Integration Multimedia and Virtual Reality in the Online Teaching of Fine Arts

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Abstract. This article deals with the problems of Fine Arts teaching. An approach capable to integrate different types of resources is presented. The described approach corresponds to the recent trends in education where multimedia tools and virtual reality are integrated to improve learning. The described approach has been used to create an interactive experimental lesson for students studying mural painting. The developed innovative lesson is tailored to the age characteristics of students and their increased interest in fine arts. The preliminary results show the applicability of the proposed approach and satisfaction with the acquired knowledge among the students.

Keywords: Arts Education, Mural Painting, Online Education, Virtual Reality, Virtual Tour.

1 Introduction

The educational process requires new and innovative methods, adapted to the current reality and to the level of development of digital technology. It should be mentioned also the important role of serious games in the educational process (Luchev, Pavlova, Zlatkov, & Pavlov, 2020). All of these factors along with advancements in IT technologies make education in fine arts more attractive (Liu, 2021). In the methodology of fine arts education, the methods and approaches are defined as ways of organizing and executing the teaching-learning process. By using them, the knowledge about art is acquired, opportunities for individual expression of skills and abilities are provided, and creativity in students is promoted. The main goal of arts education is to form a system of knowledge, skills, and attitudes in the process of contemplation and depiction of the surrounding environment. The process of education is often complex, dynamic, and continuous. What is typical of the fine arts teaching-learning process is the application of a number of specific methods and approaches, which enhance the traditional ones, and greatly contribute to achieving fully the educational and instructive goals. As a

result of technological advancements, we are witnessing the application of various methods and approaches in teaching fine arts at school (Kupaysinovna & Abduvakhobovich, 2021). However, we are still faced with a number of challenges that need to be yet overcome.

The main focus of modern fine arts education must be the effective release of the students' creative potential. This can be achieved either via experimenting with different means of expression, materials, and techniques in different arts or via using appropriate examples from the world or national arts.

It should be taken into consideration that many arts (e.g. performing arts, conceptual art, or textile art) include some aspects of visual arts. Applied art, such as industrial design, graphic design, fashion design, interior design, and decorative art, are all parts of fine arts. Thus the theoretical part of visual arts is omnibus. However, it is often presented only in verbal or written form which may become a prerequisite to loss of interest and impede learning. The conducted analysis shows that it is necessary to implement additional interactive multimedia solutions in education that are age-appropriate for the learners. Our main hypothesis is that such implementation will increase the motivation of the students and improve their academic achievements, as well as enhance the development of their artistic skills.

In learning mural painting, students are often required to analyse, research, and learn specific painting techniques from antiquity and from the Middle Ages. This part of learning art is usually harder to grasp and students are greatly aided when good visualization is provided. In this regard, the article presents a solution that has the potential to meet the needs and expectations of modern-day learners of specific techniques in fine arts and mural painting in particular. The solution is based on virtual reality and offers real interaction in the process of self-study. It follows a lesson plan, prepared in advance and based on the age specifics of the learners, as well as on their increased interest in fine arts.

The rest of the article is organized as follows: Section 1 outlines the possibilities of how to implement multimedia solutions in the process of teaching arts; Section 2 analyses the possibilities of how to utilize virtual reality as a means of interactivity in the teaching-learning process; Section 4 presents the result about the developed interactive lesson via virtual reality, and conclusions are drawn in Section 5.

2 The Multimedia Solutions in Teaching Fine Arts at School

A modern lesson in fine arts needs to be enhanced and to be able to incorporate computers and multimedia solutions. Thus, the presented information will allow new knowledge to be acquired, new skills to be developed and new interactions to be established, leading to increased effectiveness of the educational process (Istamovna & Rakhimovich, 2019). Multimedia, being a complex structure of information sources, following specific logic, creates a totally new presentation of the information, while making the educational process more flexible. Multimedia may well be incorporated in the following types of lessons: (1) development lessons (used mainly for introducing

new information), (2) drill lessons (for automation of facts), (3) review lessons (used in tests and quizzes), and in (4) mixed lessons.

The integration of IT and communication technology in the educational process complements, enhances, and extends some teacher functions and turns into a powerful motivating factor for achieving the set didactic goals. Undoubtedly, students do extremely well when combining theory and visual aids. Via the use of visual information, their imagination is around 5 to 6 times more active than while listening to the narration, thus leading to much higher results, compared to verbally presented information (Istamovna & Rakhimovich, 2019). In turn, the presentation of visual information is easier, and more detailed, increases the level of trust a person has when interacting with the new facts and information, raises the curiosity of students, and directly impacts both the results they show in the process and the quality of education.

