sample of the study was selected using criterion sampling and easily accessible sampling methods.

Participants

In the academic year of 2013-2014, 15 sophomores who are studying at the Eskişehir Osmangazi University, Department of Science Education, were participated in this study. The main criterion for the selection of pre-service teachers was set as taking Computer II course. 8 (53, 3%) of the participants are women and 7 (%46, 6) of them are men.

Procedures

During the spring semester, first GoAnimate was introduced to pre-service science teachers through the lecture and demonstrations. They learned how to prepare animated videos using GoAnimation. They had a chance to create short animations about any topic of their interestion during the in-class

practice. Then, they were required to design an animation to engage pupils with scientific concepts as the final project. Students were required to prepare their animations related to their middle school science subjects. For the final project, students worked in groups of two or three. The following figures are the screenshots of two projects developed by pre-service teachers, so as you can acquire a quick view on what the tool may offer:

Figure 1. Sample GoAnimate Project

Figure 2. Sample GoAnimate Project

Data Collection Tools

A semi-structured interview, which was prepared by the researchers, was used to collect data. The interview consists of the questions related with the three research questions of the study. During the development of the semi-structured interview relevant literature has been reviewed. Two experts were consulted about the nine open-ended questions prepared by the researcher. The questions were rearranged in accordance with the opinion of the experts.

Data Collection

Interviews were conducted individually and face-to-face. During the interviews, 9 questions which were addressing the research questions of the study were asked to the participants. The first five question were related with the first research question, the sixth and seventh questions are related with the second research question, and the last two questions were related with the third research question. The duration of the interviews was around 15 minutes. During the interviews, voice recorder was used with written permission of the participant. During the interviews, situations that may influence pre-service teachers and that may affect data collection process negatively were avoided. For instance, directing participants about their response to the questions were avoided. Participants were provided an interview environment that is silent enough to help them talking comfortably. The participants were informed about the purpose, content of the study and the length of the interviews. The interviewee listened them objectively.

Data Analysis

Descriptive and content analysis methods were used for the data analysis. In phenomenology researches, data analysis is to uncover experience and meanings (Yıldırım and Şimşek, 2008). During the analysis, the collected data were coded and grouped under various themes. Data were reported by including direct quotations from opinions. In the study, a code was assigned to each pre-service teacher, which was used in direct quotations, so that participants' identities were kept confidential. At the end of analysis process, the two researchers examined the analysis that they made separately and obtained consensus about codes and themes. In order to ensure internal validity of the research, the perception of the pre-service science teacher about the process of animation preparation was defined using direct quotations and then they were interpreted. To ensure external validity, the methodology of the research was described in details. For the sake of the reliability, each researcher coded the data separately and independently. An overall comparison was performed, no statistical analysis was applied. At the end of the discussion about the incongruent codes, the researchers came to an aggreement. The levels of compliance in coding were close to each other.

Findings

In this part, the findings of the research is presented, supported by direct quotations from science teachers' opinions

Pre-service Sience Teachers' Opinions about the Process of Animated Video Creation Using Goanimate.

In this section, student responses to the first five (1, 2, 3, 4, 5) questions were analyzed. Interview questions are included in Appendix 1. Data obtained from the opinion of pre-service teachers were examined under opinion, experience, preparation steps, encountered difficulties, and individual and group work themes (Table 1).

Table 1
Animation Preparation Process

Theme	**Sub-theme**	**f**
Opinions	Being Visual	6
	Beneficial	5
	Increase the interest	4
	Enjoyable	3
	Facilitates understanding of the course	3
	Suitable	3
Experience	Realized	-
	Not realized	16
Preparation steps	Difficulties	9
	Vocalization	4
	Having fun	4
	Being in English	3
	Choose of characters	3
Difficulties	Asynchrony between sound and movement	5
	Being in English	4
	Selecting appropriate characters for the scenario	4
	Restricted with 30 second	3
	Voices of the characters	3
Individual and Group Work	Group work	10
	Individual work	5

