

# Educational Video Games as Tools for Raising Awareness of the Protection and Preservation of Cultural Heritage

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**Abstract.** This paper focuses on **educational video games** with a thematic orientation related to **conserving and preserving Cultural Heritage (CH)**. **Educational video games are effective and contemporary tools** for influencing and educating users. Not only the educational content is integrated into these games, but they also embody the pedagogical and moral messages of the educator, which are transmitted to the learners in an entertainment game. This paper **proposes a classification of educational video games in the domain of cultural heritage** according to the **significance** and importance of **Cultural Heritage objects** in the three categories, presented in detail in the paper. The **recommendations to designers** included in the classification will help them purposefully design and develop educational video games for CH. These games will have pedagogical principles and form additional knowledge, values, and attitude in users towards the conservation of the CH at international, national, and local levels. The proposed classification of educational video games for CH will promote CH-related educational video games and provide ideas and opportunities for future developments for such educational video games. In this way, educational video games for CH will serve as powerful tools for raising awareness of protecting and preserving Cultural heritage.

**Keywords:** Cultural Heritage, Architecture, Protection and Preservation of Cultural Heritage, UNESCO, Educational Video Games, Serious Games.

## 1 Introduction

In the modern world of technological progress and developing new and innovative technologies and means of impact and communication with people, serious video games are gaining popularity. Serious video games are designed and created for specific users who are trained in certain knowledge, skills, and abilities through playing in a virtual environment (Reynaldo, Christian, Hosea, & Gunawan, 2021; Ullah, et al., 2022; Menendez-Ferreira, Torregrosa, López-Fernández, & Mayor, 2022). Serious games enable users to perceive knowledge and skills in an interactive and modern way - game-

based learning is applied in these games, which has been proven successful in many diverse areas (Sharma, Bhagat, Huang, & Chen, 2022; Tay, Goh, & Safiena, 2022; Camacho-Sánchez, Manzano-León, Rodríguez-Ferrer, Serna, & Lavega-Burgués, 2023). Serious video games are widely used in diverse areas such as education, healthcare, defense, industries and corporations, marketing and communication, and many more (Bontchev, 2015; Min, Min, & Kim, 2022; Tay, Goh, & Safiena, 2022; Platz, 2022). Many researchers, practitioners, and developers are developing, researching, and analyzing serious video games (Alonso-Fernández, Freire, Martínez-Ortiz, & Fernández-Manjón, 2021; Schöbel, Saqr, & Janson, 2021; Platz, 2022). The focus of the study in this paper is on serious games in education - these are the **educational video games**.

The success of **educational video games** has been proven in numerous studies demonstrating the benefits for both learners and educators and the overall educational process (Marín-Díaz, Morales-Díaz, & Reche-Urbano, 2019; Bagus, Setiawan, Arisaputra, Harefa, & Chowanda, 2021; Mylonas, Hofstaetter, Giannakos, Friedl, & Koulouris, 2023). Usually, these games are used and applied in tune with learning strategies to achieve the desired goals (Blanco, Marchiori, Torrente, Martínez-Ortiz, & Fernández-Manjón, 2013; Tay, Goh, & Safiena, 2022). Educational video games are designed and created for specific groups of learners, depending on their characteristics (El Mawas, Bratu, Caraman, & Muntean, 2019; Dankov & Bontchev, 2020). User-oriented design is one of the critical factors for ensuring the high efficiency and realization of the success of the created game for the respective group of learners (Dankov, Antonova, & Bontchev, 2022). At the same time, however, this also predetermines the narrower specialization of the game for a particular group of users for whom the game is intended. It is important to note that educational video games are used in various fields of education, such as history, mathematics, architecture, arts, and more (Hutson, Fulcher, & Weber, 2022). These games are created and applied in the relevant areas to educate learners in these specialties. Therefore, this paper focuses on **educational video games** with a thematic orientation related to **conserving and preserving Cultural Heritage (CH)**.

**Educational video games are effective and contemporary tools** for influencing and educating users. Not only the educational content (according to the subject) is integrated into these games, but they also embody the pedagogical and moral messages of the educator (pedagogue, teacher, video game designer, etc.), which are transmitted to the learners in an entertainment game (Dankov, Deykov, & Dankova, In press). Using educational video games in the various stages of education (from primary to higher education) is influential for the learners, as they have to form an attitude and individual opinion and build values for the relevant domain in which they are learning. Educational video games for CH are especially these instruments with the help of which in the early stages of the young human's education, in an interactive, virtual environment and through an entertaining way, they can get learners to get acquainted with the topic of CH and with the specifics and problems for its preservation and conservation, to learn important scientific facts about the CH objects, as well as to form the necessary knowledge and affinities with the CH objects. The previous study of the authors of this paper examined the benefits for the individual age-related target groups of learners in

the domain of protection and conservation of CH (Dankov, Deykov, & Dankova, In press).

