Virtual City as a Place for Educational and Social Activities: a Case Study

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Abstract—In recent years, virtual worlds have become increasingly popular in education and social life. Using a ‘city’ metaphor, we are developing a 3D virtual world enriched with social and educational tools. This virtual world allows performing a number of activities, such as exploring the city, learning and communicating with its citizens, building a social network. In this paper we report the results of a case study we have performed to explore users’ activities and behavior in a virtual city context. Our goal was to investigate how such a city can facilitate learning and socializing, also in a cross-cultural context. Based on the empirical results, we derive a list of recommendations for a virtual city as a place for social and educational activities.

Index Terms—3D educational virtual worlds, virtual city, collaborative learning.

I. INTRODUCTION

During the recent years, 3D virtual worlds have become increasingly popular in educational settings. In [1] we have argued that such virtual worlds have promising potential for supporting learning communities because of their capability to provide a social arena where students and teachers can meet overcoming the barriers of the physical world. According to [2], virtual worlds offer an opportunity for people to interact in a way that conveys a sense of presence lacking in other media. Such environments can provide a social context for learning and a sense of presence, which is important for the students’ emotional involvement and implies a level of engagement that might not be present otherwise. The design of educational virtual worlds is often based on the social constructivism approach [3], allowing learners to co-construct their environment and understanding together with their peers.

In this work we focus on a ‘virtual city’ as a place for social and educational activities. A virtual city can be defined as an environment representing a real or fictional city and supporting a range of different activities for the purposes of education, entertainment and socializing for local communities. Other possible roles of a virtual city include attracting potential tourists, visitors and students and providing them with explicit information about the city, the local educational institutions and so on. Dissemination and sharing of the user-generated content related to the city could also play an important role in this context.

‘City’ is a powerful metaphor that most people are familiar with. A brief exploration shows that this metaphor is used in quite a broad range of virtual worlds projects [4, 5]. In the virtual city design the quality of environment and the level of detail are often of high importance [6]. Still it is not only an issue of creating a realistic 3D model, but a place that is invested with social meaning. Therefore other questions appear: for what purposes and how virtual cities can be used [6].

The most known virtual cities are made for Geo-navigation, such as Google Earth (http://earth.google.com), heritage preservation, such as, Rome Reborn (http://www.romereborn.virginia.edu) and Forbidden City (http://www.beyondspaceandtime.org), others for gaming and socializing, for example Cybertown (http://www.cybertown.com) and Citypixel (http://www.citypixel.com). However, virtual worlds that represent the physical world in a very direct and realistic way, known as ‘mirror worlds’, do not have satisfactory support of learning and socializing [5]. Many of the experiences in these virtual worlds are reported as disconnected with those of their real-world counterparts. At the same time, social virtual worlds, such as Second Life [2], resemble only little parts of real world or even do not have anything in common with the reality.

The work in this paper reports on addressing these issues and outlines a strategy for reconnecting the virtual and the physical in a city context, considering both learning communities and realistic representation. It requires the integration of the 3D virtual worlds with social software tools as we presented earlier within the concept of Collaborative Virtual Workshop [7]. In general, while virtual worlds focus on collaboration among people that are geographically distributed, the metaphor of ‘virtual city’ brings local issues back into the distributed virtual environment, recognizing the critical role of place and local communities in learning. This not only supports interactions with “others around the world, but also – and, perhaps more importantly, with people nearby” [8]. The challenge therefore is to design, what Thackara calls, new geographies of learning, “configurations of space, place, and network that respect the social and collaborative nature of learning – while still exploiting the dynamic potential of networked collaboration” [9].

In the next section we present a case study of using a virtual city for support of learning communities. Based on the results of this study, we provide a set of guidelines for designing a virtual city as a place for social and educational activities.
II. VIRTUAL CITY OF YOSHKAR-OLA

To identify the expectations that learners have of a virtual city and to investigate what functionality and content are needed for such a system, we performed a case study among the students of the Norwegian University of Science and Technology (NTNU) having a number of educational activities in the Virtual City of Yoshkar-Ola (VCYO).

A. System Description

This section presents a short description of the system VCYO. In reality Yoshkar-Ola is a little city in the Volga region in Russia, where MMLab (VCYO developer) is located. VCYO is a multiuser virtual environment, providing an accurate recreation of the central part of the real city with buildings (with examples of interiors), streets, yards, trees and other elements (Fig. 1).

The model of the city contains also the main building of NTNU as a symbol of collaboration between universities and as a fun element. The system is freeware and available on the web (http://virtyola.ru/index.php?lang=english).

The system’s functionality includes realistic customizable avatars with different navigational possibilities, including a big and a mini-map as well as teleportation. Users can communicate to each other by text chatting; voice chatting is under testing.

The system also supports social software functionality. A user can add comments to existing notes or photos, as well as leave own notes and pictures around the world (Fig. 1). It is also possible to examine descriptions of places and buildings in the city as well as other users’ notes and photos. A citizen of the virtual city can also create a social network with other users, filling the profile, adding friends to the friend list, keeping blog and commenting others’ blogs. VCYO also contains some educational tools to enable live virtual lectures such as facilities for slide show, video and web.

B. Case Study Settings

The goal of the case study was to investigate how a 3D virtual city can support collaborative learning and socializing among students.

