A Model of Content Structure for a Serious Educational Game Related to the Military and Historical Heritage Presented through the "Mission Opalchenets"

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Abstract. The article discusses methodology and structure of the content of Serious Educational Game related to the military and historical heritage "Mission Opalchenets" (working title) according to learning objective. The goal of this initiative is to achieve a specific level of knowledge and skills in users in the area of military and historical heritage of Bulgaria. The authors' thesis is that any cognitive level can be appropriately represented in the IT environment of the serious educational game.

Keywords: Serious game, Military-historical heritage, Interactive teaching method.

1 Introduction

Nowadays society becomes more and more based on ICT and advanced technologies. As a consequence, the need of new methods of teaching and learning with help of IT sector is required. The interactive methods of eLearning combine with an interesting storytelling and the fun of game is more than remember some facts.

1.1 The project background

The aim of the project "Models and concepts of serious educational games through related multimedia resources of military and historical heritage"[1] is to create a model of semantic-based digital multimedia cultural resources on which to create serious games (SG). The project affect the intersection between IT and humanities and its goal

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is to create a model of knowledge in the field of military and historical heritage, with an example of a serious game related to the participation of the Bulgarian Corps in the Russian-Turkish Liberation War (1877-1878). The creation of such an environment requires the integration of technical tools and methods on the one hand and historical knowledge on the other, in order to create a learning environment leading to an effective learning process. Pedagogically well-grounded decisions are required to select, formulate, and apply a sequence of methods, techniques, forms and learning tools to achieve the set educational goals (Terzieva & Kademova-Katzarova, 2013). The main hypothesis of the research is that the learning process in the field of historical heritage is more effective and successful with the implementation of new IT technologies and modern educational approaches that are used in serious educational games with rich multimedia and semantic content (Noev, Goynov, Sapundjiev, & Valev, 2017).

2 Serious Educational Game in the Field of Military-Historical Heritage

2.1 Serious educational game

The use of ICT in education, particularly in the field of humanities and history, has led to discussions among scholars in pedagogy and social sciences. Serious game interested by researchers for using in learning basic concepts in different levels. Actually the use of this kind of game is not very popular, instead used in some fields like health care and business marketing. “We think this may be because there is no solid model of such game that can be connected to the process of education”, according to Darwesh (Darwesh, Concepts Of Serious Game in Education., December 2015). In this paper we define a model and we hope it will be the base for further research on this topic. Up to now, a number of terms and concepts have been established that attempt to conceptualize this new phenomenon. One of them is the term “serious games”, which puts emphasis on the gameplay but also on the “serious” term, i.e. the educational purpose of the game (Vaseva, 2014). Contemporary understanding of the concept of “serious games” stems from Sawyer’s and Rejeski’s “Serious Games Initiative”, which has aroused great interest in the idea that public and private organizations and education, should use the capabilities of new information and communication technologies to create video games and simulations to present and explore real-life issues (Sawyer & Rejeski, 2002). Along with the creation of this association in 2002, the first gathered popularity and a successful SG is “America's Army”. Probably this is the reason why the most widely accepted definition of the term belongs to one of its creators Michael Zyda, who excludes board games from the modern meaning of the term “serious games”[2], and places emphasis on mental competition played on a computer according to specific rules that use entertainment to support learning in education (Zyda, 2005).

[2] Michael Zyda definition: “Serious game: a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives.”

The main difference between the video game and the serious educational game, as he notes, is that if we have a story, skill, art and software in the video game (as Figure 1 shows), we also have pedagogy in the serious game (the main purpose of the activity is to educate and train, i.e. to teach knowledge and skills). This addendum adds the games meaning of "serious". But on the other hand, as Aso Darwesh notes (Darwesh, Concepts Of Serious Game in Education., December 2015), there is no game without educational purpose and, at the same time, there is no pedagogical method that does not include entertainment.

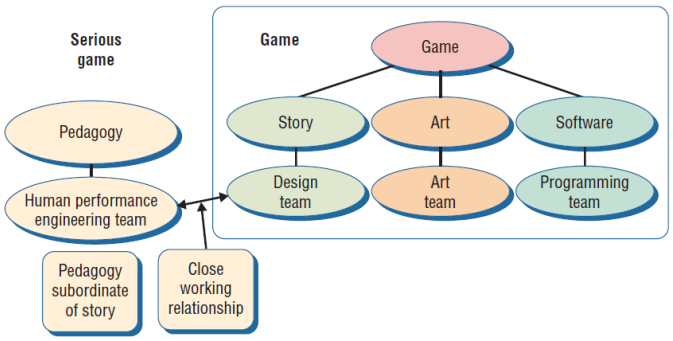

Fig. 1. Figure from (Zyda, 2005). From game to serious game. Unlike their entertainment-only counterparts, serious games use pedagogy to infuse instruction into the game play experience.