**Cultural Heritage** refers to two directions – *tangible* and *intangible Cultural Heritage*. The *tangible heritage* includes heritage objects with significant value (architectural, historical, archeological, scientific, artistic, urban, landscape, ethnographic, etc.) such as monuments, buildings, artifacts, and so on, important for preserving for the future generations (Paolis, Chiarello, Gatto, Liaci, & Luca, 2022). The *intangible heritage* refers to heritage, which involves traditions and oral expressions, performing arts, social practices, rituals and festive events, knowledge and practices concerning nature and the universe, traditional craftsmanship, and again are essential for preservation for future generations (Stancheva, et al., 2010; Paolis, Chiarello, Gatto, Liaci, & Luca, 2022; UNESCO-ICH, 2022). All cultural heritage objects and sites are placed under special protection and are subject to conservation. A special organization called UNESCO (*United Nations Educational, Scientific and Cultural Organization*) has been established for the preservation and conservation of Cultural Heritage worldwide. Within the organization's framework, numerous conventions and documents have been established, with the help of which all objects of cultural and worldwide heritage are defined and regulated, as well as strategies for preserving and conserving CH sites. In this regard, two unique lists of the UNESCO have been created - one for real-world cultural and naturally shaped CH (UNESCO, 2023a) and a second for *intangible Cultural Heritage* (UNESCO, 2023b). These lists contain all significant CH sites worldwide, selected according to particular criteria by UNESCO World Heritage Committee. Each country has its own Cultural Heritage, which is subject to protection and preservation under the current legislation of the respective country. It can be divided into two groups - objects of national importance and local importance. However, this is conditional, since each country has different criteria for dividing the objects into CH, depending on its legislation.

This paper perceives *Cultural Heritage objects* conceptually in three main groups - 1) objects of CH of global importance from the UNESCO list, 2) objects of CH of national importance, and 3) objects of CH of regional importance. In this regard, this paper **proposes a classification of educational video games in the domain of cultural heritage** according to the **significance** and importance of **Cultural Heritage objects** in the three groups listed.

The classification will support designing and creating educational video games in the CH domain. Depending on whether a given CH object falls into the relevant category of the classification of educational video games in the domain of CH, this game should be designed in a specific way for that particular CH object. This will significantly facilitate the initial design processes of educational video games for CH, as the attention of designers will be specially focused on the significance of the CH object. Therefore, the presented **categories of educational video games for CH** of the proposed classification **will be semantically bound to the CH objects**.

The proposed classification can be used within specialized platforms for designing and creating educational video games by people who are not specialists in information technology and the protection of CH. These platforms allow educators to design educational video games, and the platform automatically generates a final working version

of the video game without the help of developers to program the designed game. The APOGEE platform is an example of such a platform for designing, creating, and automatically generating educational maze video games (Bontchev, Vassileva, & Dankov, 2019).

The proposed classification contains conditional guidelines for the designer and recommendations for designing such games and is not related to the direct development of end versions of specific video games. This classification may find application in cases where it is impossible to include a specialist in the field of cultural heritage preservation in the processes of designing such games. For example, the classification can be used in designing video games during the school year (in the additional preparation hours) for learners in their school education, where the teacher acts as a designer of the gaming elements and learning content integrated into the game. This is realized using a specialized platform for designing and automatically generating educational video games by people who are not IT specialists (e.g., the APOGEE Platform). This excludes cases of designing specialized games where the participation in the design processes of a specialist in the CH field is mandatory. In the design and development of specialized games intended for students in architecture, archeology, and other closely specialized disciplines in university education, it is imperative to include specialists in the field of CH.

The proposed classification of educational video games for CH (according to the significance of CH objects for society) will promote CH-related educational video games and provide ideas and opportunities for future developments for such educational video games. In this way, educational video games for CH will serve as powerful tools for raising awareness of protecting and preserving Cultural heritage.

The paper aims to **attract attention to the more detailed and thorough research and analysis of the CH objects** to design and create educational video games for cultural heritage by the designers and creators.

