

The Design Process of Educational Video Games in Cultural Heritage

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Abstract. This paper presents a **summary model of the design process of educational video games for CH**. The model is based on the use of the *Classification of Educational Video Games for Cultural Heritage (CH)* and the *Design Recommendations* included in it, described in a previous study by the author of this paper. The *summary model* focuses on CH objects that form the theme of the educational video game. Designers should carefully and purposefully research and analyze the CH objects, use the classification, and follow the design recommendations to design educational video games for CH, following the described design stages in the presented *summary model* of the design process. The paper also presents an appropriate example of using the *summary model* in applying it to design a new educational maze video game dedicated to CH object. The proposed *summary model* can serve as a starting point in establishing the design process of educational video games for CH and direct designers and creators of such games in the overall design process. Based on the classification and the design recommendations intended for the designers, the *summary model* presents essential design stages that designers should follow in designing and developing informative, purposeful, and effective educational video games in CH.

Keywords: Educational Video Games, Serious Games, Design Process, Cultural Heritage, Protection and Preservation of Cultural Heritage, UNESCO.

1 1. Introduction

Video games are an integral part of the daily routine of young people, but at the same time, these games are popular and are played by users of all ages (Li, Wang, & Liu, 2020; Ponce-Blandón, et al., 2020; Barr & Copeland-Stewart, 2022). The ability of video games to entertain and intrigue their users has been proven in a modern technological society (Quwaidar, Alabed, & Duwairi, 2019; Predescu & Mocanu, 2020; Heo & Park, 2021). Therefore, users desire and are highly interested in bringing this pleasure (from playing video games) into their education field within the educational process (Engelstätter & Ward, 2022; Antonova, Bontchev, & Dankov, 2022). That is why educational video games are widely used in various areas of education and are perceived with high interest by learners. The pleasure of playing video games and their popularity

is among the factors for learners' increased receptivity to educational video games in various fields of education (Andreeva, 2019; López, Arias-Oliva, Pelegrín-Borondo, & Marín-Vinuesa, 2021; Antonova, Bontchev, & Dankov, 2022; Urgo, Terkaj, Mondellini, & Colombo, 2022).

Educational video games are the subject of research and development in different fields of education (Olejniczak, Newcomer, & Meijer, 2020; Zeiler & Mukherjee, 2022; Udeozor, Toyoda, Russo Abegão, & Glassey, 2023). The success of educational video games has been proven in many studies focused on both the benefits of the games for the respective learners for which these games have been created, as well as on the analysis and evaluation of the consumer experience of learners during the game (Rahimi, et al., 2022; Toh & Kirschner, 2023). The use of educational video games in the educational process of learners in various fields of education often leads to elevated success of consumers, high satisfaction, and constant and lasting interest from the learners in the subject they are studying (Martín-del-Pozo, García-Valcárcel Muñoz-Repiso, & Hernández Martín, 2019). Among the essential areas of application of educational video games is the conservation and preservation of the Cultural Heritage of the world. Therefore, this paper focuses on **educational video games** in Cultural Heritage and problems related to the protection and preservation of Cultural Heritage (CH).

The **complicated process of designing** and creating educational video games often involves many interdisciplinary professionals (Dankov, Bontchev, & Terzieva, 2021). These teams include educators or teachers who intend to use an educational video game in the learning process and many other specialists with other responsibilities (Deykov & Andreeva, 2017; Dankov & Bontchev, 2020). For example, these may be IT specialists responsible for the software development of the game and the implementation of a software product - a finished version of the educational video game that will be accessible to the learners and ready to play from them (Dankov & Bontchev, 2020). Educators take serious participation in the design of educational video games as they are specialists in the field of education where this game will be applied (Antonova & Dankov, 2023). Very often, educators take on the role of designers of educational video games that aim to create an educational game that contributes to learners' overall learning process and intrigues and entertains them. Usually, educators are the specialists responsible for the most appropriate and accurate selection of the most significant and essential learning content that must be integrated into the game and perceived by the learners.

The selection of educational content, which will be integrated into the educational video game, depends mainly on the defined learning goals, the subject of education (discipline), and the specific characteristics and preferences of all learners for which the game is intended (Bontchev, Antonova, & Dankov, 2020). Designers of educational video games for CH must pay serious attention to the CH objects for which the game will be designed. Undoubtedly, this also determines the topic of the game and content (didactic content and gaming content), which must be integrated into this game. Among the critical steps in designing educational games is the appropriate selection of educational content to be integrated (Padilla-Zea, Gutiérrez, López-Arcos, Abad-Arranz, & Paderewski, 2014; Martí-Parreño, Galbis-Córdova, & Miquel-Romero, 2018; Bontchev, Antonova, & Dankov, 2020). Designers must study and determine the educational content that needs to be integrated into the game, tailored to the goals, users,

and field of application (discipline). This determines the main characteristics of educational video games in CH.