Virtual and augmented reality are examples of non-linear, object-oriented multimedia which, in the recent years, have proved to be powerful tools for visualization of geopositioning data and generation of 3D photorealistic models of images in different applications (Koutsoudisa, Arnaoutogloub, & Chamzasa, 2007) (Putra, Wahyudi, & Dumingan, 2016) (Doležal, et al., 2019) (Koller, Ebert, Martinez, & Sieberth, 2018) Virtual reality in education provides the opportunity to form experience, based on the "learning by doing" method where the learner is not a mere passive spectator. Virtual and augmented reality are powerful tools that can be applied in the educational process in different subjects, such as geography, history, humanities, and arts.

3 Applicability of Virtual Tours in Teaching Fine Arts at School

A particular case of the use of Virtual Reality (VR) is the virtual tour: a simulation of an existing location represented via a series of video images (Osman, Wahab, & Ismail, 2009). In the general case, the simulation is set via video clips or images and is accompanied by text, audio guides, or sound effects. The simulated location, with all adjoining effects and information, is created for providing the viewers with a realistic experience of the authentic existing place (Aguilera, Alonso & Gomez, 2014; Spielmann & Mantonakis, 2018). VR tours may be organized in two ways (Sefercik & Kavzoglu, 2021): 1) by 360-degree virtual tour via a set of panoramic images, shot in different locations; or 2) by 3D virtual tour, created via the integration of high-quality 3D models in an artificial environment.

What makes the technology of virtual tours appropriate for the purposes of education are: 1) easy access and 2) ease of use. The user gains access to the virtual tour and may watch and interact with the simulated reality (Koutsoudisa, Arnaoutogloub, & Chamzasa, 2007). The opportunities that virtual tours provide for learners are access to a set of tools that facilitate the learning process and allow presenting both material and non-material features and aspects of objects (Mah, et al., 2019). These virtual tours provide opportunities for teaching students without the need to leave the classroom and enrich the process in the following aspects:

(1) They connect theory with the real world by allowing students to make connections and references, and to compare theory with practical situations. Students are encouraged to be critical thinkers and apply the concepts they have learned in class to real-life situations.

(2) Students may learn at their own pace as are not limited by distance, time, or money. This technology provides students with the freedom to explore, watch and learn at their own pace.

(3) They provide an interactive experience for learners. Certain settings allow students to take a bird's-eye view of a specific location, zoom in or out, and check the terrain via a 360-degree rotation.

The main aspects that are taken into consideration when checking if a virtual tour is a solution for enhancing the main teaching methods and tools are shown in Table 1.

Table 1. Applicability of virtual tours in teaching fine arts at school.

Aspects	Applicability
Psychological	- They increase the motivation to learn and acquire knowledge. - They form a positive attitude to the school subject where they are being used.
Educational	- They do not change the general organization of the curriculum
Methodical	- They support better acquisition of knowledge and learning the subject material
Organizational	- They supplement the material taught, without changing its structure

Along with the main aspects, stated above, opportunities have been analyzed for overcoming existing limitations, imposed by the framework of traditional education and are shown in Table 2.

Table 2. Limitations in teaching fine arts at school, overcome by the use of Virtual reality.

Limitations in traditional education	Benefits of using Virtual reality in the classroom
Time and space constraints	The limitations of the traditional classroom are overcome.
Resources limitations	Access is granted to a huge variety of current information which can help learners in acquiring knowledge and new facts.
Technological limitations	Interactive environment is created for information exchange at any time, in any place via the means of digital media and communication.

By the implementation of virtual tours, various problems of different nature may be solved, part of which are listed in Table 2. In addition, using the virtual tours will contribute to the motivation of students will be increased, as well as the effectiveness of the educational process.

4 An Approach to Creating a Virtual Tour to Aid the Teaching of Mural Painting

In this section, a virtual tour is presented as a tool that supports the learning of mural painting. The title of the interactive lesson is "Mural Painting in the Cultural and Historic Monument Kazanluk Thracian Tomb". The lesson is developed to meet the needs of students studying mural painting at the National High School of Arts in Plovdiv, Bulgaria. The described interactive lesson in the mural painting makes a smooth link and connects the different subjects of history, archaeology, ancient fresco techniques (ways of using them to paint murals), religious beliefs and customs, fashion design of the specific time period, art style, patterns, forms and stylization of objects. The tour may be watched on a mobile device, a computer, or VR glasses. Certain control tools have been provided and are accessible via the main menu, the menu for selecting the type of media, as well as the menu for selection of panorama. There have been included hidden sections, providing additional information to support the lesson facts as shown in Fig. 1.

The tour has been created via 360-degree panoramic images, connected by hotspots. Each of the images is accompanied by multimedia information, dependent on the visibility of a specific area and what information has to be learned during the lesson. The following types of content have been used:

- Integrated video from special video galleries on YouTube;
- Audio files, presenting information, supporting the main elements and visible objects in the panorama;
- Galleries of images, supporting the visible panorama;
- Written text, enhanced with single photos;
- Test quiz, checking each answer provided if right or wrong.