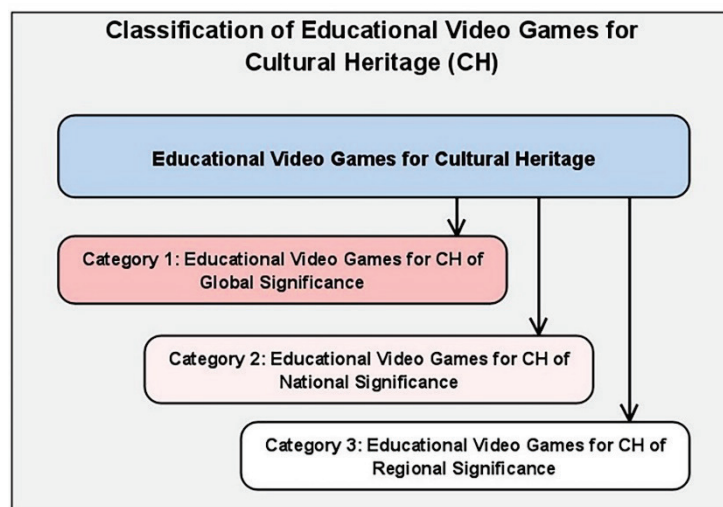
The paper continues with the following parts. Section 2 presents the classification of educational video games for CH. Section 3 introduces examples of CH objects from the different categories from the classification. The paper ends with a conclusion and acknowledgments.

## 2 Proposed Classification

Due to the specifics of the legislation of the individual countries and the specific categorization of the CH objects for each country, the presented classification seeks to distinguish the different CH objects to be used for designing and developing an educational video game for an object of CH. In this regard, this paper proposes a classification of educational video games for CH, according to the **significance** of CH objects in three categories - 1) *Educational Video Games for CH of Global Significance* (CH objects from the UNESCO list); 2) *Educational Video Games for CH of National Significance*; and 3) *Educational Video Games for CH of Regional Significance* (Figure 1).

The classification supports the design of video games for a historical moment in which a CH object is considered in one of the mentioned categories of significance of the CH object. The paper and the proposed classification are not intended to comment

on or consider administrative and legal issues determining CH objects in different countries. The proposed classification aims to support the designer at a specific historical moment in which a CH object is considered in the particular category and, in this regard, to assist the designer in making decisions for the design of an educational video game in the field of cultural heritage for this CH object. In the event of a future change in the status of a given CH object for which a game has been created, this game will not be up-to-date since the content integrated into it will not be up-to-date compared to the site's classification. In this situation, the game will not be relevant. It must be updated, considering the information on the significance of the CH object at a particular historical moment.



**Fig. 1.** Classification of Educational Video Games for Cultural Heritage.

Depending on the significance of the CH object, this CH object falls in the relevant category of the proposed classification. In this way, designers will be supported and focused on designing and developing an educational video game in the domain of CH for their chosen CH object. Therefore, the recommendations to designers included in the classification will help them purposefully design and develop educational video games for CH. These games will have pedagogical principles and form additional knowledge, values, and attitude in users towards the conservation of the CH at international, national, and local levels.

The specifics of each category are directly related to the significance of each CH object that falls into the relevant category. According to the authors of this paper, the classification presents **conditional recommendations** to the designer to refer to some of the necessary aspects that should be considered when designing and creating the relevant game. Designers of such games must carefully analyze and perceive the CH objects' relevant issues to present the educational information of the CH objects as clearly and objectively as possible to the learners and present it in an appropriate virtual environment characteristic of the game's theme.

### 2.1 Category 1: Educational Video Games for CH of Global Significance

These educational video games are designed and created for CH objects of **global significance** from the UNESCO lists for CH. These objects are under the protection of UNESCO and are in a unique conservation and protection regime. All these CH objects are attractive to tourists from all over the world. They are also subject to study from many university disciplines with a professional focus in the CH domain.

*Design Recommendations:* Designers need to pay serious attention to the global significance of the CH object within all objects in the UNESCO list. For these CH objects, much information is available from different data sources. For this reason, designers need to determine information for the game according to the characteristics of the learners and the time provided for play. The virtual environment is easy to build as there are numerous visual materials, such as captures and photo materials of the CH objects from the UNESCO lists.

### 2.2 Category 2: Educational Video Games for CH of National Significance

These educational video games are designed and created for CH objects of **national significance**. The legislation of each country defines these CH objects. This category of games may be included in the education system of each country where the CH Object is located and, in the tourist, destinations given, where these games can be used as a means of interactive learning of tourists for the CH objects of national importance.

