

Virtual Environments for Learners with Special Needs

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ABSTRACT

This paper proposes methods to create educational Virtual Environments for users with no computer and reading skills. The objective is to outline issues that are critical for the success of an educational Virtual Environment: user interface, navigation, interaction and environment design. We propose solutions to improve the usability and visual quality of environments. Two example environments are presented in detail to illustrate our ideas: The education of battered women and a city guide of a historical boulevard in Istanbul.

Keywords

Education, Virtual Environments, User Interfaces.

1. INTRODUCTION

This paper will undertake the task of addressing the issue of providing educational environments for learners with special needs.

The projects presented in this paper are the output of the 'CS450: Computing and Art' course, taught at Sabanci University, an interdisciplinary course involving the collaboration of computer engineering and visual communication design students that are teamed up as one representative of each discipline. These teams are asked to create the content, scenario and design of an immersive Virtual Environment, involving architecture, modeling, animations, image processing, special effects and sound amongst other elements. These Virtual Environments are then implemented into standalone computer applications by the usage of OpenSceneGraph (OSG) [1]. We encouraged our students to give thought to creations that would give possible indicators as to how Virtual Environments can be used as educational environments, especially where little or no literacy is a factor brought into play by the participant/viewer of the environment. The

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two examples presented below demonstrate two different approaches to educating in a Virtual Environment without the presence of type. Example # 01 solves the communication problem by voiceover techniques that guide the user to the specific lessons, tasks and components of the architecture, whilst Example # 02 solves the same problem of guidance and communication, i.e. teaching, with the aid of an avatar, i.e. a pedagogic agent.

2. USER INTERFACE AND INTERACTION DESIGN

Our premise is that the users have minimum or no computer knowledge compounded by the overriding factor that they cannot read or write. In their state of stress and nervousness they might not be open to learn any complicated tasks. Furthermore in some cases there might be no trained instructor available on site. Therefore we limited the navigation of the interaction to the automatic selection of an object to its proximity to the mouse. No keyboard is required to navigate and perform selections in the presented environments. The complete environment is accessible just with the movements of the mouse.

Given that it is fairly easy to get lost in Virtual Environments, even for trained users, we have made a special effort to design the navigational components: To address navigation issues we have implemented:

- 1-) *Limited movement space* around the environment.
- 2-) *Automated camera placement*.
- 3-) *Voice/narrative*.

3. CASE STUDIES

Example #1: Educational Virtual Environment for Battered Women

The first environment is on the education of battered women of all education levels, literate as well as illiterate, as a focus area and created a Virtual Environment to educate them about actions they can take to fight against abuse in the family. We have identified the global [2] and local [3] issues on battered women at the beginning of this project. There are a couple of important issues to consider when designing Virtual Environments for not only computer illiterate, but illiterate in the full meaning of the word, target groups.

The interface helps empower women through visual language, provide a safe space for abused women and girls where they can enter and feel secure. The objective is to make women aware of their own power and be in control over their own bodies and lives, that they can in fact make choices in these matters. By showing individual cases, we aim to establish identificatory examples that the user can empathize with as well as make correlations to her own situation, releasing her from the anxiety of feeling confronted with a situation that she is facing alone. (Figure 1)

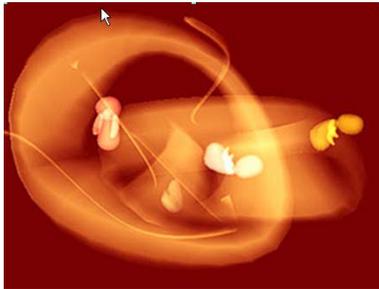


Figure 1: Snap-shots from Virtual Environment to educate battered women. Each fetus contains a different story.

Example #2: The Istiklal Avenue Guide

We created a Virtual Environment that will educate the user in the architecture, history, as well as places of interest on one of the main historical avenues of Istanbul, Istiklal Avenue. The avenue is a pedestrian area that nonetheless has a tramcar running its length. This tramcar has become the symbol of the location and thus we decided to use it

as an avatar/pedagogical agent. To this end we employed some minor antropomorphisation to the front of the car, simulating facial features with windshields; bumper and so on and most importantly gave the tramcar a human voice. (Figure 2)



Figure 2: Snapshots from Istiklal Avenue Guide Virtual Environment. The tram is an animated pedagogical agent presenting the history and daily life of the area.

4. CONCLUSION AND FUTURE WORK

In this paper we have proposed a methodology to create interactive 3D Virtual Environments to educate users with no computer and reading skills. Presented example environments provide solutions on interface, interaction and environment design for educational VE's with and without pedagogical agents.

The main result of our experiments is that once carefully designed 3D Virtual Environments can become a promising platform to convey information to people from diverse background and skill

In near future we plan to experiment with a large set of participants from Turkish women rights NGO's and Beyoglu municipality where the second VE takes place to open both environments to public use in selected sites.

5. REFERENCES

- [1] OpenSceneGraph www.openscenegraph.org
- [2] Amnesty International: <http://www.amnesty.org.uk/news/press/14030.shtml>, January 10, 2005
- [3] "Violence against Women : Terror at Home". Istanbul: Mor Çati Publications, 1996