The Subject of Arts Education through the Use of New Technologies. The Case of the Virtual Museum

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The wide dissemination of technology in museums is gradually establishing the need for a critical validation of its use in the process of sustaining the learning process. This paper examines the results of the use of a Virtual Reality application with the aim of teaching the subject of Arts Education to the pupils of the Fifth grade of Primary school. The objective of this action is to study the combination of Virtual Reality with Arts Education, so as to cast the latter more interesting and appealing to the students. Some individual aims are to investigate the attitudes and the views of students on the introduction of New Technologies to the Primary school curriculum, to examine the way through which technology is utilized in activities related to museums and, finally, to augment the interest and the participation of the students in the subject of Arts Education.

Introduction

Through the school subject of Arts Education, pupils undoubtedly learn how to work, evaluate their classmates' work, freely express their views to others, describe the work of art they have created and support its value in public. However, the field of Arts Education in Primary Education is yet to be fully explored and it is unfortunately taught very infrequently. Most of the time, during Arts Education class periods, tutors teach other core subjects, such as Greek or Mathematics. The lack of Art, History and Art and Cultural History course books adjusted to the needs of Primary Education also constitutes a significant drawback.

On the other hand, new media technologies are gradually being incorporated into the educational process. Despite the rapid spread of technology in various areas of our everyday life, educators are reportedly worried and hesitant with regards to the application of new technological achievements in educational school practices. They are, therefore, attached to the conventional ways of learning and fail to exploit technological advances. Consequently, the use of Virtual Reality for educational purposes is another new and unexplored area in most primary schools.

Nevertheless, Virtual Reality includes many aspects it brings together in a plethora of features and possibilities, which can be used and defined independently or in combination with one another. In the 1970s the term Artificial Reality emerged and was then followed by the term Cybernetics and the term Virtual Reality later on.

The founder of VPL Research (Virtual Programming Languages Research) J. Lanier was the first to define virtual reality: "*Virtual reality is defined as a three-dimensional computer-generated interactive space, in which one can be immersed*" (Kokotos, 2007). Thus, according to Lanier, it is a method in which the user visualises and processes complex data, as they interact with a computer. Later, the following definition has developed (Manetta & Blade, 1995) "*a computer system which is used to create virtual worlds in which the user has the impression of their own existence in them and they additionally have the ability to navigate them and use their objects*". In the dawn of the 21ˢᵗ century, it became defined as "*a medium composed of interactive computer simulations that sense the participant's position and actions and replace or augment the feedback to one or more senses, giving the feeling of being mentally immersed or present in the simulation*". (Sherman & Craig, 2003)

Virtual Museums

The creation of virtual museums is important for visitors, curators, and managers of exhibit halls. First and foremost, the lack of space forms one of the main reasons that has led to the growth of virtual museums and virtual tours. For the most part, museums have limited space and small halls, and as a result, most of them display only a small number of their exhibits. Consequently, the exhibits can be easily shown to the public through virtual tours and presentations either inside the museum or on its website (Skamantzari, 2015).

Virtual museums provide the visitor with the complete control of their tour. Such applications include a three-dimensional projection of the space as well as a map of the floors and the rooms of the museum, facilitating the movement and the orientation of the user. The visitor is free to explore, to move independently in the space and to create their own virtual tour through select pathways, according to their needs and desires. Therefore, digital media expand the boundaries of human thought and memory by helping the student to form and maintain their personal course of learning (Sylaiou, Liarokapis, Kotsakis, Patias, 2009). Most virtual museums have been designed under special principles and specifications, in order to facilitate learning through constructive, interactive activities and educational games.