*Design Recommendations:* Designers must focus on designing as short, informative, and purposeful educational video games as possible. Thus, these games will take little game time for the players and learners, and, at the same time, they will give complete information about the CH objects. Designers must study the CH objects of national significance from sources of information in a given country to convey the most important information for the CH object. The virtual environment should be directed to a country's national identity, culture, and natural environment. This way, educational video games will acquire distinctive national characteristics for individual countries.

### 2.3 Category 3: Educational Video Games for CH of Regional Significance

These educational video games are designed and created for CH objects of **regional significance**. Often, such CH objects are studied in the disciplines directly related to the domain of CH because these CH objects are an essential part of the historical development of a country. These games are supposed to be part of the education of future professionals in architecture, archeology, restoration, and conservation of the CH objects in the country.

*Design Recommendations:* Designers should include as many details in the game as possible for the selected regional CH object to draw the learners' attention to all the associated problematic areas. Information of regional significance is required, which can be challenging to find, as well as up-to-date visual details.

### 3 Future Application of the Classification for Educational Video Games for CH

The proposed classification can be applied to designing and developing various thematic educational video games for different CH objects. One of this paper's authors has considerable experience designing and creating such educational video games. He has participated in numerous projects, including the specialized international project E-Creha (<https://www.ecreha.org/>) related to the problems associated with preserving tangible CH throughout Venice, Italy. Within this project, the author participates in a team of specialists in architecture, preservation of tangible cultural heritage, and climatology from several universities in different countries. As part of the results of this project, a specialized educational maze video game intended for students in architecture in Italy was created, and experiments were conducted (Bontchev, Antonova, Terzieva, & Dankov, 2022). The successful educational video game on cultural heritage and the problems associated with protecting and preserving is the educational video game is named "Let's Save Venice." (Bontchev, Antonova, Terzieva, & Dankov, 2022). One of this paper's authors (Yavor Dankov) is one of the game's creators and contributed to all stages of design, development, realization, and experiments (Bontchev, Antonova, Terzieva, & Dankov, 2022). This game falls in the first category of the proposed classification - *Category 1: Educational Video Games for CH of Global Significance*. The city of Venice and its Lagoon are subject to the UNESCO list and are objects of global significance. The game is dedicated to the cultural heritage of Venice and its Lagoon, as well as their protection and preservation from the climate change that threatens them. The educational video game is aimed at students whose education directly relates to CH's issue in Italy (Bontchev, Antonova, Terzieva, & Dankov, 2022). The educational video game seeks to introduce students to the problems associated with the protection of Venice and its Lagoon.

Bulgaria has 18 cultural heritage objects on the UNESCO list of CH objects. They are of global significance. Educational video games can be designed and developed for these CH objects, which fall into the first category of the proposed classification. The tangible and natural cultural heritage objects from the UNESCO list in Bulgaria are (UNESCO, 2023a): Boyana Church; Madara Rider; Rock-Hewn Churches of Ivanovo; Thracian Tomb of Kazanlak; Ancient City of Nessebar; Pirin National Park; Rila Monastery; Srebarna Nature Reserve; Thracian Tomb of Sveshtari; Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe.

With the help of the proposed classification, educational video games can also be created for national and regional significance CH objects, which are part of the CH Lists of the National Institute of Tangible Cultural Heritage, Bulgaria, corresponding to Category 2 and Category 3 of the classification for Educational Video Games for CH.

The **proposed classification is universal** and applicable to designing and creating cultural heritage educational video games in all countries worldwide.

## 4 Conclusions

This paper **proposed a classification of educational video games in the domain of cultural heritage** according to the **significance** and importance of **Cultural Heritage objects** in three categories. Depending on the significance of the CH object, this CH object falls in the relevant category of the proposed classification. In this way, designers will be supported and focused on designing and developing an educational video game in the domain of CH for their chosen CH object. Therefore, the recommendations to designers included in the classification will help them purposefully design and develop educational video games for CH. These games will have pedagogical principles and form additional knowledge, values, and attitude in users towards the conservation of the CH at international, national, and local levels.

The proposed classification of educational video games for CH (according to the significance of CH objects for society) will promote CH-related educational video games and provide ideas and opportunities for future developments for such educational video games. In this way, educational video games for CH will serve as powerful tools for raising awareness of protecting and preserving Cultural heritage.

Future work will be dedicated to further developing the proposed classification with additional design recommendations. As a future work, the authors plan to present a separate paper to discuss the issues related to applying the proposed classification in detail. It is planned to create process models when applying the classification to design thematic educational video games for CH.

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