In the opinions theme, pre-service teachers mostly stated that GoAnimate provided a visual representation. A participant (K-7) underlined the benefit of educational animations as "T*he use of animation is useful because there are experiments in science education. Since it is an animation, it is easier for the students to visualize them in their minds",* whereas another participant (K-2) stated his opinion as *"Since science education is a discipline that is better apprehended with experiments and observations, and educational animations appeal to the eye, I believe that students can understand more easily, I think instruction with educational animations will be enjoyable".* Another participant (K-3) stated his opinion as "*I think educational animations are very useful in science education, because visual intelligence is improved when students see something visually. It is more effective, easily remembered, concepts get more concrete".*

The opinion, which was mostly mentioned under opinions theme, is that educational animations are beneficial. A participant (K-9) shared his opinion as "*Educational use of animation includes contents which are useful for the education and training of individuals"* whereas another supportive opinion (K-8) was "*There is science in every area of life. I think it is important to show many of these kinds of animated movies to the students".*

Another opinion, which was mentioned under opinion theme, is that educational animations increase the interest. A participant (K-4) stated that "*It may have a positive effect to perform the education in a fun way.*

Other opinions, which were mentioned under opinion theme, are educational animations being enjoyable / funny, making contribution to the comprehension of the course and being suitable. A

participant (K-5) expressed his opinion as "*I think it is appropriate to use educational animations in science education. They should learn science by living it. They should be inside it. It is more enjoyable like this; with visual animations".* A participant (K-2) expressed his opinion about course becoming easier to understand as "*Students comprehend more easily"* whereas another one (K-16) stated that "*It is easier to learn with animations instead of memorizing".* Under suitability theme, a participant (K-16) expressed his opinion as "*I think educational animations are suitable for science education. It is not always scientific; it is more fun in terms of rising attention. It is easier to learn with animations instead of memorizing".* Some other sub-themes that were mentioned by the participants less frequently were popularizing the course and helping for permanent learning.

Under experience theme, all pre-service teachers stated that they did not have any experience about animation preparation before taking Computer II course. A participant (K-10) stated that *"I did not have similar experience before. I did not even know there were such software".*

Under preparation steps theme, pre-service teachers mostly stated that they encountered difficulties while preparing educational animations using GoAnimate software. A participant (K-3) shared his opinion as "*At the beginning I was having difficulty. We had difficulty in hearing while teacher was explaining. We learned to use the software partially"* whereas another participant (K-5) expressed himself as "*At the beginning, I had difficulty in creating a story. I wrote a long story. We shortened it a little while processing. But as a result it was nice".* The other opinions, which were mostly mentioned under preparation stages theme, are vocalization and having fun. About vocalization a participant (K-10) shared his opinion as *"Since we worked in group, it was hard to create the scenario. Themes, characters were limited. We changed the scenario three times. It was hard to connect. We had difficulties in vocalization and recording".* Participants expressed that they had difficulty to fit the voice to the character's movement while vocalizing (K-16). About having fun a participant (K-6) expressed his opinion as "*It was funny to prepare the animation. We recorded our voice while the animation was streaming. It was fun. It was hard to combine".*

Other opinions, which were mentioned under preparation step theme, are the software being in English, and having difficulties in character selection. A participant (K-7) stated the problems that he encountered with the following words: *"I didn't have any problem in selecting the personalities and characters. I had difficulties in the production and recording because it was in English. We spent a little more time at the thinking stage. I watched the cartoons created before. I didn't have any problem since the characters were fitting well to the topic that I would lecture".* About character selection a participant (K-9) said that "*First of all GoAnimate consists of visual elements. I started touching everything. Than I had some difficulties in the selection because when varieties increase, choosing is getting more complex. I had language problems and suffered during recording".* Other opinions that were mentioned less under preparation steps were: it was sometimes hard to choose or arranging movements of characters and recordings; time management issues; making changes for scenario creation was necessary, understanding the content of the software was important before background creation and matching the appropriate level.