Therefore, this paper is based on the previous study of the author of this paper, which presents the *Classification of Educational Video Games for CH*. The classification includes *three main categories for educational video games for CH*, depending on the *significance of CH objects*, as well as *conditional Design Recommendations for designers* in designing such games from the relevant Category of the classification. This paper will **use the classification and design recommendations for designers** and creators of such video games to **create and present a summary model of the design process for educational video games for cultural heritage**. The paper also presents an example of **using the proposed summary model to design a new educational maze video game**, which falls into Category 1 of the classification. The game is dedicated to one of the CH objects of Bulgaria. This is the *Thracian Tomb of Kazanlak*, a CH object of global significance, included in the *UNESCO* list of CH objects (UNESCO, 2023).

Developing a summary model of the design process of educational video games in CH, using the classification and the design recommendations included in it, will contribute to a clearer understanding of the design process and will help the future development of such games. The model will serve as a starting point in establishing the design process of educational video games for CH and will direct designers and creators of such games in the overall design process. Due to the specifics of the application area (CH), the model focuses on the in-depth study and analysis of the CH objects. Based on the classification and the design recommendations intended for the designers, the model presents essential design stages that designers should follow in designing and developing informative, purposeful, and effective educational video games in CH.

The paper continues as follows. Section 2 presents a summary model of the design process for educational video games for CH, developed based on the Classification of Educational Video Games for CH, and the design recommendation included in it. Section 3 presents the use of the summary model to design a new educational video game for the CH Object Thracian Tomb of Kazanlak. Section 4 presents a conclusion and future work.

2 A Summary Model of the Design Process for Educational Video Games for Cultural Heritage

This paper presents **a summary model of the design process of educational video games for CH**. The model is illustrated in Figure 1. The model is based on the use of the *Classification of Educational Video Games for CH* and the *Design Recommendations* included in it, described in a previous study by the author of this paper. The model focuses on CH Objects that will form the theme of the educational video game. Designers should carefully and purposefully research and analyze the CH objects, use the classification, and follow the design recommendations to design educational video games for CH, following the described design stages in the presented summary model of the design process.

The model presented describes some of the most essential and critical steps in designing educational video games for CH. The game design process starts with the intention of the designer to create an educational video game to be used in the education of a particular group of learners. In the model, this is illustrated in the upper left corner.

