From 3D virtual museum to 3D collaborative virtual workshop

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Abstract

In recent years, virtual museums have become more widespread and the usage of them for educational purposes has increased. They are used to facilitate educational process in different ways, such as presenting their exhibitions online and serving as a place for educational activities. In this paper, we present an example of such a virtual museum – "3D Virtual Environment for Learning Arts". Still, only few of existing virtual museums provide sufficient support for collaboration and social interaction. Therefore, considering the growing importance of collaborative technologies and social networking in education, we show how a virtual museum can be enhanced and extended to serve as a collaborative virtual workshop.

1. Introduction

In recent years, virtual museums have become more widespread and the usage of them for educational purposes has increased. This metaphor is popular because it is well-known from everyday life. A modern age virtual museum is a complex system with a wide range of possibilities for users. Virtual museums have proved effective in a number of educational projects [1, 2] and are used to facilitate educational process in different ways, such as presenting their exhibitions online and serving as a place for educational activities. An educational virtual museum is a part of a bigger set of educational *virtual worlds*. Previously, we characterized such worlds [1] in terms of learner, place and artifact. This is inspired by the Activity theory (as discussed in [1]), i.e. activities are performed by learners and are mediated by artifacts, while both learners and artifacts are contained in a place. In this paper, we focus mostly on the place dimension as we consider it most important in educational contexts. The metaphors behind the design of virtual places are quite diverse. Shortly, we characterize 3D educational CVEs in terms of *outlook, structure and roles* [1].

In this paper we will present an original system based on virtual museum metaphor – 3D Virtual Environment for Learning Arts (VELA). Considering the growing importance of collaborative technologies and social networking in education, we will also elaborate on how this virtual museum can be enhanced and extended with collaborative support and a variety of possibilities for collaborative learning, creativity expression and resource sharing. We denote the resulting system Collaborative Virtual Workshop (CVW). The proposed procedure could be generalized to other similar systems.

2. Background

Learning arts have particular qualities, which is necessary to consider when designing e-learning systems. It is essential to find out effective ways to promote art-related experiences for students and to provide a social and aesthetic environment for art education.

The richness of the museum experience is that it can stimulate most of the different types of intelligence, while traditional classroom learning tends to concentrate heavily on a more limited range, principally linguistic [3].

Virtual museums offer many of the informal learning opportunities through digital technologies and by creating a corresponding atmosphere. Informal learning contradistinguish with formal education – often perceived as being equivalent to school and the curriculum. Informal learning is particular important for art education [2].

Several museums have already established own 3D representations, providing services for learning and communication. Nevertheless, most such existing virtual museums do not provide the necessary level of

engagement because the support for collaboration is not sufficient. Also the content of these projects is usually expensive to create because it is designed mostly by developers, not end-users, as the Social Software approach presupposes [4].

On the other hand, enhancing virtual worlds with means of the social software technologies, popularly known as Web 2.0, (such as blogs, wikis, social networking, media sharing and social tagging), provides users with more possibilities to create and share any content. This new way for content-generation becomes increasingly popular [4].

3. Design of VELA

In this section the project "3D Virtual Environment for Learning Arts" (VELA) will be considered in detail. We will describe the design of the virtual place in VELA in terms of outlook, structure and role, in accordance with the characterization network mentioned in the Introduction.

VELA is a 3D environment where user can learn art by traveling through European cities, visiting art exhibitions, galleries, artists' studios, etc. In VELA user is represented by 3D avatar. Managing it, user can move through the environment, interact with agents/bots and get information from them in the form of a text dialog.

Fig. 1. A scene of VELA – "Paris"

Outlook. VELA provides an immersive 3D environment. This environment relies on several known metaphors: exhibition halls, museums, cities and streets. It provides user with a new experience in learning.

Scenes of VELA resemble real cities with corresponding elements (houses, streets) and interiors though without direct correspondence to their physical counterparts. Still, the most prominent landmarks such as Eiffel tower in Paris are recreated as in reality (Fig. 1). This provides an atmosphere of real presence, easily recognizable by users. For example, user can visit an art exhibition, where the most important paintings of the period of study are presented. It is possible to look at the pictures and read accompanying short descriptions, like in a real museum. User can also visit a painter's workshop and get immersed in a creative atmosphere.