Regarding individual and group work themes, it was found that pre-service teachers mostly preferred to work in groups. A participant (K-7) underlined the benefit of group work as "*We need different friends for vocalization"* whereas another participant (K-9) expressed his opinion as *"When working with groups, different opinions complement each other"* whereas another participant (K-16) stated that she prefered working individually. She said *"Individual because I don't think that group work would be fair. Two persons cannot sit on the same computer at the same time. Individual work after the formation of the scenario is preferable".* One participant expressed the opinion as both individual and group work might be useful.

Pre-Service Science Teachers' Opinions about Pros and Cons of Using Animated Videos That Were Created Using Goanimate in Science Education

In this section, students' responses to the sixth and seventh questions were analyzed. Data obtained from the opinion of pre-service teachers were examined under pros and cons and contributions themes (Table 2).

Table 2
Pros and Cons of Using Animated Videos in Science Education

Theme	**Sub-theme**	**f**
Pros and Cons	**Pros**	19
	Engaging	6
	Easy to understand	4
	Visual	3
	Easily remembered	3
	Cons	16
	Difficult to adapt to all topics	4
	Direct pupils to visual monitoring rather than studying	3
	Distracting	3
	Preparation takes too much time	3
Contributions	Creating love of science in children	6
	Concretization	5
	Increase the interest	4
	Easy to remember	3
	Visual	3

For the *pros and cons* theme, most of the pre-service teachers stated that they think these animated videos are engaging, but they have concerns about if these video would lead students to just watch to the movie instead of deeper understanding of the concept.

Under pros theme, most of the pre-service teachers emphasized that educational animations prepared by using GoAnimate software are engaging. A participant (K-6) stated that "*Pros are: it draws attention of children, and it contributes to the development of science."* whereas another participant (K-15) declared his opinion as "S*cience courses are very comprehensive ones. Students may become more active, we can increase their interest towards the course. Technical conditions may be unfavorable."* Another opinion (K-16) supporting this view is as following; "*I think it is appropriate and engaging. I don't think that it will draw much attention from 8th grades because they are at puberty.... Multiple animations can be created and combined. It may be used in drawing interest to the topics".* Another opinion, which was mostly mentioned under pros theme, is that educational animations are easy to understand. A participant (K-7) expressed his opinion as "It enables *students to understand the courses more easily. They come willingly."* Other opinions, which were mentioned under pros theme, are about educational animations being visual and easy to remember. The opinion of a participant (K-2) about being visual is as *"There is no laboratory in each class. Moreover, since we will lecture small grades, working in the laboratory may be dangerous. You cannot explain them all; showing is much more useful, in this way you can even show the kettle boil, they can understand more easily. First you can put the kettle on, than you can show it boiling. They were always lecturing us these topics verbally; it would not draw much attention. On the other hand if it is explained using GoAnimate it becomes easier to remember because it appeals the eye".* Other opinions that were mentioned least under pros theme are about educational animations being enjoyable / funny, useful and popularizing the course.

Under cons theme, the opinion, which was mostly mentioned, is the difficulty of adapting educational animations to every topic. A participant (K-8) expressed his opinion as "*Since the* s*cenes are limited for every science topic, it would be difficult to adapt"* whereas another (K-14) commented as "*If it was prepared incorrectly, without knowing the topic or it was too long or too short, it might not be beneficial.* Other opinion are directing pupils to watching rather than studying, distracting and preparation taking too much time. About directing pupils to watching rather than studying, a participant commented as "*It leads children to computers and televisions instead of studying".* About distracting, a participant (K-3) expressed his opinion as "*Movies may be distractive. You should not select characters that can be distracting".* About preparation taking too much time a teacher (K-7) said that "Too m*uch time is spent in preparing animations".* Other opinions that were mentioned under cons theme are: GoAnimate software requires pro membership and lack of understanding the software effects the animation creation process negatively.