Creating of SG requires more than a team of developers. In this case, it is necessary to include experts from the different science field of the game in the development team. In the work on this project and the creation of an exemplary game dedicated to the military-historical heritage (MHH), the model is fully subordinated to and in line with the basic requirements of pedagogy and teaching history in order to achieve the main goal of learning of the MHH-related knowledge of Bulgaria.

2.2 Serious educational games and knowledge in the field of historical heritage

History as a science is characterized by the prevalence of methods of direct observation, registration and classification of facts. In addition, this statistical and fragmentary information that results from the use of such methods does not allow for full recovery, reconstructs a particular fragment of the historical process. And this, in turn, does not make it possible to separate the accident from the lawful, the subjective from the objective in the course of the development of the historical phenomenon being studied. The recreation of a historical situation, playing it in roles besides real theoretical and factual knowledge, helped in particular for the acquisition of practical skills by the students. The restoration of a foreign identity through the fulfilled historical role expands the student's perceptions of the variance in human development, reveals many images

before him, and ultimately through his co-experience he teaches him to be tolerant to other points of view.

In the presented exemplary game, the restored identity is a Bulgarian volunteer, a participant in the military actions of the Russian-Turkish Liberation War. The presented text material is based on real historical sources: (Genov, 1976), (Hristov & Todorov, 1981), (Valkov, 1983), (Cholpanov, 2007), (Miladinova, 1978), (Gyuleva, 2017) and (Atanasova, Bogdanova, & Ivanova, 2013).

The imitation computer model, which underlies the SG, allows:

- To reconstruct a particular fragment of the historical process;
- To analyse the historical information that is related to the studied period;
- To imitate the development of the historical process in stages;
- To understand the meaning and the significance of historical events.

Using SG in education has a multifunctional character: while solving game training problem are formed not only knowledge but develop and varied intellectual qualities, like motivation and willpower and stimulates initiative and creative thinking, i.e. it develops personality.

Advantages of serious educational games related to the historical heritage:

- Increases and stimulates interest in the learner, improve the mental activity and the efficiency of learning new knowledge, thanks to the interactivity;
- Allows visualization and modelling of processes that are sophisticated for demonstration. In the case of historical games, it allows the reproduction and simulation of past historical eras. Thanks to the multimedia and the graphic reconstructions are recreated and modelled ages long ago;
- Allows for self-study of additional materials, by visiting hyperlinks, opening additional information boxes, browsing multimedia library etc.;
- Through the plot of the game, especially in the presented example of SG on the participation of the Bulgarian volunteers in the Russian-Turkish Liberation War, knowledge is gained and through the experience of the event they help to memorize a large number of facts;
- The advantage of the game is that “there is no mandatory factor” (in fact the “duties” in the game are not perceived as such, which takes away the psychological pressure from the participant).

2.3 Methodology and structure of the content according to learning objectives

Basis of cognitive domain in educational work and existing researchers programs and standards of evaluation is the taxonomy of Bloom (Benjamin Bloom, a psychologist at the University of Chicago), which classifies six cognitive levels (knowledge, comprehension, application, analysis, synthesis, evaluation as shown on figure 2). In the cognitive field of learning, according to Bloom, in order to learn one of the six levels, the previous one must be mastered. The approach allows for the measurability of the student's knowledge, skills and attitudes. Taxonomy has the idea that goals and learning outcomes are not the same. For example, remembering scientific facts, however important they are, is at a lower stage than the ability to analyse or appreciate.

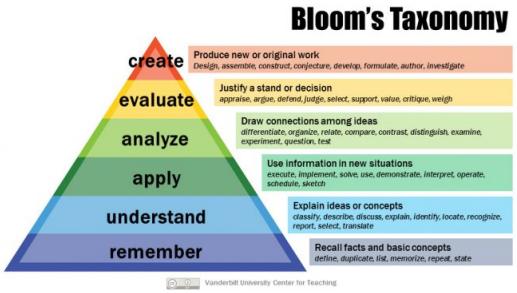

Fig. 2. The Bloom's taxonomy[3].

2.4 Objectives and tasks of the serious educational game representing the military-historical heritage

The presented model for content structure of serious educational games related to the military and historical heritage is transmitted in an accessible and attractive form of knowledge about the participation of the Bulgarian volunteer in the Russian-Turkish Liberation War (1877-1878). The model integrates both historical sources and maps, imagery, logical thinking is developed through the test, and the level of knowledge is verified, accessible chronological and spatial references are used to explain the historical facts.

The historical competence in terms of the required knowledge, according to the objectives set in the MES[4] educational program, includes "Knowledge and understanding of the historical facts, events and processes, ideas and actions of individuals. The formation of this competence should be done mainly at the cognitive and communicative level, developing the student's ability to apply historical knowledge to solve problems from other subject areas and from everyday life"[5]. In order to achieve the educational goals, it is necessary to develop the following skills and abilities: separation of the essential from the insignificant, analysis of different types of information (text, images, maps), flexibility of the thought processes and formulation of summaries (true / false, logical questions, summarizing question by filling in missing words).