Structure. VELA provides openness in information access and the ability to form conceptual hierarchies of knowledge area in a variety of ways. An important issue is that user has the ability to perceive information from several sources simultaneously. This contributes to better understanding of the subject and increases user's interest. Well recognizable cognitive scheme was used in VELA. The project consists of several 3D scenes, integrated into one environment. Scenes include 3D models of land, buildings, interiors, avatars and a lot of pictures and texts.

Role. VELA plays several roles. First, it is an educational space that contains information about modern art. The educational content is presented in the form of informational blocs in different parts of the space. Also, there are several interactive tests and quizzes in VELA that can be used to control learners' knowledge about the subject. Thus the system may function as an individual educational tool or serve as a supplement to traditional tools used in art education.

4. From virtual museum to collaborative virtual workshop

Based on the discussion in Section 2, we suggest to transform 3D virtual museum VELA into 3D collaborative virtual workshop (CVW) by adding support for communication and collaboration. We suggest extending system's functionality and scope. First, we propose using it in a wide range of subjects, not only art education. Therefore, we suggest enhancing the set of supported activities that are available for users. It would be possible for learners to collaboratively construct shared knowledge and understanding of a subject by participating in real-time group exercises or by collaboratively manipulating educational content (including 3D objects), for example, by annotating, commenting and modifying it. It will allow enriching the system with user-generated content. We also propose to integrate some key Social Web functions to provide users with wide possibilities for communication and social networking.

Such CVW can be widely adopted in University education. For example, all the students can use such virtual environment for collaboratively designing their projects (e.g. in science, history and architecture) and then displaying and sharing the results in designated

'galleries'. Further, students from subsequent years can modify and reuse this content.

Based on the discussion above and characterization framework for 3D educational CVEs, we propose the following requirements for a collaborative virtual workshop.

5. Requirements for CVW

Learners/users should be represented by customizable animated 3D avatars that express user's personality and reflect his/her status, ethnicity, sex etc. A learner should have the possibility to communicate with other learners, explore virtual space and existing artifacts and create own artifacts in form of text, graphics or 3D objects as well as sharing these artifacts with peers. A user can play a number of roles such as learner, teacher, and assistant.

Artifact. CVW should contain several types of artifacts: basic ones for collaborative work, communication and transportation and specialized sets of artifacts for different tasks (e.g. for manipulating text documents, graphics and 3D objects).

Place, outlook. CVW should consist of a variety of virtual places/modules for different purposes with outlook tailored to the concrete task. It could for example be lands with buildings and rooms with furniture, working tools and other objects. Virtual places should be realistic and apply easily recognizable metaphors. The overall outlook should promote a motivating and informal atmosphere, with elements of fun where appropriate.

Fig. 2. Students are discussing Claude Monet and Vincent van Gogh paintings in CVW

Place, structure. The structure of CVW should consist of rigid and flexible parts. Rigid parts of the system should where appropriate resemble 'physical' structures from reality and be well recognizable for users, for example a meeting hall recreating an existing one in real life. At the same time, parts of the structure should be flexible enough to be easily adjustable according to current needs and purposes.

Place, role. CVW in general should be a place where both local and distant users can work and learn together. Therefore, the system should support both synchronous and asynchronous communication and work. CVW should contain several places with different functions and purposes such as labs, galleries, places for meetings and socializing and so on. A user should be able to easily move from one place to another. All these virtual places should contain toolsets tailored to the various activities performed there.

Based on these requirements we have started to design and implement a prototype of Collaborative Virtual Workshop as shown in Fig. 2.

6. Conclusions and future work

In this paper we have discussed the role of virtual museums in education. As an example, we have presented 3D Virtual Environment for Learning Arts (VELA). We have further argued that virtual museums used in education need to provide substantial support for collaborative work and learning. Therefore, an extension of VELA, 3D Collaborative Virtual Workshop, is proposed.

We have outlined a set of requirements for CVW. A prototype is currently under development and it will be tested among the students of our universities. Based on the results of the empirical evaluation, the set of requirements will be revised and extended.

7. References

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