Synthetic Learning Environment Games: Prototyping a Humanities-Based Game for Teaching African American History

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Abstract

Generational differences and financial and motivational barriers have limited student access to humanities resources. We contend that Simulation-based Learning Games (SLGs) offer a potential means for delivering humanities content in a format that is more accessible to students and more appealing – both visually and interactively – than traditional educational materials. To explore this assertion, a prototype SLG was developed by students and faculty at the University of Central Florida. This prototype was created using off-the-shelf game technology, and was designed to incorporate sound principles drawn from both the science of learning and the area of game design. Additionally, the SLG is designed to reference and incorporate Florida's Sunshine State Educational Standards to ensure relevance to and support of traditional educational methods.

Synthetic Learning Environments

This demonstration will highlight and discuss the conception and development of a prototype Simulation-based Learning Game, or SLG. SLGs are digital-media based environments that provide deliberate, well-managed *synthetic experiences* as a means to enhance learning and performance. We are using the term *synthetic learning environments* (SLEs) to describe the larger class of such systems, and seek to generate knowledge that leads to their optimization in both design and implementation (see Sanchez, Cuevas, Fiore, & Cannon-Bowers, 2005). The goal of this demonstration is to share with the larger Human Factors and Ergonomic Society community a means of more fully expanding their areas of research and development into the education domain. We also hope to inform this community of one recent effort in that direction through our work with this project.

Our goal was to create a compelling introduction to the historical *Underground Railroad* using existing "off-the-shelf" technology drawn from role-playing computer games to stimulate interest and understanding of events of historical significance while introducing the public to historical artifacts. The collaborative and multidisciplinary efforts involved with this development process contributed to the formation of the *Partnership for Research on Synthetic Environments* lab (PROSE) lab, which was formed to continue the study of synthetic learning in various environments The PROSE lab website can be found at http://www.cas.ucf.edu/create/technology_prose.php.

Addressing the Problem of Access to Historical Resources

Supporting student interest and access to historical resources is foundational to developing a citizenry knowledgeable about our nation's history and culture. Unfortunately, students are often unwilling or unable to interact with historical resources. Broadly speaking, this problem has two underlying causes: one largely financial, and one largely motivational. From the financial perspective, access can be limited due to budgetary constraints with school systems, inadequate local historical or cultural resources, or the lack of finances necessary

to inform the community about available opportunities for interaction with local humanities resources. From the motivational perspective, developing an interest in the humanities has always presented a unique set of challenges. Such challenges are exasperated by the current generation's exposure to and familiarity with digital media. The population of children who have grown up over the last 25 years have been raised in the midst of the computer revolution, growing up in the era of the personal computer, the cell phone, the PDA, and the video game (Greenfield, 1984, Prensky, 2001). The ubiquitous presence of such rapid-fire digital media has conditioned students to accept these forms of interaction with information while at the same time distancing them from more traditional forms of learning such as lecture and reading.

Such problems have led to the development of technologies devised to investigate how digital media may be used to increase access to, and encourage a willingness to interact with, humanities related resources. Unfortunately, attempts to digitize resources oftentimes only produce electronic access to source material with no meaningful attempt to augment the user experience. The present demonstration shows and discusses an effort designed to explore how emerging technologies can be better developed to support learning by augmenting, replacing, creating and/or managing a learner's actual experience with the world. In particular, we discuss a particular form of the synthetic learning environment: that of the *simulation-based learning game* (SLG). In essence, such a technology integrates learning theory from the cognitive sciences with simulation and games technologies in order to facilitate learning.

The Mundy Collection

This SLG makes use of digitally archived documents and materials from a prominent Orlando historian and folklorist who has been collecting and studying these historical items for the last several decades. This historian, Carol Mundy, has amassed a large collection of artifacts, manuscripts, documents, and collectibles dating from the 1720s to the 1970s. This partnership allowed us to

develop a SLG that serves both as a means of preserving digital images of unique cultural artifacts and enabling access to these resources. In this way we are able to teach players about African-American culture and history, using authentic items from the Mundy collection. Ms. Mundy founded the African American History Education & Culture (AAHEC) organization, whose primary goal is to make these resources available and usable for education in history and social studies. Ms. Mundy has continued to work in collaboration with the University of Central Florida (UCF) Her collection is highly valued in the Orlando community and is currently on display in Special Collections at the UCF library.

Theoretical and Pedagogical Background

This project involves an innovative combination of multidisciplinary approaches that were integrated in an effort to examine how SLGs can enhance the learning experience. First, from the cognitive sciences and research in modeling and simulation, we examine the idea of using simulation-based games to enhance the acquisition of knowledge. This involves using SLGs in order to facilitate elaboration of critical content and to scaffold the learning process such that it enhances structuralness, coherence, and the accessibility of interrelated chunks of knowledge (see Glaser, 1989). In this way, the learner is able to build more accurate mental models of domain relevant knowledge (Fiore, Cuevas, & Oser, 2003). Seen through this lens, learning is said to be a process where knowledge is created through interaction

between the environment and the learner when that learner is engaged and challenged (Kolb, Boyatzis, & Mainemelis, 2001).