The total number of 360-degree panoramic images is four and covers: (1) the entrance to the Tomb, (2) the museum of jewelry art and ceramics, discovered in the Tomb, (3) the corridor (dromos), and (4) the vaulted hall. The lesson follows the architectural design of the tomb and presents different types of content, depending on the needs of the presentation in the course of the tour (see Fig. 2).

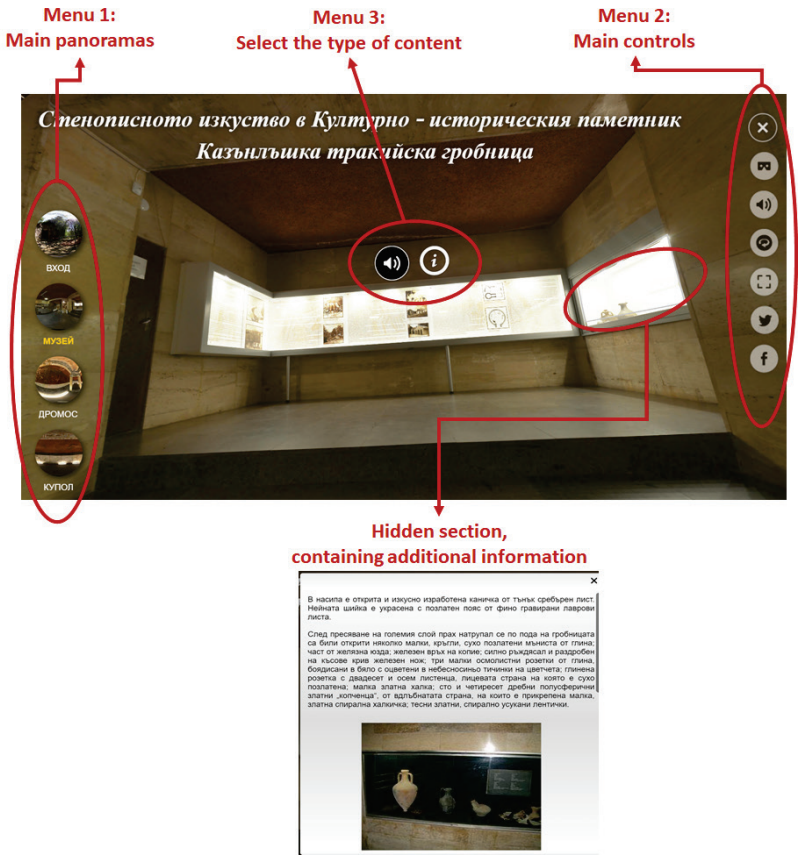

Fig. 1. Main functions of added content and control tools

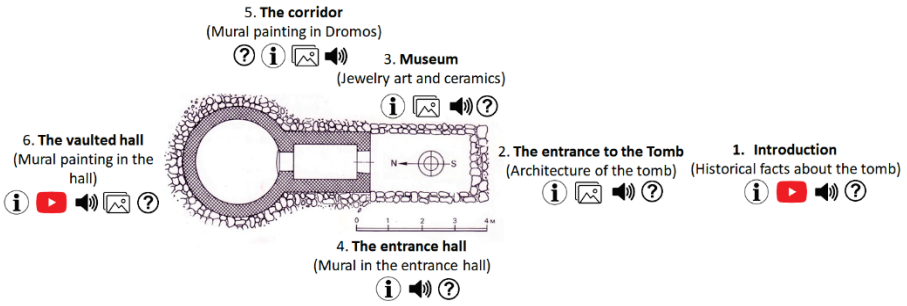

Fig. 2. The distribution of multimedia content in the architectural design of the tomb

In the course of the lesson, students may go back and use the resources of the virtual tour repeatedly, as well as make their own plan on how to follow the material. Learning

is considered successful when all quiz questions have been answered correctly. A part of the used questions is shown in Fig. 3.

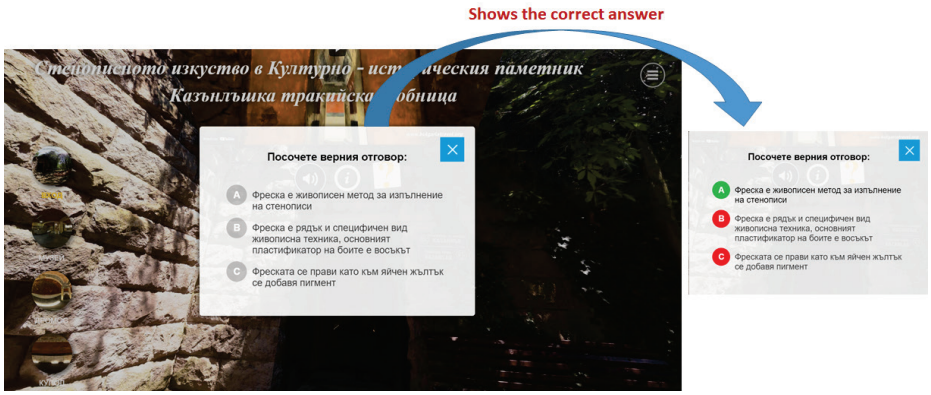

Fig. 3. Visualization of a quiz question

There is a possibility for the tour to be organized in a timed manner for getting acquainted with all the content and answer all the questions. Exceeding the time may be announced via a message, similar to the one shown in Fig. 4.

