

A Serious Educational Game of Bulgarian Military and Historical Heritage

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Abstract. This article present work on the project of developing the models and concepts of serious educational games through related multimedia resources of military and historical heritage.

Keywords: Visualization Techniques, eLearning, Serious Games/Gamification, Semantic Relations.

1 Introduction

Learning in the field of cultural heritage through serious games has incredible potential by offering of free choice of place to learn, flexibility in manage, choice of time and speed of learning, autonomous learning in game context, self-controlled learning, problem solving, systems thinking and readiness for cooperation. The significance of the considered scientific problem is an absorbing of new knowledge, provoking interest to culture, the construction of cultural skills and language learning through modern methods.

Serious games, also called “Applied games” or “games with purpose” are created with special purpose other than pure entertainment.

The research and modeling of serious educational games is important part of the concept for building new educational practices and may have significant impact on learning experience no matter what is the educational domain.

The main objective of the project “Models and concepts of serious educational games through related multimedia resources of military and historical heritage” (contract No. DM02/3/17.12.2016, supported by Bulgarian Scientific Fund) is the realization of fundamental research by junior researchers in a field of informatics, information and communication technologies (ICTs), humanities and social sciences in order to acquire new knowledge of the fundamental causes of events and observable facts in these areas without any direct commercial application or use. The project in particular is oriented in searching of new knowledge and achieving fundamental results in the area of: artificial intelligence, visualization techniques, eLearning, serious games/gamification, semantic relations between different domains and etc. It aims to define mechanisms and

create models and tools for context-based application of digital cultural resources for educational use through serious educational games.

The main goal will be achieved by performing the following tasks:

- Research of approaches, tools and methods for creating and modeling of contextually related multimedia resources;
- Building a model of semantic-based connection of digital multimedia cultural resources for a specific area;
- Research of global experience in the field of serious educational games and their application to cultural heritage;
- Building a model of serious educational game by using related multimedia resources in the field of cultural heritage.

2 Semantic-based Connection of Digital Multimedia Resources

Creating of models of serious educational games through related multimedia resources is original and innovative scientific research supporting the understanding and perception of cultural heritage in a very interactive way.

The implementation of the idea of providing semantic and context-based access to content in the field of cultural and historical heritage for everyone, without restrictions of time and place, through the effective use of information and communication technologies are essential prerequisites for the emergence of new tools and services in digital environments and infrastructures for managing and accessing digital content. In general it includes activities such as:

- Description of the semantics of digital multimedia objects, considering their specifics and subject area which they belong to;
- Providing of semantic and context-based access, adapting of navigation and the format for displaying, providing and presenting of informational resources, specialized search, grouping, sorting, intelligently curation of cultural, historical and artistic objects and more;
- Selection and recommendation of information resources according to their content and the context in which they are used, etc.

On this basis during the last years actively is working to implement semantic-based tools and services in the environments for managing digital content and in this way to allow maximum achievements to the rich semantics of valuable artifacts from the cultural and historical heritage (Bogdanova, Todorov, & Noev, 2013), (Bontchev B. , 2012), (Noev, 2015), (Todorov & Noev, 2014), (Bogdanova & Kancheva, 2015), (Bogdanova, Ivanova, & Atanasova, 2013), (Pavlov & Luchev, 2014). The knowledge of these treasures, created by the human hand is hidden from the modern viewer because of insufficient knowledge of the era, evolution and origin of this richness, and because of the difficult access to some artistic artifacts.

The ability to create, use, and extend semantic models of cultural, historical, military, and many other different areas in order to implement them in the context of serious

educational games is a great challenge, and will lead to great opportunities for further researches and extensions, building of new and upgrading of existing concepts and models no matter what is the educational area.