Under contributions theme, pre-service teachers mostly emphasized that animations creates love of science in children. A participant (K-2) expressed his opinion as "*It may popularize science more among children"* whereas another participant (K-16) commented as "*I think the course can be appreciated more*". Other opinions, which were mostly mentioned under contributions theme, are the use of educational animations on science education will contribute to concentration and increasing students` interest. A participant (K-7) expressed his opinion as "*It will help to concretize"* whereas another participant (K-9) commented as "I*mages in science education can be concretized with this software".* Being easy to remember and visual are also among the mentioned opinions. The opinion of a participant (K-2) about being easy to remember is "*It is more memorable"* whereas another supporting opinion (K-13) is "*It enable them to learn more permanently".* About being visual a participant (K-1) commented as "*When children see something visually, it always remains in the mind"* whereas another opinion (K-4) sharing this view is "V*isual representation increase everyone's perception level".* The opinions that were mentioned less frequently under contributions theme are facilitating the lecture, effective time management, satisfying curiosity and being instructive.

Pre-service Science Teachers' Suggestions about the Usage of Animated Videos That Were Created Using GoAnimate in Science Education.

In this section, student responses to 8th and 9th questions were analyzed. Data obtained from the opinion of pre-service teachers were examined under grade level, topics, and suggestions for improvement themes (Table 3).

Table 3
Suggestions about Using Animated Videos in Science Education

Theme	**Sub-theme**	**f**
Grade Level	Secondary school	8
	Primary school	7
Topics	Physics	4
	Biology	4
Suggestions for improvement	Characters suitable with the levels	7
	Diversity in movements	5
	Training to teach the software	5
	Software being in Turkish instead of English	3
	Diversity in background	3
	Diversity in voices	3

Under grade level theme, most of the pre-service teachers stated that educational animations prepared by using GoAnimate software were suitable for secondary school level. A participant (K-4) expressed his view as *"More suitable for 5-6th grades. It will be more effective on 5-6th grades"* whereas another opinion (K-9) supported this view as "*It addresses to young children. It can be used at the first grade of secondary school"*. A participant (K-13) expressed his opinions in favor of primary schools as *"It can be used for 4-5th grades or less but it would be too simple for older students, such as 6th grades, it would not draw their attention"* another participant (K-15) stated that *"It is suitable for primary school, 1-2-3-4th grades"*. Only one participant *(*K-16) said that utilization of educational animations would be effective in all levels saying "*I think it can be used in high school, even in the university. It can be used most intensely for childhood and adolescence".*

Under topic theme, they stated that the animations were mostly suitable for physics topics. Participants expressed their opinions about physics and biology together. A participant (K-15) stated his opinion as *"It would be very helpful for the topics such as electricity, induction, weather, lightning, life sciences and nature"* whereas another supportive opinion (K-5) was *"Lovely animations can be prepared in biology and physics".* Other sub-themes of the topic theme were science education, English education, mathematics education, chemistry courses, verbal issues and topics related with the nature.

Under suggestions for improvement theme, most of the pre-service teachers expressed their opinion about characters being suitable with the levels. A participant (K-1) stated his opinion as "*Characters should be appropriate to each age level"*, whereas another participant (K-4) suggested as *"More characters can be added. Different positions may be included"*. Other opinions, which were frequently mentioned under suggestions for improvement theme, are diversity in movements and providing training to teach the software. About the diversity in movements a participant (K-6) commented as "*There are few individual movements. They should not include very silly characters"* whereas another supportive opinion (K-2) was *"They can allow people to move in more directions".* A participant (K-14) shared his opinion about providing training to teach the software as *"I saw this program at the university. If this program was taught to high school students, they may like it and investigate a topic more deeply, they would learn in more details. Thus, more research can be achieved. It will improve students` learning"* whereas another participant (K-15) expressed his opinion as *"More time should be allocated to this issue and an environments should be provided that students can learn it. More information about planning and the usage of animations should be provided".*

Other opinions, which were less frequently mentioned under suggestions for improvement theme, are software being in Turkish instead of English, having diversity in background and voices. A participant (K-16) stated his opinion about the software being in Turkish instead of English as: *"I have not heard about GoAnimate before. Users must obtain more information about this site. Since this site is in English, it would be nice to be explained by a dedicated person. We can improve by preparing different animations and choosing different scenarios. To make better animations, we need to better understand the site better".* The other opinion for suggestions for improvement theme was 30 seconds time restriction should be longer.