From the discipline of Texts & Technology, a new discipline specializing in the intersecting space formed by English, computer science, and media studies, we drew upon research on using narrative as a knowledge management framework. Our SLG therefore acknowledges the power of story as an encapsulating technology and learning aid (see McDaniel, 2004). Such potential has also been recognized in the psychological sciences. In his influential work on narrative, Bruner (1991) described how we come to know our world and construct our representation of reality through the use of narrative. The utility of story to encompass not only a number of cognitive factors but also attitudinal issues is perhaps one of its strongest points. Additionally, it has been suggested that a number of complex cognitive processes are engaged when one comprehends a story and that "the enabling events and causes form a web of connections among other events and conditions" (Bower & Morrow, 1990, p. 45).

Finally, from the simulation sciences, we examined how these approaches could be integrated through the utilization of "Commercial-off-the-shelf" (COTS) game technologies, thereby enabling learning that provides a multi-sensory environment (e.g., Bowers, & Jentsch, 1998; Salas & Cannon-Bowers, 2001). The particular game platform

chosen for the project, Neverwinter Nights ™ (developed by Bioware®), had a number of unique advantages. Among these advantages were a robust dialog and level editor, modest technology requirements, and a large and knowledgeable community of game "modders" (individuals who change, tweak, or edit games for recreational and non-commercial purposes). The game is a Role-playing Game, or RPG, a game type which emphasizes storytelling, character development, and dialog over action or gameplay. These elements combined to generate an environment well-suited for our purposes in designing a prototype SLG so as to accomplish our stated objectives.

Prototype Development

The goal of the design approach was to create a compelling journey for participants to navigate through a digitized collection of African-American artifacts which included everything from legal documents and personal correspondence to household items, clothing, and decorative materials. This journey requires users (the primary audience will be fourth grade students) to solve mysteries/puzzles and complete activities with educational value as specified by targeted standards such as those outlined in Florida's Sunshine State Standards. For instance, in one section of the game, players must earn the trust of a fellow traveler on the Underground Railroad so that he will provide them with an important password that will win them admittance to a safe house where they can rest and regroup. In this example, the game utilizes story to weave together historical fact (the fugitive slave law), social issues (trust among slaves and abolitionists) and local educational standards (the Florida Sunshine State Standards pertaining to African American history and culture).

Graduate and Undergraduate Training

An important element of this effort was the involvement of students at multiple levels of the educational process. To support graduate and undergraduate training in research and development for pedagogically sound learning games, students researched and generated period-appropriate dialog and identified important historical, legal, and

cultural issues of the time. Items and images from the Carol Mundy collection were digitized and integrated into the game, and an original score was written and performed by a digital music student. The students who worked on this project were able to gain valuable work and research experience in their chosen fields of study while making an important contribution to the community and to the body of knowledge surrounding the use of digital media in educational environments.
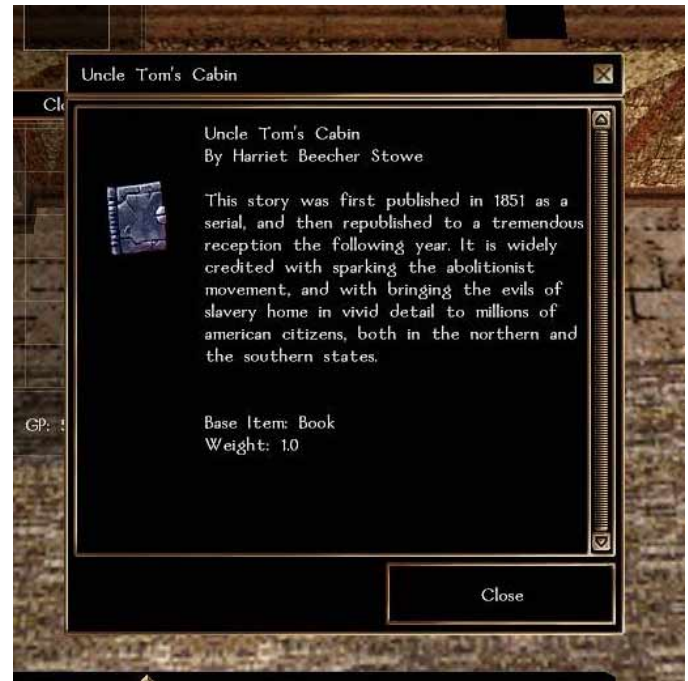
Conclusions and Future Directions

In sum, our short-term objectives for this project were to develop a demonstration game that would enable us to make the SLG concept concrete by identifying the necessary storyline, learning objectives, and candidate artifacts for a humanities based learning game built upon the Mundy Collection.

Our future plans hinge on the development of this project along three parallel paths serving, practical, theoretical, and societal goals. On a practical level, additional research needs to improve the technical quality of art and resources within the game. On the theoretical level, research needs to examine game features to better address their impact on learning. This involves manipulating game characteristics that can impact the affective and cognitive states of learner so as to better understand how this impacts actual retention and understanding of the learning material. Finally, on a societal level, our goal is to produce on-line documentation explaining the steps involved in producing such games. This will allow other humanities based organizations to pursue the development of SLGs incorporating their own historical content and including their own historically relevant storylines.

Our long-term objectives for this effort include research and development in the production of compelling stories and games for the Mundy collection. We will pursue this to both showcase her wonderfully original artifacts and to allow children to learn about history and African-American culture as they navigate through a virtual world where they interact with historic artifacts, objects, and characters.

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