ABSTRACT

One of the reconsidered topics in the field of teaching technologies in the recent years is “Virtual Reality” due to the opportunities the developing technology provides. Virtual Reality is one of the most important developments of the 90s. Virtual reality changed the perspectives of people even when it was in its gestation while also finding its place in the popular culture. What it can do and how it can be used are important. The first virtual reality application begun at NASA and the exercises showed that this special technology can be used in different fields and the learning regarding the field can be realized using this tool.

Development of virtual reality applications and discovering the materials to be used in the learning-teaching processes required long-term and high-cost studies. The fact that preparing the simulations on a computer in order to support the learners’ learning through the virtual reality experience taking a long time and being high-cost is considered to be one of the most important factors in preventing the spread of virtual reality in education. On the other hand, the produced simulations not being able to give the feeling of reality at the expected levels can be addressed as another issue.

The possibility of developing virtual reality applications via the transfer of real environments into digital environments has increased throughout the recent years due to the new 360-degree photo and video techniques. Thus it is now possible to create virtual reality applications and educational products easier and more practically with a lower cost and without the requirement of long time periods. The individuals can experience environments they have never experienced before with the help of this technology which is based on recording the real environment in 360 degrees and watching it with appropriate equipment. The users can have this experience via tablets, monitors, goggles or even wearable technology without facing any danger even in disadvantageous environments. The recorded videos can be brought into the classroom environment especially with the help of low-cost solutions such as Google Cardboard and it can bring many advantages in terms of benefiting from the out-of-school learning environments productively.

The purpose of this study is to conduct a literature review on how to create and use 360 degree videos in education as a tool of virtual reality and contribute to the researchers who will conduct studies in the related field.

KEYWORDS: Virtual Reality, 360-degree video

INTRODUCTION

Everything starts with imagination. We can say that this is the secret that lies beneath most of our achievements. In fact, it would not be wrong to say that there is imagination behind a lot of the innovations in the technology field. It is possible to see the examples of it most prominently in novels and stories which have been written. The concept of “Virtual Reality” is one of the examples of it.

We initially came across the concept of virtual reality which has become one of the most important
agendas of today’s technology market also in stories. “The Veldt”, a story which was written by the famous British author Ray Bradbury, is about an African family away from their country. To fulfill the children’s longing for African moors, they established a system in their room that could be felt by all of the sense organs such as visual, audial and olfactory (Oppenheim, 1993). This description is equal to today’s concept of visual reality.

The concept of Virtual Reality which has firstly started in 1980s can be described as a three-dimensional environment in which real environments are simulated in digital environment that provides user interaction by appealing to individuals’ sensory organs, affecting emotions of suspicion, curiosity and astonishment; and creates the illusion that something which actually does not exist, exists by directing the senses (Miller, 2014, Kuruüzümçü, 2007, Kurbanoğlu, 1996).

**Virtual Reality in Education**

**360-degree Videos as Virtual Reality Applications**

Since the emergence of virtual reality applications, its use in education field that is generally high in educational costs, the applications which use simulation and necessary interactive objects in digital environment draw the attention. It is also a fact that virtual reality and related teaching contents of primary-elementary-high school and even university students have not become popular. One of the most basic reasons of this is because virtual reality technologies are very expensive and simulation is needed to actualize the contents of virtual reality (Andolsek, 1995). Production of simulations close to reality both take time and cost too much (Merchant, Goetz, Cifuentes, Keeny-Kenncutt, Davis, 2014).

In recent years, global technology giants have expedited their works on virtual reality. Especially with Google’s virtual reality glasses called Cardboard which individuals can make by themselves, it is possible to experience virtual reality. Besides, other technology firms have started adding virtual reality equipment to their products. Thanks to this, the technology which individuals need in order to experience virtual reality has gradually become popular and cheap.

On the other hand, 360-degree video recording technologies has become an alternative to simulation which is preferred to create virtual reality. 360-degree videos are the ones which are created by shooting an environment with multiple, specially designed cameras and bringing those footage together with some techniques. In order for these videos to be displayed on screens, compatible video players are needed. To gain a virtual reality experience with 360-degree videos, a video player that divides the screen in half in accordance with virtual reality glasses and virtual reality glasses are needed.

Production of 360-degree videos has become easier with the new video camera technologies. The purpose of this study is to show the steps to produce these contents to teachers who want to prepare virtual reality contents with 360-degree videos and draw attention to the areas of usage in educational processes.
360-degree Video Production

The basic principle of 360° videos which increase in popularity today is to, unlike one point-perspective videos, create more effects and make the individuals experience virtual reality with small movements in a single view. In order to make a good 360° video that catches the reality we want to present to the individuals, cameras which can shoot videos in high resolution are needed. In today’s technology market, there is not yet a camera which can record 360° videos on single lens. 360° video shooting can be either done with a single camera with at least two lenses which can see all angles or with at least two or more cameras which possess generally the same features. 360° video can be produced by shooting simultaneously with cameras that are specially designed to take all of the 360° angle and then bringing those footages together on computer.