Discussion, Conclusion and Suggestions

This study is based on animations, which is one of the technological tools, and the opinion of pre-service science teachers about the use of educational animations, which were prepared with GoAnimate software, in science education have been examined. Results of the study are presented below.

The analysis of the data obtained from the opinions of pre-service teachers about animation preparation process using GoAnimate in science education showed that most of the pre-service teachers mentioned that the use of educational animation in science education is visual, they encountered difficulties while preparing animations using GoAnimate, they had no experience about animation preparation before attending Computer II course and they prefered working in group. The analysis of the data obtained from the opinions of pre-service teachers about pros and cons of using educational animations prepared with GoAnimate software in science education showed that most of the pre-service teachers mentioned that educational animations prepared using GoAnimate software were engaging and could popularize science among students. However, pre-service teachers also stated that the adaptation of educational animations prepared using GoAnimate software to all topics might be difficult. In a study conducted by Ayvacı, Abdüsselam and Abdüsselam (2012), it was observed that students from the test group had fun while watching animation supported cartoons, they did not get bored while acquiring the gains that they should learn; they developed positive behaviors toward science. The results of this study support the findings of the study conducted by Ayvacı, Abdüsselam and Abdüsselam (2012). In addition, the findings obtained from this study coincide with the results of other researches (Daşdemir and Doymuş, 2012; Karaçöp, 2010; Yakışan, Yel and Mutlu, 2013). Aşçı (2006) and Kaba (1992) in their studies mentioned that visual branches, such as cartoons and animations, draw easily the attention of students, moreover cartoons and animations possess the task of education in addition to entertaining, in their own internal structure. In addition they stated that, since cartoons may enhance the imagination of students, they will contribute to an increase in the desire to learn by converting the teaching process into a more enjoyable process. Hoban (2007) stated that animation preparation was quite attractive because students had fun while using digital technologies, in addition they need to know science to be able to explain in their animation, thus this process helps them to understand science topics.

The analysis of the data obtained from the suggestions of pre-service teachers about the usage of educational animations prepared with GoAnimate software in science education showed that most of the pre-service teachers mentioned that animations prepared using GoAnimate software were suitable for secondary school and physics course. As improvement suggestions, most of the pre-service teachers expressed their opinion about characters being suitable with the levels.

In line with the research findings, several suggestions were given. Pre-service science teachers expressed their opinions about the use of educational animation prepared using GoAnimate software was engaging and interesting, it might help to popularize science among pupils but it might be hard to prepare educational animation for each topic and it might be difficult to find suitable characters. Pre-service Science Teachers need classroom environments where they can implement the animated videos that they have prepared. Thus, Computer II course and material development and design courses should cooperate. Quantitative and qualitative studies can be conducted to evaluate the effectiveness of animated videos that was created by Pre-service Science Teachers. Pre-service Science Teachers should be encouraged to prepare and use animated videos in other courses as well. Teaching programs may offer elective courses featuring animated video creation. Within the scope of FATIH Project, in-service trainings about creation and use of animated videos can be given to teachers. Some features of GoAnimate should be improved, pre-service teachers should have training before using it, and Turkish version should be available for use. GoAnimate is not a software created for educational purposes. A software producing animations for educational purposes, supporting Turkish, can be developed.

As a result, this study is significant in terms of determining opinions of pre-service science teachers about the use of educational animations, which were prepared with GoAnimate software, in science education. Students interact with many visual learning tools in their daily lives. In this respect,

teachers are required to use visual learning tools in their courses, to draw students' attention. In this study, due to the particularity of the topic, data gathering tools were not diversified, only conducted interviews were used. Future researches may use more diversified data gathering tools and researches including pre-service teachers, students and teachers can be designed. Also experimental studies, evaluating the effectiveness of educational animations prepared by pre-service teachers can be conducted.