Art can, therefore, function on different levels, other than the level of emotions. One of its most central strengths is its property to incorporate memories, knowledge, as well as the human self-realisation as integral parts of understanding. The museum can contribute to the aforementioned creative process by leading the visitor through their experiences, which derive from the objects of art, their personal fulfillment. The concept of sensori-emotional participation with the help of specific methods of organizing exhibitions can revitalize the sensori-emotional experience and contribute to retrieving the creative function of art inside the human civilization. Museums can turn into environments that broaden conscience and augment one's receptive skills. "Esthetics and technology, when adopted consciously as guidelines, can transform a museum and turn it into a place that broadens the aesthetic horizons of humans" (Mastroyanni, 2012).

Open Simulator

The OpenSimulator program is a free platform for the creation and management of three-dimensional spaces. It was first run in 2007 by Darren Guard. It is a fast-developing program whose number of programmers is increasing, and its users community is also developing because every one of them has the opportunity to install a virtual world on their computer, without costs or limits (size, number of items).

On the other hand, there is Second Life, which differs significantly from OpenSimulator. This is a project which started in 2002 by Philip Rosedale, the founder of the Linden Lab company, and it is a free computer program in which the users can interact with a virtual world or other users through their avatar. This virtual world is based on a wide range of servers, the GRID. The world is divided into zones called Regions. Each Region is served by a server. Second Life has its own economy and currency, the Linden dollar (L$). With a monthly 10-dollar subscription fee an avatar is considered a permanent resident of a virtual country and receives a monthly allowance of 40 lindens.

Virtual Reality and Education

Virtual Reality can be defined as a three-dimensional space that provides a strong degree of interaction with the user. Faithfulness in representation is not as important a factor in understanding concepts, ideas, and processes, and for educational applications, the low cost involved is significant. There is however, a lack of pedagogical support for the design of educational virtual environments, as well as evaluation criteria. Virtual Reality technology appears to be a powerful educational tool for supporting the teaching process mainly because of the following options: Exploring existing objects and spaces that are not accessible by students. Furthermore, studies real objects that can't be understood differently because of their size, location or properties. Finally, the user interacts with real people in distant natural places or imaginary places in real or non-real ways.

Methodology

The study occurred in a public primary school (3rd Primary school of Messolonghi) and was carried out within the school curriculum and during the ICT class period for one month (four [4] days once [1] a week). The target groups of the action were 10-11-year old students and the title of the educational scenario was "*The Modern Sculpture of Larion of Tatlin, Pevsner and Gabo"*, while the learning areas concerned Arts Education and ICT.

For the realization of the research plan there was one questionnaire distributed to 26 Primary school students. The basic categories of the of the questionnaires were: the knowledge of students regarding any issues related to the use of New Technologies, their relationship with New Technologies, the connection of New Technologies with education and also their familiarity with virtual museums. The distribution of the questionnaires happened in September 2016. On average, they needed almost ten minutes to complete the questionnaire. The completion of the questionnaires was conducted during the school curriculum. The tool of editing and analyzing the research data and the tool of presenting the findings was the SPSS software, which helped extract accurate results out of the questionnaires. Then, Microsoft Excel was used to create "pie charts" for every question that could be implemented so as to depict in chart form the result of each question.

Conversely, the experiment conducted with the OpenSimulator was applied in the Fifth grade of a pubic primary school. The experiment was conducted in October 2016. On average, the time needed for a virtual tour had been set to 20 minutes. Twelve (12) students were involved, 6 boys and 6 girls, from both Fifth grade classes. Finally, the CamStudio application of RenderSoft was used to record the virtual museum in video.

Aims and Objectives of the Research

This paper belongs to a considerably wider and more ambitious research project which aims at probing the use of New Technologies by Primary Education students both in their daily and their school life. The target of the research is to combine Virtual Reality, on the one hand, with Arts Education, on the other, and, thus, to assess whether the use of the Virtual Reality program results in raising the interest of students in studying the Arts Education subject.

The objectives set for this research were:

Cognitive:
- The students can learn about the beneficial contribution of PCs to schooling.
- The attitudes and the views of students on the issue of introducing New
- Technologies to the Primary school curriculum can be investigated.
- The way through which technology is utilized in activities related to museums and cultural centres can be examined.
- The students can be taught how to work in teams.

