Innovate: Journal of Online Education

Volume 5
Issue 2 *December 2008/January 2009*

Article 1

1-1-2009

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by Rochelle Mazar and Jason Nolan

Although Neal Stephenson's *Snow Crash* (1992) is often noted as the inspiration for virtual worlds like Second Life, virtual environments were flourishing prior to its publication. Multi-user dungeons (MUDs), text-based and multiplayer environments for role-playing games, were popular in the 1980s. In the early 1990s, a new trajectory for online spaces was mapped by the introduction of what became known as MOOs, for "MUD object-oriented" (Curtis 1992; Curtis and Nichols 1993). MOOs, like MUDs, delivered a social environment where players could interact with game elements and with each other, but MOOs allowed users, for the first time, to create their own spaces within the environment. Second Life, which has taken center stage in current research around virtual learning environments, is very much a graphical grandchild of MOOs, sharing in many of the constraints and opportunities of these original virtual environments.

As a result, we contend that researchers and educators investigating educational uses of Second Life could benefit by examining some of the strategies used to create rich educational spaces in MOOs. In our work in a variety of MOO environments (Robbins-Sponaas and Nolan 2006; Nolan, forthcoming), we experimented with modifying communication mechanisms and employing chatterbots to create rich, thoughtful, text-based educational environments. The best practices we uncovered remain relevant in a visual, three-dimensional virtual environment, and we are actively employing these practices in our explorations in Second Life.

Negotiating Communication in the Virtual Classroom

One of the challenges we encountered repeatedly in our work with virtual classrooms, whether in MOOs or in Second Life, was the communications learning curve. The traditional classroom invokes a cultural tradition of privileging the words of some—particularly the instructor—over others; that structure is largely invisible, but it remains extremely powerful and hegemonic (Jackson 1968; Apple 1980; Eisner 1985). There is an element of power in the mere presence of an instructor and that power structure is often impossible to eradicate (Illich 1970). Constructionist virtual worlds have few such traditions (Maxwell 2006; Papert and Harel 1991; Turkle 1998). When a class enters a virtual space as part of a course, the absence of this built-in structure alters the dynamic (Robbins-Sponaas and Nolan 2006). This ability to play with power structures is one of the key attractions of teaching and learning in a virtual space.

Undercutting traditional power structures makes worlds like Second Life and MOOs invaluable for knowledge building, but at times the lack of structure presents a painful roadblock. Without those default roles, it is difficult to provide basic instruction and guidance in the face of confusing and competing text. An instructor's words are easily lost in a stream of other interjections; critical information can be overwhelmed by the constant scroll of chat when there are few cues to draw attention to one message over another. Many students find the constant scroll of text chat overwhelming and off-putting.

While many instructors arrive in Second Life and build classrooms that look and function precisely like traditional classrooms, we should tread carefully when invoking this cultural script. As we discovered in MOO, it is important to consider the implications of relocating the rules of the physical classroom (Nolan and Weiss 2002). The challenge is to consider carefully what we need in the traditional classroom structure and draw it into virtual worlds in a way that does not recreate the power structure that silences most and privileges others. Rather than reconstitute the power relationships that govern traditional educational spaces, we sought instead to use the MOO's capabilities to imbue virtual spaces with key functions that allowed for power to be

better shared and negotiated in ways that will be useful in graphical virtual worlds like Second Life.

Hacking Say

One of the first lessons MOO has to teach Second Life is that building happens not only in the objects in a space but also in precisely how a space allows users to interact with it. What aids in exploring that element of building is the fact that in a MOO space, the script that controls the user's ability to speak resides not with the user but with the space itself. This is different from other environments, like Second Life, where communicative functions reside with the user's avatar.

It seems logical that the ability to speak should reside with the user; speech is a fundamental right of individual expression. But in MOO, speech is understood as an activity contained within an object. Since users are almost never outside of the realm of some room object, they can always call the "say" script as if speaking is an inherent ability. There are only a few special situations when this might not be the case. The owner of a room can modify how speech is represented, for instance, or even decide if it is possible at all. While such control over the "say" script is conceivably problematic, it allows for tremendous creativity and provides great teaching and learning opportunities.

Talking Stick

By hacking the "say" script, we built MOO spaces that allowed for modulated communication and distributed power; the script was modified to allow the power structures found in a traditional classroom to be invoked temporarily to accomplish a specific purpose, encased in an explicit metaphor, and located within the nature of the room itself rather than with the instructor.