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GENİŞLETİLMİŞ ÖZ

Bugünün öğrencileri bilgisayarlar, video oyunları ve diğer pek çok dijital teknolojiyle kuşatılmıştır (Horzum, 2011; Prensky, 2001a; 2001b). Web 2.0 araçları öğretim materyali hazırlama amacıyla kullanılan güncel teknolojilerdendir. Multimedya araçları, video, animasyonlar önceleri de eğitimde kullanılan teknolojiler olsa da, son yıllardaki teknolojik gelişmelerle birlikte ses, grafik ve metin öğeleri olan bu teknolojilerin öğretim amaçlı kullanımı tekrar yaygınlaşmıştır (Daşdemir ve Doymuş, 2012). Bu araçlardan en yaygın kullanılanlardan biri de animasyonlardır. Soyut ve karmaşık konuların öğretiminde animasyon kullanımının geleneksel yöntemlere göre öğrenci başarısını artırmada daha etkili olduğu görülmüştür (Aksoy, 2013; Pekdağ, 2010; Rohendi, 2012). Teknolojinin sağladığı kolaylıklar ile üretilmiş eğitim içerikli animasyonlar eğitim sürecinde önemli görevler üstlenmektedir. Fen eğitiminde animasyon kullanımı görsel zenginliği ve etkileşimi artırarak konuların öğretilmesinde öğrencilere alternatif yollar sunmaktadır.

Yapılan çalışmalar bilgi ve iletişim teknolojilerinin özellikle fen öğretiminde katkı sağladığını savunmaktadır (Burke ve Greenbowe, 1998; Kıyıcı ve Yumuşak, 2005). Fen derslerinin çok kapsamlı olması öğrenciler tarafından öğrenilmesini zorlaştırmaktadır (Taber, 2002). Fen derslerindeki genel amaç öğrencilerin kavram ve formülleri ezberlemesi değil, öğrencilere eleştirel ve yansıtıcı düşünme becerilerini kazandırmaktır (Lind, 2005). Bu amaçla uygun öğrenme ortamlarının hazırlanmasında öğretmenler önemli rol oynar. Bilgisayar teknolojileri de etkili öğretim materyali hazırlamada önemli araçlardandır (Güvercin, 2010). Bununla birlikte öğretmen yetiştirme programlarının bilgi ve iletişim teknolojilerini etkili kullanmak amacıyla öğretmen adaylarına gerekli donanımı sağlaması gerekmektedir (NPADC, 2001; Lim, Chai ve Churchill, 2010).

Bu çalışmada fen öğretmen adayları güncel bir animasyon hazırlama programı olan GoAnimate programını kullanarak eğitim amaçlı animasyonlar hazırladılar. Hoban'a (2007) göre öğrenciler bir konuyu öğretmek amacıyla bir animasyon hazırladıklarında o konuya ilgileri artmaktadır ve konuyu derinlemesine kavramaktadırlar. Bu bağlamda öğretmen adayları öğretim materyali hazırlarken aynı anda fen konularını da öğrenmektedir. Bu nedenle öğretmenlik eğitimleri sırasında öğretmen adaylarına animasyon hazırlama sürecinin öğretilmesi gerekmektedir. Ayrıca FATİH projesi kapsamında MEB görsel öğrenme-öğretme araçlarını ve sınıf uygulamalarında bilgisayar kullanımını desteklemektedir. Öğretmenlik eğitimi sırasında öğretmen adaylarına animasyonların hazırlama sürecinin öğretilmesi açısından bu çalışma değerlidir. Öğretmen adaylarına GoAnimate programı kullanılarak eğitsel animasyon hazırlama ve sürece ilişkin deneyimlerinin ortaya çıkarılması açısından bu çalışma diğer çalışmalardan farklılık göstermektedir. Ayrıca literatür incelendiğinde animasyonlarla ilgili yapılan çalışmaların kuramsal boyutta olduğu göze çarpmaktadır (Rieber, 1990a; 1990b, 1991, Hoban, 2007, 2009). Öğretmen ve öğretmen adaylarıyla ilgili yapılan çalışmalar ve nitel çalışmalar sınırlı sayıdadır. Bu çalışmada öğretmen adaylarının animasyon videoları hazırlama sürecinin incelenmesi ve fen derslerinde bu teknolojinin nasıl kullanılabileceğine ilişkin görüşlerinin analiz edilmesi amaçlanmıştır.