Learning:
- The students can be taught how to use a PC.
- The students can be taught how to cooperate with each other.

Behavioural:
- The interest and the participation of the students in the subject of Arts Education can be augmented.
- The students can be taught how to follow instructions.
- The students can be taught how to use a PC in combination with school subjects.

Research sample

The first action taken during the sampling process focused on setting the scope of population of the research. Thus, the 26 students of the Fifth grade of Primary School of the town of Messolonghi comprised the reference reporting population. All of them participated in the administering of the questionnaires while 12 students in total – 6 boys and 6 girls from both classes – participated in the experiment of the Virtual Tour. According to the answers extracted from the questionnaires of the students, more boys answered (54%) compared to the girls, who reached an answering rate of 46%.

Results

A number of typical answers from the questionnaires of the students are provided below. To the question whether the students themselves own a PC, tablet or other electronic device, 96% of them have replied positively, whereas only 4% of the replies has been negative. Also, with regards to whether they use a PC for the studying of their school subjects or for their personal entertainment, 58% of the students responded that they use it for personal entertainment and the remaining 42% for the studying of their school subjects. When the students were asked whether they had a social media account, 77% of the answers were positive and 23% negative. Subsequently, when they were asked whether they use New Technologies at school, 58% of both the students and the teachers responded positively, while 42% of the responses were negative.

Discussion

As far as the accounts of similar research activities in Greece are concerned, few surveys have been recorded, Fokides, Tsolakidis, Vratsalis & Zouboula (2008) discuss the evolution of a Virtual Reality museum. The virtual museum which was developed introduced the Byzantine Museum of Rhodes and the study was condcuted on a sample of 40 Primary school students (20 Fifth grade students and 20 Sixth grade students).

Virtual Reality (VR) was defined as the interaction within a three-dimensional space. This space may simulate real or unreal situations. The main characteristic which is sought after is to have the user act like in a real world situation. The virtual reality

systems were classified into three categories: 1) Desktop VR, which provide a window to the virtual world, 2) Dextrous VR, which show through the mirror virtual objects in front of the user who handles as in the case of virtual surgeries, 3) the immersion systems (Immersive VR), wherein the user is cut off from reality with the use of peripheral devices such as stereoscopic helmets etc.

Regarding the features of Virtual Reality technologies that contribute to their application in the educational process, the strong interaction with virtual objects, the direct response of the system to the user actions and the freedom inside the virtual worlds have been three of them. In particular, interaction outweighs the realistic depiction of objects. Last, the freedom of navigation is especially important since many cognitive activities derive form kinesthetic actions.

On the subject of searching for pedagogical and psychological approaches in the Virtual Reality technologies to sustain the educational practice, empirical studies show the way to constructivism. The work produced by a group of students in a collaborative environment, in which the users act in a common virtual world, constitutes a positive element.

There is fear when it comes to the views of the educators on the possibility of using Virtual Reality systems. The phenomenon is general and concerns all of the Information and Communication Technologies. However, empirical studies prove that the fear recedes after the educators come in contact with these technologies for the first time thanks to the ease of learning and using them. Then again, the students believed that new technologies have to be present in schools and be utilized along with other subjects. They also contend that the virtual museum is a tool whose means of utilization can be tested in the school curriculum.

Conclusions

New technologies and learning in museums and cultural centres are linked to a series of studies attempting to record the efforts of utilizing virtual technologies that sustain learning. In addition, studies have been conducted concerning issues of learning via educational museum websites (namely Schaller et al, 2009) and utilizing virtual reality in museums and cultural centres (for example, Economou & Pujol Tost, 2008). These surveys cross on the fact that both of them focus on the description of the technology used and the characteristics of the learning experience, but they do not aspire to analyze how the technology is used, what type of activities it is used in, and which its role in supporting learning is. In this action, the students managed to utilize new technologies in the educational process and to design the shapes in the virtual world themselves.

