The Slow-motion Technique in Science Teaching[1]

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Abstract

It is known that the usage of technological materials in science courses is beneficial for the learning process in education. According to Ekici and Ekici, 2011, a proper method and an efficient learning process should be created to get involved students to this process actively by using technological devices. Animation supported lessons can be shown as an example method of using technology in classes. This study consists of the meaning of the animation, using it in science teaching, upcoming of the slowmation technique, the steps and the studies about the slow-motion techniques. Moreover, features advantages and disadvantages of the technique are explained. Through the animation gives the objects dynamism, the teaching activities become more effective (Koç, Şimşek ve Has 2013). In particular, the use of animation methods for science courses which is in the majority of abstract concepts makes it quite clear learning for students (Daşdemir, 2006). According to Hoban (2005) animation preparation process can be expressed as planning, drafting, creation, rebuild. At the planning stage, the draft is created after necessary research on the subject. Music, sound and text or other kind of multimedia can be added creating the animation during the process. According to the literature, the advantages of a slowmation technique are; to develop students' skills, to make students active in the learning process, to be able to be used in every educational level, to make the science understandable, and to be able to prepared in a short time. The disadvantages of a slowmation technique are; to be expensive because of the need of technological devices such as camera, computer and tripod, the difficulty of practicing in crowded classrooms, students' inability to create ideas for sketches and models necessary for the process of creating animation (Ekici and Ekici, 2011). Although the first practices of slow-motion techniques in teaching may seem as compulsive or time consuming, more efficient results in terms of learning can be achieved after a few attempts if it is used properly. For this reason, the slow-motion technique can be recommended in science lessons for.

Key words:Animation, slowmation, science teaching, technology.

Introduction

The word of animation comes from French and can be expressed as providing the movement of objects (Ayas vd., 1997; Kolomuç, 2009). Animations are utilized as a method for making many complicated concepts more understandable with the help of adding many visual materials in succession and associations between these visual materials (Genç, 2013). Moreover, animations composed of motion of materials like pictures and graphs inform about how events and changes occur. It is essential to make enough investigations for determining effects of proper application of animations in education on the speed of learning (Daşdemir, 2006). Animations applied in an accordance with constructivist learning approach provide students to learn effectively in the process of schooling (Efe, 2015). According to Koç, Şimşek and Has (2013) animation can be identified as a way which provides existence of objects in computer environment. Application of animation in science education provides not only saving time but also safer test environments for some contents such as; mitosis, meiosis and the structure of atoms, which are difficult to demonstrate in a classroom environment.

Spreading the application of animations in education aims at providing better revival of scientific events in the mind, various perspectives into scientific cases and positive attitudes towards lectures. Therefore, educational goals can be accomplished easily (Daşdemir ve Doymuş, 2016). In today's world, technology has rapidly changed and that makes the adaptation of educational and training activities to developments of new technology essential. Thus training of teachers and students in conformity with these recent developments in technology will facilitate the improvement of society.

Animations should have obvious constructions, attach attentions of students, provide permanent learning of students and be applied in proper time during the process of learning for the effective learning of students. Especially, containing of audial stimulus in animations provides the effective learning for students (Mayer ve Anderson, 1991; Daşdemir, 2012). In the process of learning, students should have prior knowledge about subjects of animations which are used for meaningful learning of students. If pre-knowledge of students is ensured, the problem solving ability of students will be affected positively during learning period (Daşdemir, 2012).

Training teachers about creation of their animations themselves makes teachers more beneficial professionally (Genç, 2013). If not only teachers but also students at different grades could create animations that would improve the process of learning. Firstly, clay animation method was utilised for students to create animations in education. Since, nowadays the application of this method is very difficult for students, slow motion animation technique is advanced and applied.

The Purpose of Study

The purpose of study is discussing the meaning of animation, application of animations in science education; presenting emergence, stages of slow motion technique with touching on examples of researches; arguing the advantages and disadvantages of this method referring to its effects on science education.

Slowmation Animation

Slow motion animation technique was presented by Prof. Garry F. Hoban at Wollongong University in 2005. The concept of slowmation is a brief expression of "Slow Animation" (Hoban and Nielsen, 2010).

The Stages of Slowmation Animation Techniques

The stages of slow-motion animation in terms of scientific concepts consist of 7 steps

(Hoban, 2005)

    (1)   Planing/Researching/Teaching
In this stage, students can make investigation about the concept relating to subject or conceptual knowledge can be presented directly by teachers.
    (2)   Jigsaw
    The subjects are separated in sections with considering features of the subject and students are divided into groups. The sections are completed with the unity of groups.
    (3)   Storytelling
    Each group makes plans about the subject. When it is necessary, which music, story and signal will be determined in this stage.
    (4)   Designing a Model and Taking Photo
    It is more appropriate to make model on pasteboards. Digital camera is mounted on a tripod and the photos are taken for each step.
    (5)   Downloading the photo in computer
    In this stage, transmission of photos is provided into computer.
    (6)   Develop and Organise

    Adding music, comments, voices to an animation created by an animation programme can be done in this stgae. The programmes, such as; SAM Animation, İMovie, Windows Movie Maker, Windows Live Movie Maker and QuickTime Pro can be used for creating animation with slow-motion animation technique. For learning details about usage of these programmes in the process of creating an animation, the website of Hoban (http://www.slowmation.com) can be visited. Instead of these programmes, Scratch programme can be utilized for students to create animations. In Turkey, Scratch programme which provides students to add music, voice, text and photo, and convert them into animation is illustrated in the schools.
    (7)   Presentation
    In this final stage, completed animations are presented in the class.