Bu araştırma nitel olgubilim (fenomoloji) yaklaşımıyla desenlenmiştir. Örneklem seçiminde ölçüt örneklem ve kolay ulaşılabilir örnekleme teknikleri kullanılmıştır. Çalışmaya 2013-2014 eğitim öğretim yılında Eskişehir Osmangazi Üniversitesi Fen Bilgisi Öğretmenliği Anabilim dalında 2. Sınıfta öğrenim gören 15 öğretmen adayı katılmıştır. Araştırma grubunda yer alan öğretmen adaylarının 8'i (%53.3) kadın, 7'si (%46.6) erkektir. Bahar yarıyılında, öğretmen adaylarına öncelikle GoAnimate programı sunum ve uygulamalarla tanıtılmıştır. Daha sonra kendilerinin GoAnimate programını kullanarak animasyon videoları hazırlamaları istenmiştir. Öğretmen adayları sınıf uygulamaları sırasında kendi seçtikleri bir fen konusuyla ilgili kısa bir animasyon oluşturmuşlardır. Bu çalışmada verilerin toplanması amacıyla araştırmacılar tarafından geliştirilen yarı yapılandırılmış görüşme formu kullanılmıştır.

Görüşme formunda araştırmanın üç alt problemiyle ilgili sorular yer almıştır. Görüşmeler bireysel olarak yüz yüze gerçekleştirilmiştir. Görüşmelerde fen bilgisi öğretmen adaylarına animasyon videoları hazırlama sürecine ve öğretmen adaylarının bu teknolojileri kullanım süreçlerine yönelik olarak hazırlanan 9 soru yöneltilmiştir. Görüşmeler yaklaşık olarak 15 dakika sürmüştür. Görüşmelerde katılımcılardan izin alınarak ses kayıt cihazı kullanılmıştır. Verilerin analizinde içerik analizi yöntemi kullanılmıştır. Araştırmada elde edilen veriler analiz sürecinde kodlanmış ve amaçlara dayalı olarak temalar altında toplanmıştır. Veriler görüşlerden doğrudan alıntılara yer verilerek raporlaştırılmıştır. Araştırmada her bir öğretmen adayına bir kod ad verilmiş, raporlaştırmada görüşlerden doğrudan alıntılar yapılırken bunlar kullanılarak katılımcıların kimlikleri gizli tutulmuştur. Analiz süreci sonunda iki araştırmacı ayrı ayrı yapmış oldukları analizleri inceleyerek kod ve temalar üzerinde uyum sağlamışlardır.

Araştırmadan elde edilen bulgular incelendiğinde öğretmen adaylarının GoAnimate programı kullanılarak hazırlanan eğitsel animasyonların görsel olduğu, ilgili çekici olduğu ve öğrencilere fen dersini sevdirebileceği yönünde görüş belirttikleri görülmüştür. Bununla birlikte öğretmen adayları GoAnimate kullanılarak eğitsel animasyon hazırlarken zorlandıklarını ve hazırlanan eğitsel animasyonların her konuya uyarlamasının zor olabileceğini belirtmişlerdir. Ayrıca öğretmen adayları GoAnimate programında öğrenci seviyeye uygun karakter olması yönünde önerilerini dile getirmişlerdir. Araştırma sonuçları doğrultusunda çeşitli önerilere yer verilmiştir. Fen bilgisi öğretmen adayları GoAnimate programıyla hazırlanan eğitsel animasyonların fen eğitiminde kullanımının ilgi çekici olabileceği, öğrencilere fen dersini sevdirmeye yardımcı olabileceği, ancak her konuya uygun eğitsel animasyon hazırlamanın ve seviyeye uygun karakter bulmanın zor olabileceği yönünde görüşler bildirmişlerdir. Fen bilgisi öğretmen adaylarının hazırladıkları animasyonları kullanabilecekleri sınıf ortamlarına ihtiyaç vardır. Bu nedenle materyal geliştirme ve tasarımı dersiyle bilgisayar dersleri iş birliği içinde yürütülebilir. Fen bilgisi öğretmen adaylarının hazırladıkları animasyonların etkililiğini değerlendirmeye yönelik nicel ve nitel çalışmalar yapılabilir. Fen bilgisi öğretmen adaylarının diğer derslerde eğitsel animasyonları hazırlayıp kullanmaları sağlanmalıdır. Öğretmen yetiştirme programlarında eğitsel animasyonlara yönelik seçmeli dersler verilebilir. Fatih Projesi kapsamında da eğitsel animasyon hazırlamaya ve kullanmaya yönelik öğretmenlere hizmetiçi eğitimler verilebilir. Animasyon hazırlarken kullanılan GoAnimate programının içeriğinin geliştirilmesi, programının öğretmen adaylarına daha önceden tanıtılması ve programın Türkçe versiyonunun oluşturulması gerekmektedir. GoAnimate eğitim amaçlı hazırlanmış bir yazılım olmayıp, Türkçe destekli eğitim amaçlı animasyon hazırlamaya elverişli yazılımlar geliştirilebilir.