We used the tradition of the talking stick as the base metaphor for this hacked "say" room. In several Native American cultures, a talking stick (or other object) is used to regulate cacophonous conversations. The person holding the stick is allowed to speak without interruption; when he is finished, he passes the stick to the next speaker. The talking stick is meant to indicate the importance of everything being said, to assure the speaker that his words are heard by the group, and to help focus attention on each speaker (Fujioka 1998; Waern and Cerratto 2001).

Our hacked "say" room restricted the "say" script to users in possession of the virtual talking stick. When the talking stick functionality was turned on, only the person with the stick could call the "say" script; if other users attempted to speak, they received a message explaining that they must have the stick before they could speak. In MOOs, objects appear as textual descriptions. The talking stick is turned on with a command such as "@talkingstick on". A user who wanted to speak could pick up the stick to speak and drop it on the ground when he or she was finished. If someone else was holding the stick, another user could ask for it using a command like "@request talkingstick". This command signaled to the talking stick object who should have it next, so that it could be moved to the next requester when it was dropped by the individual who was using it.

In our experience working with groups of graduate students, educators, and youth, this technique worked to slow the speed of conversation, helping everyone to follow the discussion (Nolan and Weiss 2002; Robbins-Sponaas and Nolan 2006). More profoundly, it turned an ordinary room into a more sacred and serious one, invoking some of the specialness of the traditional classroom without reifying traditional power structures. At the end of the discussion, we could disable the talking stick function, allowing the room to revert to a more typical space.

Where MOOs are exclusively text based, Second Life provides for communication via chat, instant messaging, and speech; while these diverse channels have advantages, creative strategies to limit or alter user abilities to match the educational purposes of a space may provide different kinds of educational

experiences. The introduction of voice capability to Second Life may provide what MOO could not: a literal talking stick with live voices. By building a room that allowed only a user holding a particular object to use voice chat, an instructor can use what we learned in MOO to control the flow of conversation in Second Life, restricting voice chat to a central speaker while allowing text chat to proceed unrestricted. Text-chat scroll issues could become secondary if the voice channel takes primary place in delivering key instructions or sharing particular insights or reactions. Second Life could provide both the main event and the back channel for a classroom, which could be extremely powerful.

Creative Anachronism

In another experiment with the "say" script, we inserted short phrases into users' speech to create a sense of place and time. As part of Project Achieve MOO (Exhibit 1), we created a historical reconstruction of Bingen, home of St. Hildegard of Bingen, intended to help students explore early modern European history (Nolan and Weiss 2002). At the entry point to the town, we created a room with a modified "say" script that added to users' utterances short phrases drawn from the works of Shakespeare. The intent was to help immerse users in the environment and introduce them to the idea that they were entering a historical recreation.

While interfering with user speech could be perceived as insulting, defamatory, or at least uncomfortable, this kind of speech modification has the potential to support and extend interactivity and immersion within a virtual environment. Although we agree that individual speech should be sacrosanct, we felt that modifying the "say" script in this way was justified as long as the meaning and integrity of what users in the room intend to say remained intact and users were notified that such modification was happening.

While the modification surprised visitors at first, reactions were surprisingly positive. Because the phrases were many and often amusing, the modification was fun for students, encouraging them to linger in the space and prompting them to communicate with each other, if only to see what the next interpolated phrase would be. As an orientation activity, it helped students get used to speaking in a virtual world and to feel more comfortable with the commands. Additionally, it primed them to look for other interactive objects or spaces inside the historical re-creation and pulled them toward the rest of the build. This simple modification helped to immerse students in the space and improved their overall experience.

The structure of Second Life allows us to forget that communication is itself part of the constructed space. Rather than merely building a classroom space in Second Life, consider building an environment that reacts directly to student activity in a fun or surprising way. For example, a recent build called “Cancerland: A Thyroid Cancer Narrative by Hilde Hullabaloo” (Mazar 2008a) uses transparent objects that visitors walk through to initiate the various phases that move the narrative forward (Mazar 2008b). Walking through these veil-like objects triggers audio clips that become layered voices, situating the visitor more intimately within the personal, medical experience described than merely walking through an exhibit or clicking on objects would allow. Cancerland is alive, as it were, with these voices, each located within its own object, in a way that offers a more rich experience, one that is different for every visitor who moves through the narrative as each moves on her own path.