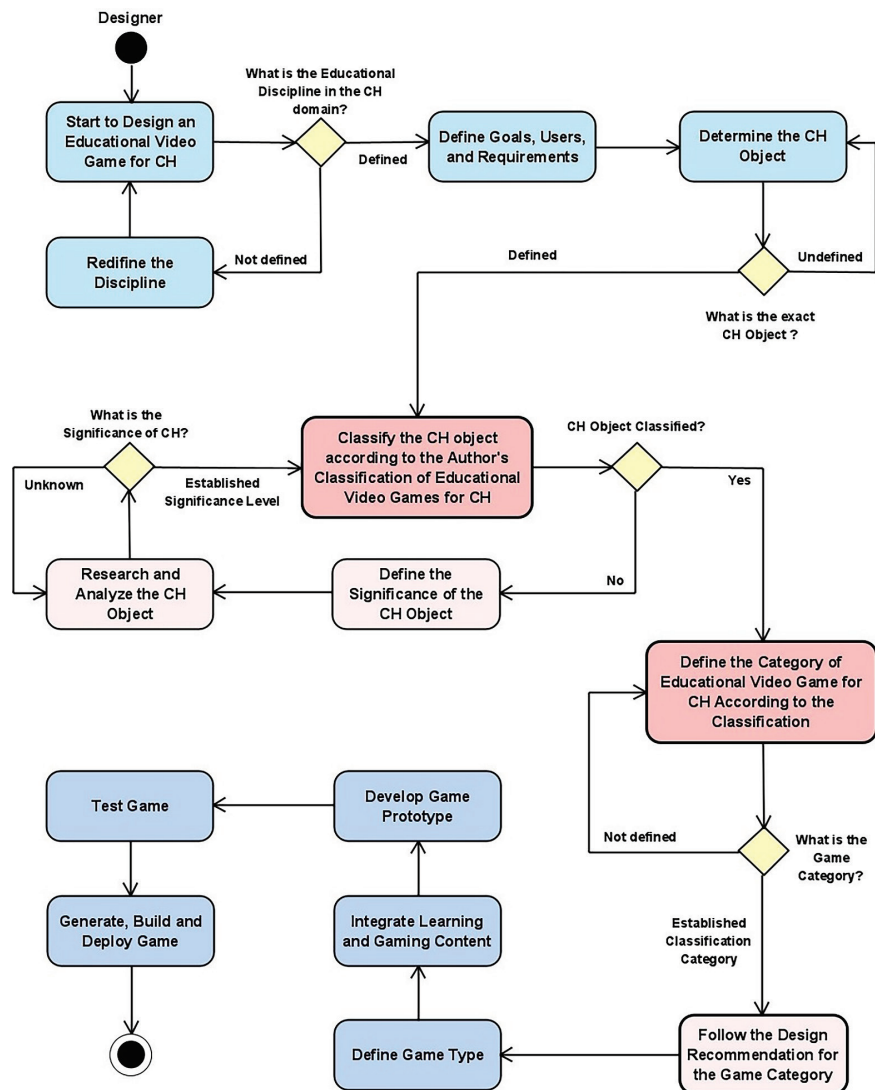


Fig. 1. A Summary Model of the Design Process for Educational Video Games for CH

The first question the designer should answer is, "What is the Educational Discipline in the CH Domain?". The question is essential as this game's application domain must be defined - this is the discipline in which the game will be used for play and learning by the learners. The educational fields are very diverse. Some education disciplines

indirectly relate to CH, such as history, geography, architecture, and Civil Engineering. Other disciplines directly related to CH include architecture, chemistry, different arts, etc. These are part of the few similar disciplines where learners could study various aspects of CH.

Once the discipline is defined, the designer must determine all the game's goals, examine the users for whom the game will be intended, and determine all the restrictions that will be applied. This is illustrated in Figure 1 as the *Define Goals, Users, and Requirements* process. Therefore, this predetermines the game's basic concept and the future CH object, which will be the game's central theme.

In this regard, the designer must go through the next step of the design process regarding defining the CH object for which the educational video game will be created. The designer must answer, "*What is the Exact CH Object?*". Suppose the CH object is not determined. In that case, the designer must return to the *Determine the CH Object* process and make a purposeful choice of a particular CH object (or objects) for which the game will be designed. Suppose the CH object is defined. In that case, the designer goes to the next step of the design process for the educational video game for CH, illustrated in Figure 1.

The following essential step of the design process, presented in the summary model, is that the designer should classify the selected CH object according to the *Classification of Educational Video Games for CH*. The designer must go through the process of determining the significance of the CH object - the *Define the Significance of the CH Object* process. For this purpose, the designer must thoroughly study and analyze all available information about the CH object (*Research and Analyze the CH Object* process) from various sources. In addition, the designer must comply with the respective country's existing legal framework to determine the CH objects' significance. As a result, the designer must answer the question, "*What is the Significance of CH?*" In this circumstance, the options are two: 1) in one case, the designer has not established the significance of the CH object - therefore, it must be returned to the process of study and analysis of the CH object. 2) In the second variant, the designer has established the significance of the CH object, and it falls in the relevant category of the *Classification of Educational Video Games for CH*.

The designer must go through the next essential step of the design process. The designer must determine which game from the three categories of educational video games for CH from the *Classification of Educational Video Games for CH* will choose to design. The classification includes three types of educational video games for CH, depending on the significance of the CH object. Due to the specifics of the different legislation of the countries, it is feasible in some circumstances that the CH object may be dualistic. This means that the CH object can be of national or regional significance and, simultaneously, be of global significance and be included in the UNESCO lists of CH objects. Therefore, the designer must answer the question, "*What is the Game Category?*" The designer must choose one of the games in the classification categories. After establishing the desired type of educational video games for CH from the classification, the designer moves to the next step of the design process.

Depending on the selected category of the *Classification of Educational Video Games for CH*, the designer must follow the recommendations for designers included

in the classification. This is the *Follow the Design Recommendation for the Game Category* process. This is an essential part of the game's design process - the designer is introduced to the relevant design recommendations that apply to *Category 1*, *Category 2*, and *Category 3* of educational video games for CH from the classification. The design recommendations are described in a previous study by the author of this paper. These conditional design recommendations support the designer in the game design process from the respective classification game category. Following the design recommendations, the next game design steps are related to defining the type of game and integrating the desired educational and gaming content in the game. After completing these processes, the next step is to go through the *Develop Game Prototype* and *Test Game* processes. The last step is related to the generation, build, and deployment of the educational video game for CH, which is ready to play by users.