Objectives of the game at the level of knowledge:

- Acquainting with facts about the participation of the Bulgarian volunteer in the Russian-Turkish Liberation War;
- Acquaintance with the lifestyle of the Bulgarian volunteer - clothing, equipment;
- Recognition of archive and museum units, monuments related to the Russian-Turkish Liberation War;
- Discerning memories of participants in events from other written historical documents;

[3] Web source: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
[4] Ministry of Education and Science of Republic of Bulgaria, https://www.mon.bg/en/
[5] Methodological guidelines for history and civilization education. Ministry of Education and Science, http://www.riopz.com/

- Discourse of written information from the age from contemporary written information;
- Learning new facts related to the study period of the military-historical heritage.

Objectives of the game at skill level:

- Distinguish different types of maps and guidance on the map of Bulgaria and the Balkan Peninsula;
- Working with a term glossary;
- Link text with an image in a specific semantic field;
- Arrange events in chronological order;
- Analysing and synthesizing facts related to the military-historical heritage.

By structuring the content in the model, the information is presented in such a way that the underlying facts are repeatedly covered. Before it can understand a concept or fact must first be learned. In order to apply the acquired knowledge, it must be understood. In order to evaluate a process, it must first be analysed, i.e. every subsequent level builds on the previous one. This allows game users to learn knowledge through multiple ways and to perceive information in different ways.

Level of perception/knowledge is realized through the presented main text in the game "The Diary of a Bulgarian" and first mission "Opalchenets". For better understanding of the facts and overall information, the text is divided into five parts. Based on these parts, the five levels of the game are built. Educational goals are accomplished through cognitive processes, knowledge, remembering. In addition to the facts about the participation of the Bulgarian volunteer in the Russian-Turkish Liberation War, at the level of perception/knowledge are used also unknown words and concepts presented in the dictionary.

Levels of understanding, application and analysis require the transformation of the perceived knowledge through interpretation, extraction of the parts of the whole, and determination of the interrelationships between them. In the presented SG model this is achieved through the questions after each level. Closed questions are asked which require a choice of options: verbatim statement; logical questions: and image recognition issues. In order to solve the tasks placed after each level, a user's classification, summary, and conclusion is required.

The cognitive level of synthesis is accomplished through the summarizing questions at the end of the game, by merging the parts already analysed into a whole. At the level of synthesis, for the first time, we can speak of "creative thinking", as the parts are united in a completely new way, unknown to this point.

Training is a responsibility. For this reason, the training process must be documented and be traceable. As Darwesh notes (Darwesh, December 2015), one of the strengths of SG is the ability to track players' actions and results. Scoring is one of the basic concepts of each game ("there is no game without tracking the results, and there is no training without evaluation"). Effective training analyses the learner's achievements at each level and if the knowledge is not used on one, the player is not allowed to the next one.

2.5 Objectives and tasks of the serious educational game representing the military-historical heritage

"While playing a computer game, you learn to participate in a semiotic domain, i.e. a field or a set of activities, in which you think, act and evaluate in a certain way", according to Gee (Gee, 2005).

The serious game contains three main components: gameplay, knowledge and multimedia resources. The gameplay part, through the script and test items, translates the player through the mission, and giving access to other game components at all times. The knowledge store embedded in the game contains semantic annotations and related resources divided into specific themes: historical event; locations and maps; monuments; equipment and weapons. Also for facilitating the player and for additional information there is a terminology dictionary. A multimedia library with multiple digital resources (images, maps, sounds, videos, literary and scientific sources, etc.) is also included in the game. The following figure shows the contents of the SG.

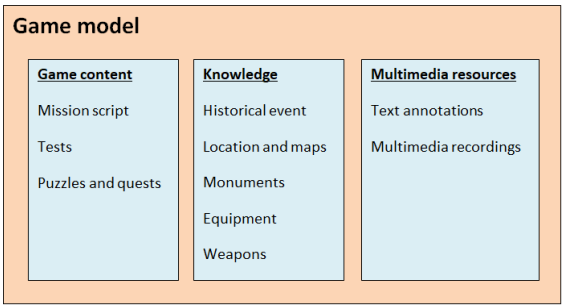

Fig. 3. The content structure of serious game in the field of military-historical heritage.

3 Conclusions and Future Work

Presented content model and pedagogical methods are the basis of mission "Opalchenets" game. Based on them, will be develop a complete serious educational game related to different periods of the military history of Bulgaria. Thanks to the participation of experts and specialists studying the relevant period of Bulgarian history, content could be created to represent the MHH in a manner consistent with the goals and tasks of history education, both in secondary schools and in universities.

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