34 students from NTNU divided into 8 groups participated in the case study, most of them in their 4th year of study; plus a small group of Russian students. The NTNU students included both ethnical Norwegians and exchange students from other cultural backgrounds. The students were given an exercise where during the preparatory phase they were supposed to explore the virtual world of VCYO, aiming at analyzing the different design features used and discussing the usage of virtual worlds for learning and socializing. The students were also asked to make suggestions how they would have designed a virtual campus representing NTNU and a virtual city of Trondheim (where NTNU is situated) in the most appropriate way.

A central task was participation in a virtual lecture. The lecture took place in the open-air auditorium (Fig. 2) in VCYO, where several tools for learning are situated.

Lecture theatre with slide show, web browser and video screens with a pointer, as well as chat were used during the lecture. After the lecture, the students had a discussion on virtual worlds and virtual cities in educational settings.

The students also delivered essays answering a number of questions regarding their experience in the virtual city.

All the data in this explorative case study was gathered from the following sources of evidence:
- direct observation of students’ activities online;
- archival records (visiting statistics, chat log as well as notes, pictures and comments recording);
- users’ feedback (essays and questionnaires)

III. RESULTS AND DISCUSSION

A. Case study results

This sub-section presents the empirical data that was gathered during the case study. This includes mostly how the students used communication and social software tools, path recording data as well as some examples.

From the 34 students participating in the study, 27 communicated by chat and posted text-notes and pictures. We selected 28 discussions from the chat log that students took part in from the chat-log (excluding the lecture). Most commonly in these discussions students helped each other to understand the system’s functionality details and how to navigate in the virtual city, as well as shared their impressions about the VCYO. Some of the observed students also met local visitors of VCYO and had some informal conversations. In general, we observed a number of examples of ‘social navigation’, where the students
Students left 135 notes in the virtual city; some of them were commented by their peers or other virtual citizens. Notes were tagged to particular places so that students from the observed group used them mostly to ask about interesting places, buildings and objects, while local virtual citizens often answered by commenting on those notes. For example, there were discussions around the virtual gallery in VCYO replicating the one available in reality in the city of Yoshkar-Ola. Some of the Norwegian students expressed their interest in the exposition, wishing to learn more about Russian art.

The students from the observed group were interested in the photos of the real city posted in appropriate places in the virtual one; however, they uploaded relatively few pictures of their own. But there was one exception – the main building of NTNU that was created and placed in the outskirts of the virtual city. All of Norwegian students could easily recognize this building and some of them posted photos of it, also leaving a lot of notes discussing the building, the university and other issues.

Concerning profiles, friend lists and personal blogs functionality, it should be said that it was used to a smaller degree, due to technical problems and the relatively small size of the community and a short trial period.

We performed path recordings during the case study (Fig. 3). These data were used to analyze how much time students spent in the virtual city and what places they visited.
design of certain places for various educational activities (such as lecture halls and museums) might have a limited reality resemblance to serve the specific goals in a best possible manner.

*City atmosphere* plays an important role, according to students' feedbacks. Appropriate music and sounds, moving objects, presence of other users, real or artificial, will contribute to make the virtual world more ‘alive’ and appealing.

*Informational resources* should be an essential part of a virtual city as well as a set of tools for content manipulation. It was generally agreed that only models of buildings without corresponding information have a very limited value and meaning, especially for the users not familiar with the city. Therefore, there should be a strong correspondence between the constructions in the virtual city and the associated informational resources and facilities. For example, the city hall should contain information about local government; the doctors’ offices should contain information about the medical services. The city should in general contain multimedia resources such as sound, pictures, video and ‘enactments’ with virtual agents associated with relevant important buildings and landmarks, allowing the users to learn about the city, its history and culture.

A wide array of *community resources and tools* reflecting and supporting the life of the community should be integrated in a virtual city, in a situated and contextualized manner. For example, there should be established virtual places for social activities (imaginary ones or representations of real places) such as squares, parks, art galleries, museums and clubs. Other examples include bulletin boards with announcements, blogs and virtual houses for community members, discussion forums and tools for supporting social networks with extensive possibilities for the users to share, annotate and modify the content. There should be clear connections between the constructions in the virtual city, the associated informational resources and the related virtual places. A basic support for commercial activities should be provided to ensure better integration of local businesses into the community.

Various *navigation facilities* should be available for users to access the content in a virtual city in the most efficient way, such as ‘city tours’ led by agents, and ‘transportation routes’ marked clearly between different places, ‘tourist offices’ with information and links to the main points of interest plus searchable maps with filters where one can look for shops, local businesses and historical places. In order to support social navigation, there should be possibilities for sharing information on paths taken and places visited by other users.

*Virtual campus* in a ‘student’ city like Trondheim is supposed to act as a natural educational center, providing a broad range of educational resources. At the same time, such resources supporting learning and students, communities and social activities should be integrated throughout the city. Examples include virtual ‘concert halls’ for student festivals and history lessons in the city streets.

IV. CONCLUSIONS AND FUTURE WORK

In this paper we discussed the concept of virtual city as a place for educational and social activities. We presented also basic results of a case study, performed in the Virtual City of Yoshkar-Ola. We analyzed the effectiveness of different tools supporting educational and social activities and suggested directions for their development and improvement. In addition, based on the empirical data, we derived and presented the set of the major guidelines for designing an educational virtual city.

Future research directions will include further work on the VCYO project, designing a virtual city representing Trondheim as well as the development of the theoretical framework for designing educational virtual cities.

REFERENCES


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