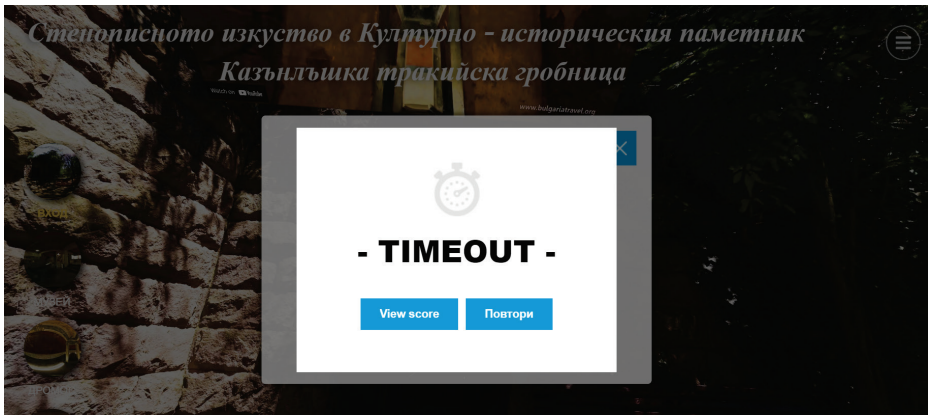

Fig. 4. Message after timeout

The learner can check the accumulated points and repeat the tour and respectively repeat the quiz, in order to achieve the maximum score (see Fig. 5).

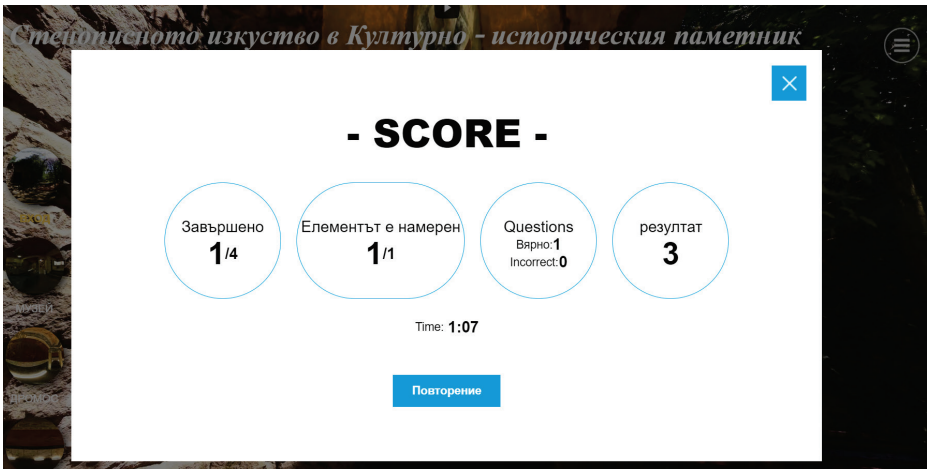

Fig. 5. Scores and academic achievements

The described lesson has been created with the purpose of presenting new material and acquiring knowledge via a virtual tour. It is applicable to both brick-and-mortar classes, as well as to online sessions. This model is suitable for teaching students a broad spectrum of subjects, as well as all kinds of arts.

Virtual reality has the potential to improve significantly the education and is yet to be used extensively in the traditional classroom. It is still expected to release the full potential of virtual reality and become a breakthrough addition to each school lesson.

5 Conclusions

Virtual tours undoubtedly have their place in teaching fine arts at school and may create interactive, stimulating, and enriching learning experiences for students. This article aims to integrate multimedia tools and virtual reality to improve learning through the use of leading technologies in teaching. For the goal, special video galleries on YouTube, audio files, image galleries, text, and test quizzes are combined. The described approach has been used to create an interactive experimental lesson for students studying mural painting. The preliminary results show the applicability of the proposed approach and satisfaction with the acquired knowledge among the students.

The described approach based on different technologies could be used to enhance the acquired knowledge in a variety of educational fields. They make the process of learning amusing, safe, and more engaging. It is clear that virtual tours will be the next step in education that will contribute to overcoming the challenges faced in teaching fine arts at school.

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