Reviving ELIZA: Chatterbots and Their Uses

Much of the best building in Second Life and in MOOs can feel like a stage all of the actors have vacated rather than an occupied space. Without a cast of avatars online and lying in wait for visitors, it is difficult to construct an engaging, interactive, and immersive narrative space (Collins and Berge 1997; Fernback and Thompson 1995; Kollock 1998; Nolan and Weiss 2002). There are many opportunities in Second Life to break down this static feeling; the sun rising and setting, birdsong, and fish swimming provide an excellent sense of progress through time. MOO programmers also attempted to provide these elements by using text to indicate sounds or movement. These details help users become immersed in a space, but they do very

little to push the narrative forward.

Chatterbots, which evolved from Joseph Weizenbaum's ELIZA program, offer another, more interactive way to populate a space. Chatterbots can interact with each other or with users by responding to questions from a database of programmed responses. They can act in a game as non-player characters, providing information to flesh out the narrative experience, explaining elements of a build, answering contextual questions, or pointing users to new places to go. A chatterbot cannot take the place of real human interaction (Schweller 1998; Leonard 1997), but chatterbots can represent a form of space building that goes deeper than scattering meaningful objects around a room (Bjork 2004). They can allow a builder to construct a standing narrative that will engage visitors and draw them deeper into the space.

We employed many chatterbots to populate spaces in Bingen and create realistic historical tableaux, rich with objects and description, designed to be explored and interrogated much like MUD spaces or static textbooks. Chatterbots were programmed to respond within that context and to add richness to the space. In Bingen, historical scenes were played out by chatterbots; in a street in front of a convent, a boy cried and called out for his mother, Marie de l'Incarnation, who had joined a convent and left him. He would answer questions directed to him, but otherwise he was distracted by his grief. In another room, users could listen in on the disputation of Martin Luther, the last step before Luther's excommunication from the Roman Catholic Church. In this room, two chatterbots triggered each other to create a realistic question-and-answer tableau. To prevent users from accidentally triggering the chatterbots or interfering with the exchange, speech was not permitted at all; any speech entered by users was met with a request to keep quiet while the disputation was under way. These heavily constructed, chatterbot-driven spaces provided a sense of ongoing historical action in which users could participate. Although the entire build existed for users' eyes and ears, the chatterbots created the illusion that users were visitors in a world that continued with or without their participation. Embedded in a historical experience that was active and alive all around them, users became more easily and more completely immersed, frequently reporting that they felt part of what was transpiring around them.

This is a model that would work very well in Second Life, which can offer even more stimuli than MOOs could provide. The Literature Factory on Creative Commons' Kula is built on this model; users can enter the factory and watch words being created, organized, and used to create a computer-generated book. While the Literature Factory does not allow for direct interaction with users, it remains a dynamic, active space that easily attracts and absorbs users.

Second Life and MOO spaces that are rich with chatterbots, objects, and interactive elements can act like living textbooks; builds that tell their own stories can express personal histories, illuminate themes, and roll out a narrative that describes particular historical events. In Cancerland, the veil-like objects are chatterbots, sharing personal narrative elements at key locations throughout the space while the visitor experiences the visual elements surrounding them. While chatterbots can be difficult and alienating in both environments, when used with particular purpose in targeted doses, they can help deepen the level of experiential construction. Chatterbots can make the difference between a static, empty stage and a lively, living place.

Conclusion

What is perhaps most surprising about working first in the text-based virtual world of MOOs and then in the highly visual, three-dimensional Second Life is how remarkably similar they are; Second Life represents an important step in the development of virtual spaces used for learning, but it is not the first of its kind nor are its problems and constraints unique. While the technologies driving MOOs and Second Life are different, the challenges for educators remain the same. Immersive technologies can be overwhelming and stark at the same time, and overcoming both presents challenges that require varied and creative responses. We have presented some of our experiments with these challenges and their results in the hope of reengaging educators with the body of literature that already exists on teaching in virtual worlds and to introduce some of the ideas already in play. From our experiences with both MOO and Second Life, it is clear that each new feature presents its own possibilities, challenges, and questions. Online environments continue to provide

engaging opportunities that challenge us to reconsider, reinvent, and renegotiate every aspect of the classroom experience.

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