Advantages of Slowmation Animation Technique

- It is easy to create slow-motion animation.
- It provides active learning process of students.
- It is applicable to all grade levels.
- It motivates students in science class.
- It improves knowledge of students in subjects.
- It is visual and enjoyable.
- It develops abilities of students.

• It is effective in communication (Hoban, 2005; Hoban & Ferry, 2006; Hoban & Nielsen, 2010; Akt: Ekici, 2011, s. 4).

Disadvantages of Slowmation Animation Technique

• Technological tools such as stabilizer, digital cameras, and computers are required for creating animation. So these gadgets may require some cost.
• Creating animation may take some time
• If students are not efficient and active, slowmation animation technique will hinder success of students. (Hoban, 2005; Hoban & Ferry, 2006; Ekici, 2011, s. 4).

Researches About Slow Motion Animation

In the study of Hoban and Ferry (2006) about teaching scientific concepts with slowmation technique in the university, thirty candidate teachers created an animation about the life cycle of frogs. Firstly, students were divided into groups in order to planning about preparing the stages of a frog's life cycle. After students were divided into groups, an expert about the context took the role of background designer for making scientific explanations. Students designed models related to stages of life cycle of a frog in 20-40 steps. They took photos of models with the help of a tripod. These photos were transmitted to computer and converted into an animation with Quicktime programme. Some texts, voice and music were added to the animation. Each stage of a frog's life cycle was gathered like a puzzle and the animation was presented in the class. As result of this study, slow-motion animation technique is a simple and remarkable way for students in order to learning scientific concepts.

Hoban and Nielsen (2010) made investigation for encouraging a new learning method of scientific concepts. Students created an animation about the germination of seed and the process of getting seed with designing models. It was observed that students thought deeply about scientific concepts in the process of creating animation with slow motion technique in this study and it was represented that application of this method in other areas could prove the effectiveness of this method.

In the study of Keast, Cooper, Berry, Loughran, and Hoban, G. (2010), trainee teachers introduced slow motion animation to students in the course of general science teaching during their school internship. Then, trainee teachers discussed about effects of the animations which students created on their learning process. As a result of the study, the effects of animations on abilities in computer, creative writing, group working and abilities in researching of both teachers and students were observed.

55 participants created 15 animations in the study of Kidman, Keast and Cooper (2012), that aimed to reveal conceptual changes with slowmation animation technique. Trainee teachers could have opportunities to comprehend deeply about scientific knowledge; improve their pedagogical learning; discuss, argue, think and reflect about scientific facts in consequence of the study.

Researches About Slowmation Animation Tecniques in Turkey

In the study of Ekici and Ekici (2011), the slowmation animation technique was introduced advantages and disadvantages of this method were mentioned. Nowadays

educational technology has rapidly improved and this investigation was made due to feasible contributions of using slowmation animation techniques. It was represented that this technique engaged learning thanks to animations made by students as a result of their studies about the topic.

Slowmation animation technique contributed students to learn topics of science in three ways:

(1) Researching about designing models related to topics with dividing scientific concepts into portions.
(2) To be able to think about each step for better representation of designed models in order to photo shooting in details
(3) The knowledge learned could be represented by many ways like editing, reviving and preparing (Hoban, 2007; Ekici, 2011).

In the study of Çamloğlu (2014), the unities of "Electricity in the Life", "Earth, Sun and Moon" and " Discovering the Planet of Livings" were mentioned to the control groups of the study in accordance with the curriculum of Science Education in 2005. In the stage of exploration, the control group made animations about the topic, they had already studied ,with using the slowmation animation techniques. In the process of creating animations, the missions of scripting, being a speaker and taking photos were accomplished by the students. When results of data from interviews were analyzed, people thought that slowmation animation technique gave rise to better learning of students, increasing in participation of students, rising motivation, enjoyable learning, strong belief of being able to success. On the other hand, difficulties of being inexperienced for the first time, some problems in audio system, the difficulties in taking photos and scripting were determined as some troubles of students in terms of the application of this techniques in subjects. As a result, although they had some troubles for first unit, they liked the application of this technique. They were willing to apply this method in other units and they applied entertainingly with group working so, it was accomplished to provide positive attitudes of students toward science education.

In the study of Uzun and Karaman (2015), the participants were science teachers who have students at 3rd grades. There were five volunteer students in the study. It was provided that students had some pre-knowledge about the topic with showing some examples formed by slowmation animation technique before the application of this method. Students created their animations with following five steps, creating background, creating draft with pictures, designing a model, taking digital photo and animation. Consequently, according to expressions of students in interviews, the advantages of this study were learning of students by experiences, providing participation of students, learning entertainingly, making subjects more clear, making possible to produce some goods with simple materials for every student. Eventually, students thought that the disadvantages of the study were the difficulty in applications of this method due to crowded classroom and taking considerably time.

Conclusions and Recommendations

Eventually, the permanent learning and increasing in participations of students can be provided in the process of learning and teaching thanks to the application of slow-motion animation techniques. Since animations can address visual and audial senses, they can be used as an effective method for permanent learning (Daşdemir, 2006). It can be provided students

to learn the scientific process with step by step playing. Gaining a movement to stationary models makes the process of learning enjoyable. In this process, this technique brings some abilities such as planning, analyzing, designing (Hoban, 2005). It is predicted that making application of this technique in science education widespread will be useful.

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