Appendix 1. The Interview Form

GOANİMATE PROGRAMIYLA HAZIRLANAN EĞİTSEL ANİMASYONLARIN KULLANIMINA YÖNELİK GÖRÜŞME FORMU

Yönerge: Fen Bilgisi öğretmen adaylarının fen eğitiminde GoAnimate programıyla hazırlanan eğitsel animasyonların kullanımına yönelik görüşlerini belirlemeye yönelik bir çalışma yapıyoruz. Bu konu ile ilgili fen bilgisi öğretmen adaylarıyla görüşmeler yapıyoruz. Görüşme yapmayı kabul ettiğiniz için çok teşekkür ederiz. Görüşmelerin ortalama 20 dakika gibi bir sürede gerçekleşeceğini düşünüyoruz. Lütfen, sizden elde edilen görüş ya da bilgilerin sadece bu araştırmada kullanılacağından ve başka kimseyle paylaşılmayacağından emin olunuz. Tekrar kıymetli vaktinizi ayırarak görüşlerinizi bizimle paylaşmayı kabul ettiğiniz için size teşekkür ederiz. Bir sorunuz yoksa görüşmeye başlamak isteriz.

Görüşülenlere İlişkin Demografik Bilgiler

1. Cinsiyetiniz:
2. Yaşınız:
3. Sınıf Düzeyiniz:
4. Bilgisayar I Dersi Geçme Notunuz:
5. Görüşme:
6. Tarih:…../……/2014

Görüşme Soruları

1. Fen Eğitiminde eğitsel animasyon kullanımına yönelik düşünceleriniz nelerdir?
2. Daha önce yani bu dersi almadan önce eğitsel animasyon hazırlama deneyiminiz oldu mu? Olduysa deneyimlerinizi paylaşır mısınız?
3. GoAnimate kullanarak animasyon hazırlama aşamalarındaki (senaryoyu oluşturma, sahneleri oluşturma, karakterleri seçme/canlandırma, seslendirme, kaydetme, paylaşma) deneyimlerini paylaşabilir misiniz?
4. Eğitsel animasyon hazırlama sürecinde karşılaştığınız güçlüklerden bahsedebilir misiniz? Zorlandığınız herhangi bir aşama oldu mu?
5. GoAnimate kullanarak animasyon hazırlarken bireysel çalışmayı mı, grup çalışmasını mı tercih edersiniz? Nedenlerini açıklar mısınız?
6. GoAnimate kullanarak hazırlanan eğitsel animasyonların Fen Eğitimi'nde kullanımının olumlu ve olumsuz yönleri hakkında neler düşünüyorsunuz?
7. GoAnimate kullanarak hazırlanan eğitsel animasyonların Fen Eğitimi'ne ne gibi katkılar sağlayacağını düşünüyorsunuz?
8. GoAnimate kullanarak hazırlanan eğitsel animasyonların hangi sınıf düzeyi ve hangi konular için kullanılabileceğini düşünüyorsunuz?
9. GoAnimate kullanarak hazırlanan eğitsel animasyonların kullanımının geliştirilmesine yönelik önerileriniz nelerdir?
10. Son olarak eklemek istediğiniz bir şey var mı?