The data from the research tools analysed have revealed remarkable results regarding the interest of the students in the new technologies. The central question is whether the students know how to use a PC and if they use it for their school projects, too. Overall, the statistical analysis of the results of the questionnaires and the final assessment via the experiment has demonstrated that the use of the Virtual Reality software enhances

creativity and learning and renders the procedure more amusing for the students. This can be explained by the faculty of three-dimensional spaces to ensure that the users feel present there (Mikropoulos, 1995); to let students become involved in activities that promote active experimentation, the solving of challenging situations, decision making and the nurturing of critical and creative thinking; to encourage students express themselves in their own way and in collaboration with others; to build up their knowledge on their own through links and associations (Yakoumatou, 2008).

Additionally, results indicated an expanded attitudes and opinions of educators on the subject of the integration of new technologies in the curriculum of primary school and provided ideas for future similar activities in classroom. In the beginning, it was found that fears about the possibility of using Virtual Reality systems existed, but this was within more general concerns about all new technologies. But then, it seemed that this fear was eliminated after first contact with the educational program. Kainourgiaki (2008) mentions that *"the visitors of virtual museums should be able to seek information on the exhibits. This requires skills and knowledge of the computers. This means that the computer illiterate immediately excluded from the process."* Thus, constant updating and training of the educators with regard to the use of new technologies in the school process was required.

Finally, there was discussion and evaluation of student actions through dialogue both between students and with teachers of the classes. They discussed the role of new technologies, the training that both teachers and students have with them and reported the positive elements that students gained through this action. According to Livathinos & Moraitis (1998) within the culture of dialogue in the course, students learn to think in their own way, to respect the opinions of his/her classmates and to deal with them in a critical and exploratory manner, to react responsible and with reasonable arguments to those with which they disagree, acquires the ability to give answers and questions, learns to balance and self-check their spontaneous externalizations, learns to think calmly and not miss the target in the course of the dialogue.

In conclusion, this paper has illustrated that the teaching of Arts Education and, in particular, of sculpture through the use of three-dimensional virtual museums enhances students' creativity since the educational unit is given to them in a more appealing educational environment. Therefore, they are able to work on their creative thinking and to develop a positive attitude towards the use of new technologies.

Suggestions for Future Research

The aim of the paper has been to support future educators who will:

- Be improving themselves through seminars and conferences about the novel technological achievements caused by the introduction of New Technologies in the field of education.

- Be able to combine any learning areas with the modules of ICT, for instance, Mathematics and ICT, Greek and ICT, etc.

- Utilize technology in school subject activities related to museums and cultural centres as well as visits to museums which are organized by the school.

- Allow for the testing of their knowledge of New Technologies utilization in the schooling process through relevant New Technologies classroom projects.

- Bring students closer to culture and the arts within educational activity.

Finally, some complementary action is being suggested:

- It could be applied to age groups other than the Fifth grade. For instance, for junior high school students or even kindergarten students as long as it is simplified.

- The works and the artists exhibited in this kind of virtual museums could be from around the globe. The act could therefore include more artists and works and not the ones related to the Russian movement only.

- The time allowed for the virtual tour could be extended. However, the conditions at the specific Primary school would not allow for an extension. The time suggested for a future research is 30 minutes and, if possible, more days of laboratory-based surveillance are also ideal.

- It is also suggested that both educators and parents participate in a similar future research through the distribution of questionnaires and the invitation to an interview. This way the researcher will be able to gather the results that are relevant to how they experience the use and introduction of New Technologies in their own children's and students' daily life. Lack of time would not allow for such an option during this specific action.

- The Virtual Museum could be also realized through a different virtual reality program in order to compare two or more programs and to suggest to schools the one that works better for the students and their teachers. Artsteps, PowerPoint, Alicia, Unity etch. are such programs.

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