

Mubil: Creating an Immersive Experience of old books to support learning in a Museum-Archive environment

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Abstract. Historical archives as collections of social memory have always played an important role in creating awareness about cultural heritage. The Norwegian University of Science and Technology University has created a hybrid space of interaction where its archives are mediated through applications of novel technology for schools as new potential users. The project called Mubil, established as an international and interdisciplinary cooperation in 2011 explores how visitors interact with archive documents of great historical value using a 3D tool, without touching the authentic physical objects. Borrowing museum design strategies into archive management and using gaming technology to support learning, the project will investigate possible ways of allowing archive-visits to become an educational arena for younger generations. Mubil aims at finding ways to design active participation in an immersive environment that stimulates knowledge-seeking through a perception-action interaction procedure. Mubil focuses on testing the extent to which distinctive features of Virtual Environment, such as immersion and interaction, affect the involvement of the public in the transmitted content, such as of old books or manuscripts.

Keywords: Augmented Books, Cultural Heritage, Immersive Systems, 3D, Archives and Libraries, XVR Systems.

1 INTRODUCTION

Cultural and heritage Institutions as museums and archives have played an important role in informal education and outdoor learning activities in today's society. Nowadays, virtual exhibits have become the principal means through which museums communicate their mission objectives and they can be static or interactive. Recent technological advances have enriched the design tools of virtual exhibitions [5] and have established novel activities that convey information for knowledge construction, acquisition and integration.

New types of interfaces, interaction techniques and tracking devices are developing at a rapid pace and can be integrated into multi-modal interactive VR and AR interfaces [7]. Beyond the technological advances of recent years, several studies have empirically validated the benefits of virtual applications on museum learning activities [2]. Especially at young ages, gaming activities provide structure for collaboration and reward and promote participants in many learning contexts. As such, students are motivated to interact and to be engaged throughout the learning process in a way that is meaningful for them. Learning by playing encourages interactions and stimulates collaboration. Collaborative playing requires the simultaneous utilization of various skills [6]. As evidenced by the performance of students, learning via gaming has proven to leverage students' experience with the learning context and increase the educational effectiveness [8]. Additionally, gaming successfully teaches students in several areas, including history, arts and cultural heritage [3] [6]. In most cases, gaming elements (e.g., cooperation, competition, score, time limits) have the ability to motivate and attract students. Mubil aims to explore the role of ICT has on learning through the lens of mixed environments at museum-archive visits.

2 SYSTEM DESCRIPTION

The technological tool we use to promote archive content in this study is 3D technology, where the user interacts with objects virtually rendered in an immersive reality environment. Manuscripts are presented in the form of an interactive 3D book (augmented book). Users can freely explore the original pages of the book or access their translations into several languages. An enhanced interaction modality enables the exploration of additional content purposely developed for the project such as 3D texts, images, movies, audios, real-time animated 3D models. In Figure 1, a page from the 3D transposition of Lonicer's treatise on medical distillation is presented. A second interaction level is represented by a virtual laboratory, where the user exploits knowledge from the previous level into an interactive lab application. The reader becomes an apprentice alchemist that must perform a real experiment based on the distillation notions acquired from the Lonicer treatise. A point-and-click interaction metaphor enables players to discover information, combine objects and perform all the operations involved in the distillation of a medicine.



Fig. 1. The book of Lonicer from 1590

Thanks to the flexibility of the application architecture and of the XVR underlying technology, several interaction metaphors have been implemented based on different devices (mouse, joystick, Microsoft Kinect etc.). The same applies to visualization metaphors, adapting to tablets, notebooks, and even immersive visualization systems such as CAVE.

3 WORKSHOP DESIGN

The first MUBIL prototype has been evaluated by 40 High School students, invited to participate to a day-workshop at our library-lab, November 2012, in an environment considered here to be of informal learning. The visit was organized as a field trip embedded in their curriculum as a study activity on the history of Chemistry. On the day of the visit, it was made clear to the students that the prototype presented was “work in progress” and they were invited to evaluate the idea and the pilot application that was presented to them.



Fig. 2. School students interact with the books

All groups participated first at a presentation of a chemistry-expert, presenting the physical distillation-oven and the process of distillation medicinal plants in 1590, connected to the knowledge extracted from the particular book. Then they were allowed to experiment with the book application as they chose and to decide through social conduct how to proceed further. All of the above was documented by 12 hours video recordings. All 40 answered also pre- and post-tests on knowledge tasks. Then we established a focus group that was interviewed. During the interview sessions the students were asked to express themselves freely on the design of the applications, the animations and the functionalities and they were also asked to give us their opinions on the development of the application and the overall experience.

4 CONCLUSION AND THE WAY AHEAD

At present, we are still working with the development of the final applications and the design of the workshop visits that will be adjusted to Norwegian school programs. A

visit in such an environment or exhibition is defined here as a “cultural learning experience that occurs through observation, instruction, trial and error” [2]. In our context VR is used as a medium to understand material heritage culture as an arena of further exploration.

In order to measure the effect experiential learning has in this kind of game-like environments and in order to understand the significance and the effectiveness of these tools we will also perform a series of field studies with observations, interviews and pre-post surveys and tests. The fact that this is a 3D tool tailored for the first time for such an interactive design, where the user is not passively browsing through a landscape or object, has carried some unpredictable technical implementation drawbacks. Books have not been used before in an interactive design that allows the users to actually merge in the text and the illustrations of the book and get the feeling of actually touching the original.

In the next step of this ongoing research after the completion and the launching of the applications at the end of 2013, we will invite more schools to participate in the Mubil workshops, collect data on their performance and collaboration while in the VR environment and try to analyze our results with a combined qualitative and quantitative methodology. We hope then to be able to define and compare different factors that affect their learning process. The overall involvement of the researcher in the actual design of the visits and its implementation is an important drawback. In order to examine the impact of such involvement the project will also be presented to random young users during the summer of 2013 at the Museum of Natural History and Archaeology of Trondheim, adjusted to the Museums schedule and workshop program. There are many challenges though as these kind of virtual environments and their influence on learning have not been tested long enough by other researchers.

5 References

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