3 A Model of Serious Educational Game by Using Related Multimedia Resources

Serious games have gained popularity at the beginning of this century and proved their effectiveness in many cases. As summarized by Anderson et. al (Anderson, et al., 2009), their main advantages are “communication, visual expression of information, cooperation mechanisms, interactivity and entertainment”. However, initial enthusiasm has slowed because of the enhanced expectations and limitations of serious games. First SG has some pedagogical restrictions. As Brisson et. al (Brisson, et al., 2012) noted recently, serious games have to respond of two major problems: (1) how much SG support and promote learning and (2) how to support the pedagogical design of SG relating to content and experience of the players in accordance with the set up training purposes. Second, serious games suffer from significantly lower performance and audio-visual quality compared to common entertainment games, which naturally creates less enjoyment during the game. And last but not least - SG have a much higher cost and require more time than other technologically supported learning methods (Gee, 2003).

Unlike other traditional media, video games are able to deepen the understanding and perception of cultural heritage in a very interactive way. Salen and Zimmerman (Salen & Zimmerman, 2004) claimed that all video games somehow reflect the human culture, because they are “objects, made and used within the culture as a whole”, but “not all games are capable of transforming culture”.

As a tool for the study of cultural heritage, SG possess incredible potential thanks to the availability of free choice of place for learning, flexible time control, choosing the time and speed of learning, autonomous learning in game context, self-controlled learning (Arapi, Paneva-Marinova, Pavlov, & Christodoulakis, 2016), problem solving, systems thinking and readiness for cooperation (Paneva-Marinova, Goynov, & Luchev, 2017), (Bontchev, Paneva-Marinova, & Draganov, 2016). Serious games about cultural heritage are divided into several major categories:

- Interactive virtual museum – using gaming technology both for fun and education of visitors usually by including some research and assembly of tests, puzzles, quiz shows and others (Luchev, et al., 2016);
- Prototypes and demonstrations – games based on 3D virtual reconstruction and georeferenced modeling of ancient historical objects;
- Games to acquire cultural knowledge and intangible heritage – including intercultural skills and language learning games with high precision 3D simulation of cultural backgrounds;
- Social marking and gain knowledge – SG to promote players to give accurate information about cultural artifacts built into the games for further examination and acquisition of knowledge.

4 Future Work and Expected Results

Research methods and techniques that will be used in the project are based on standard methodology from the Computer Science and supposed, that created models, methods and tools will be reusable, flexible and extendable. It is used in long-term work and includes:

- Methods and techniques for research studies, collection, selection (synthesis) analysis and summary of scientific information on achievements, best practices, development, policies and problems in Europe and Bulgaria related to the objectives of the current research;
- Methods and techniques for proposing and analysis of ideas for the realization of major infrastructure components of technology platform (common architecture, object ontologies, national metadata profile, data profile and their exchange including services of context-based usage and more);
- Methods and techniques for software design of optimal functional models of highly reusable services (both atomic and complex) and others, created on the basis of the ideas of the previous point;
- Schemes for monitoring and control and for internal evaluation of performed research work.

The expected results of the scientific research are to develop a new models and tools for context-based using of digital cultural resources for educational application of serious games. In the process of research and acquisition of new knowledge will be achieved and these research results:

- Proven hypothesis, that the acquisition of knowledge in the field of cultural and historical heritage is more effective and successful with implementation of new ICT technology tools and modern educational approaches used in serious games with rich multimedia and semantic content;
- Model for adapting of serious educational game to use multimedia resources together with their semantic relations;
- Model of contextually related multimedia resources by using semantic technologies of objects and their metadata from a collection in the field of cultural and historical heritage;
- A detailed analysis of current trends and researches in the field of serious educational games;
- Detailed analysis of modern tendencies of methods, concepts and tools for creating, modeling and using multimedia resources in the field of cultural and historical heritage;
- Digital collection of multimedia resources (with their relations described by the semantic models) in the field of cultural and historical heritage.

Acknowledgements

This work has been partially supported by the National Science Fund of Bulgaria within the “Models and concepts of serious educational games through related multimedia resources of military and historical heritage” project, contract No. DM02/3/17.12.2016, and “Concepts and models for innovation ecosystems of digital cultural assets” project, contract DN02/06/15.12.2016.

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Received: June 15, 2017

Reviewed: July 10, 2017

Final Accepted: July 17, 2017