The Equipment Used

The most important technical material in order for 360° video shoot to be made is high resolution cameras. While 360° videos can be made with two cameras; if the resolution is desired to be high, number of cameras should be increased. For instance, if you want to get a 360° video at 4k resolution, you should shoot with a structure made up of at least six cameras. As the number of the cameras increases, resolution will be higher because of the narrow angle that every camera takes. Including the equipment used in normal video shoots, another important technical material of 360° video shooting system is the structure which keeps the cameras that will record simultaneously together. This structure which positions every camera systematically to complete 360° angle is called Rig. Rigs can be bought on the market as ready-made as well as specially designed in cases that cameras that require high performance are expensive, multiple numbers of cameras will be used or that it requires at least two, three, four or more camera slots according to the quality desired in the recording.
In addition to cameras and Rig, a remote control which connects to the cameras via Wi-Fi and enables them to start shooting simultaneously is important technical equipment. The ones other than this equipment are made up of materials that are used in regular video recordings. This equipment are Tripod, an extra voice recorder, if you want a voice recording other than the one in the cameras, power cable for each camera to charge the cameras and multi plug to be able charge multiple cameras.

360° video performances are done firstly in the field of virtual reality, in the advertisements of touristic places that serve in various areas, to increase visual interaction in education and to provide real world experiences via virtual world to the individuals who cannot reach it in real life. 360° video shooting program is planned according to the type of service. Shooting map is planned with attention to footage length, camera angles and interaction in shooting. After placing the Rig holding the cameras on Tripod, adjusting the same resolution on each camera and arranging the necessary Tripod height and angles; 360° video shoot begins. There are two ways to synchronize the videos while combining them. These are the options of synchronization with voice and image. In order for the videos to be combined simultaneously, all of the cameras should be given an audial or visual alert. For example, this alert may be a loud clapping or moving the camera Rig. The shooting is completed by doing these actions in order and to turn the recording into a 360° video, it needs to be transferred into computer and edited. While the videos can be transported into the computer one by one; all the large videos can be transferred at the same time and more easily with multiple USB port. After the videos are uploaded on the
computer, they are transferred onto 360° video editing program. Firstly, one of the synchronization options mentioned above (Visual or audial) is selected and the procedure continues. When it is confirmed that videos are synchronized, the 360° video is played in its rawest form on the panel. While it is possible to get the 360° video in this combined form; it is also possible to get it after editing the videos to be higher quality with better punctuation marks, color and tone.

**The Last Form and Publication of the 360° Video**

The last output of the shooting is received with Render procedure, after the editing and quality setting are done. This output is in mp4 format. The 360° video that has been prepared cannot be displayed in 360° if it is played on conventional video players. Therefore, the computers or other devices to watch the video should have 360° video players installed. The firms which produce 360° video processing programs also offer free 360° video players beside the programs. These video players can be installed on computers, as well as mobile devices such as smartphones and tablet computers. Firstly YouTube (in 2015), and then Facebook (in 2016) have started to support 360° videos. When users upload 360° videos on these social networks, the videos are detected automatically and do not need any add-ons to watch and share in 360°. Besides, users can watch 360° videos and experience wandering in virtual world by adding their mobile phones that support 360° videos on virtual reality glasses.

**360-degree Video Usage in Education**

One of the most important advantages that virtual reality applications can offer may be said to be the advantage of examining places which exist in the real world but the students do not have the means to examine and discover. Therefore, in the classes which use out-of-school education effectively virtual reality can contribute greatly and provide equality in education. In a lot of the education programs which students will take during their education lives, it is advised that education activities to be done by visiting out-of-the-school education environments such as science centers, museums, planetariums, camps, national parks, zoos/arboretums, aquariums and industrial enterprises. It can be said that these visits which can be done on a lot of grades and are needed on almost all branches have lots of limitations. For this reason, virtual reality contents prepared with 360-degree videos can be done easily as well as eliminate the deficiency in this area.

“Education through Museums” is also crucial as out-of-the-school education environments. Instructions and activities on how to make use of museums are provided in education programs. Museums can be said to be suitable environments for actualizing the principle of learning through experience. As learning through experience and observation will happen in museums in education process, the information will be more permanent and students’ motivation towards the lesson will be higher (Akengin, 2011). 360-degree videos of museums can be easily prepared...
with sound recording appropriate for the education program, without needing any simulation and can be used in teaching processes.

One of the most important limitations of virtual reality contents prepared with 360-degree videos is the limited user interaction compared to other virtual reality contents. While it is possible to create user interaction through wearable technology, joysticks, keyboards, etc. in simulations; it is on a limited level for now in 360-degree videos.