3 An Example of Using the Proposed Model

The proposed *summary model of the design process for educational video games for CH* can be used in designing various types of educational video games in the field of CH. All game design stages described in the model support the designer in the overall design process. The model can be used by professionals in the field and used by people who have the desire and are unfamiliar with the specifics of designing educational video games for CH.

An appropriate example of using the *summary model* is in applying it to design a new **educational maze video game** dedicated to one of the CH objects of Bulgaria. This is the **Thracian Tomb of Kazanlak**, representing a CH object of **global significance** from the UNESCO list for CH objects (UNESCO, 2023). Using the *summary model*, briefly in the current section of the paper, the process of designing this game will be described.

Following the *summary model of the design process for educational video games for CH*, the first step is to determine the discipline of education. In this case, the game will be designed for students from the Architecture discipline who need to get acquainted with the CH object - the Thracian Tomb of Kazanlak. This includes introducing students to the history, problems, and significance of the CH object. Therefore, after defining the main goals of the game and learners' requirements and characteristics (students of architecture discipline), the next step of the design process, illustrated in the summary model, is related to defining the significance of the CH object, according to the *Classification of Educational Video Games for CH*. After successfully transitioning the processes of researching, analyzing, and studying the CH object, it is established that the Thracian Tomb of Kazanlak is a CH object of global significance and is available in the UNESCO List for CH objects. Therefore, the Thracian Tomb of Kazanlak is associated with *Category 1* of the classification.

After the CH object is classified, the next step is to choose the respective game *Category* from the classification. In this case, the game that will be designed is from *Category 1*, referring to the *educational video games for CH of global significance*. After

that, according to the *summary model*, the subsequent design step follows the conditional *design recommendations* for designers included for games from the relevant *Category* of the classification. The *design recommendations* for the Thracian Tomb of Kazanlak video game are from *Category 1*. Among the essential *design recommendations* for designers are the focus on the CH object's global importance, compared with other CH objects globally, and the careful selection of information to be included in the designed game. In addition, since the CH object is of global importance and included in the UNESCO lists, the Thracian Tomb of Kazanlak has been examined and documented in detail. Therefore, a variety of credible and informative sources of information are available. Designers need to carefully select the appropriate information and design the game to respond to the characteristics and requirements of the architecture students for whom the game will be intended. Following the conditional design recommendations of the classification, it proceeds to the subsequent design processes presented in the model. The educational video game will be a maze type. The essential educational and gaming content for architecture students is selected from the available information. After that, a game prototype is developed, which goes through the testing processes. The process successfully ends with creating an educational video game for the Thracian Tomb of Kazanlak.

With the help of the designed educational video game for the CH object of global significance (the Thracian Tomb of Kazanlak), architecture students will become acquainted with the history, problems, and specifics of this CH object and its protection and preservation in a fun way through interactive gameplay. Thanks to the *summary model* presented, designers will have the opportunity to analyze the whole process (even in advance, before the actual start of the design) and examine each step of the design process individually to design a purposeful and effective educational video game for CH.

4 Conclusions

This paper presented a **summary model of the design process of educational video games for CH**. The model is based on the use of the *Classification of Educational Video Games for CH* and the *Design Recommendations* included in it, described in the previous study by the author of this paper. The model focuses on CH objects that form the theme of the educational video game. Designers should carefully and purposefully research and analyze the CH objects, use the classification, and follow the design recommendations to design educational video games for CH, following the described design stages in the presented summary model of the design process. The paper also presented an appropriate example of using the *summary model* in applying it to design a new educational maze video game dedicated to Thracian Tomb of Kazanlak, representing a CH object of global significance from the UNESCO list for CH objects.

The presented *summary model of the design process of educational video games for CH*, using the classification and the design recommendations included in it, will contribute to a clearer understanding of the design process and will help the future devel-

opment of such games. The model will serve as a starting point in establishing the design process of educational video games for CH and will direct designers and creators of such games in the overall design process. Based on the classification and the design recommendations intended for the designers, the model presented essential design stages that designers should follow in designing and developing informative, purposeful, and effective educational video games in CH.

The planned future work is related to further developing the summary model of the design process of educational video games for CH. The application of the model for designing educational video games for various CH objects of different regional, national, and global significance is also provided for future work.

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