"A Totally Different World": Playing and Learning in Multi-User Virtual Environments

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ABSTRACT
This study examines children's perceptions of their experiences in two science-oriented multi-user virtual environments (MUVEs), River City and Whyville. Sixth-grade students were asked how they would rate and compare different features of these environments. The children rated River City as providing greater educational benefits but preferred communicating with real people in Whyville as opposed to River City's computer-based agents. They felt more integrated into the community in Whyville, where they enjoyed equal participation with other members, than as guests to the virtual town of River City. Finally, children rated their enjoyment at customizing their unique Whyville avatars higher than when selecting a pre-constructed avatar in River City; however, they rated both MUVEs highly when asked about seeing their avatars onscreen.

Keywords
learning environments, technology, science, computers

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INTRODUCTION

Educational researchers have recently turned their attention to multi-user virtual environments (MUVEs) and how they can provide contexts for scientific inquiry [5], facilitate learning of programming [3], and provide access to socially-responsible play [2]. These early studies have started to capitalize on the educational potential of the environments with some promising findings in regard to motivation and learning. The current study contributes to this body of research by asking MUVE participants about their own learning experiences and how they would rate and compare different features of these environments. Such evaluations could provide insights for educational designers and teachers on how to design and integrate MUVEs in classrooms.

The classroom implementation of River City and Whyville, two science-oriented MUVEs, provided the unique opportunity to analyze how 46 sixth-grade students perceived their experiences. Students participated in both environments as part of their science curriculum about communicable diseases over a five-month period. At the end of this time, we asked students to reflect on and compare features concerning educational benefits, communication, authenticity, and identity in the MUVEs.

A COMPARISON OF TWO MUVES: RIVER CITY AND WHYVILLE

MUVEs are usually defined as enabling multiple participants to simultaneously access virtual contexts; interact with digital artifacts and other participants, including computer-based agents; represent themselves through avatars; and engage in collaborative learning activities [5]. Whyville and River City also share a focus on science inquiry and their exploration of communicable disease. In Whyville, a virtual disease ravages the community, and students can explore its spread through use of online science tools [6]. River City utilizes a lab book that guides students in their exploration [4] and allows them to change one feature of the environment to see the effects. Both MUVEs attempt to create authentic experiences, and communication is integral; River City encourages its users to chat with programmed residents and to collaborate with each other, and Whyville provides chat, y-mail (similar to e-mail), and bulletin boards. Finally, the issue of identity is important as these MUVEs allow students to create their own identities in the virtual world. Through these avatars, the children are exposed to – and in Whyville, even contract – diseases. River City offers a menu of previously designed avatars, and Whyville users create their avatars by assembling face parts they purchase.

Although River City and Whyville share these similarities, they also differ in characteristics such as graphics, number of participants, and access. River City is a three-dimensional simulation of a 19th century town whose residents are suffering from various illnesses [5]. It is a closed environment that can only be accessed in the classroom with the guidance of the teacher. In contrast, Whyville has a cartoonish appearance and was designed to promote science learning [1]. Anyone with Internet access can join the Whyville community, which currently maintains a population of over 800,000 registered users. These similarities as well as differences provided the background for the design of student comparison.

METHOD

Participants

Forty-six students from two sixth grade classes (ages 11-12) from an elementary school in Los Angeles participated in this study. Twenty-three students were girls and 23 were boys. The ethnic distribution of the students in the school was as follows: 47% were Caucasian, 27% Latino, 13% African American, and 13% Asian. All students used computers as part of their regular curriculum.

Classroom Implementation

Both classes participated in Whyville from October 2003 through November 2003. During this time, they experienced an outbreak of WhyPox, a virtual disease in which infected avatars were covered with red spots and had their chat interrupted by sneezing. They also used science tools on the site, including an epidemic simulator that allowed students to examine the course of an epidemic in a population. This online experience was integrated with an offline science curriculum about disease. During February 2004, both classes participated in River City. They utilized a lab book that led them through an orientation, the gathering of data to formulate their research question about disease in the town, an investigation of that research question, and a final project in which students explained their conclusions. Additionally, students used various tools, such as an environmental health meter, to track contaminants.

Data Collection and Analysis

Students completed written surveys comparing aspects of Whyville and River City. They rated each characteristic on a 5-point Likert scale and then explained their reasoning in an open-ended response. Their rankings were used to calculate means and standard deviations for each question as reported below. Student quotes illustrative of the responses are also reported.

RESULTS

In general, students reported enjoying both River City and Whyville. Differences in student preferences did emerge between the MUVEs when responses were examined across the categories of educational benefits, communication, authenticity, and identity.

Educational Benefits

While students found both MUVEs to be educational, they felt that River City supported their learning about disease to a greater degree (M=4.52, SD=1.03; Whyville: M=2.96, SD=1.48). One student wrote that in River City, "You had to use the scientific method to test your hypothesis." When asked how helpful River City and Whyville were in achieving their learning goals, students gave River City a mean of 4.40 (SD=0.76) and Whyville a mean of 3.65 (SD=1.04).

Communication

Students reported preferring communication with people in Whyville (M=4.44, SD=1.16) to

River City (M=2.68, SD=1.52), noting that the responses they received in Whyville were from real people and "it was great to talk to people from other countries." While the programmed River City residents could only respond to a few phrases, students did recognize chatting with them as being more beneficial to their learning (M=4.30, SD=1.24) than chatting with Whyville residents (M=2.05, SD=1.45), noting that they received most of their information about the diseases in the community from chatting with the residents.

Authenticity

Students were asked to evaluate how "real" their experiences in the MUVEs were. They reported feeling more a part of the Whyville community (M=4.05, SD=1.36) than the River City community (M=3.40, SD=1.29) because, as one student wrote about River City, "Even though it says I am a citizen – it feels like I'm a guest." In contrast, another student wrote about Whyville, "I felt like I lived there." Students did perceive their experience as scientists in River City as more authentic than in Whyville (M=4.42, SD=1.07 and M=2.47, SD=1.26, respectively), with one student writing, "That didn't feel like the point of Whyville." Another wrote about River City, "We were actually trying to solve a real disease."

Identity

Students preferred creating their avatar more on Whyville (M=4.68, SD=0.87) as opposed to River City's pull-down menu (M=3.49, SD=1.33). One student wrote, "You could design your own face." While they also preferred viewing their Whyville avatar more than their avatar in River City, both were rated highly (M=4.49, SD=0.91 and M=4.01, SD=1.27, respectively).

DISCUSSION

Students were generally positive about the use of Whyville and River City as learning tools in the classroom. While they viewed River City as more educational than Whyville, many students saw this as a positive feature and were quick to point out that while Whyville was fun, the chatting and creation of avatars detracted from attention to science. In River City, some entertaining features were included but were not as pervasive. These evaluations by students suggest that extraneous features designed to motivate children may actually detract from learning.

At the same time, some features that students valued highly were customization of avatars and communication with other children. Students viewed the creation of their Whyville avatars as an important activity and sought to create unique identities within the community. While designers and educators should ensure that creating avatars does not become the overriding focus on the MUVE, some degree of customization might be considered. Communication with others was also valued as chatting with members of the Whyville community was ranked highly, though students recognized that not all conversations were educational. One common complaint regarding chat in River City was the inability of the programmed residents to understand many questions.

The use of MUVEs in classrooms can offer unique opportunities to students that they might not otherwise have. However, such technology cannot be created without taking into account the preferences of its intended users. Students' perceptions of their experiences must be examined and valued by educators and designers, who can then strike a balance between a MUVE's educational purpose and the cognitive, personal, and social features children regard as important.

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