

# summer conference 2008



sparkling innovative learning & creativity

## Conference Proceedings

Rachel S. Smith, Editor

**Infrastructures in Virtual Learning**

*Holly Willis | University of Southern California*

# Infrastructures in Virtual Learning

Holly Willis | University of Southern California

While many universities deploying Second Life have constructed learning spaces that replicate their real world campus counterparts, the University of Southern California's Institute for Multimedia Literacy (IML) has worked to imagine an innovative learning environment. This essay describes the IML's design process, the interrogation of the relationship between virtual and physical spaces, creating new forms of spatiality and social interaction within a pedagogical context, and designing learning objects such as an immersive syllabus and spatialized audio texts, with an emphasis on understanding the structuring mechanism of spatial infrastructures.

## The Core Questions

In an essay written in 1980 about potential directions in interactive media, video artist Bill Viola famously asked, "Will there be condominiums in data space?"<sup>1</sup>

If you consider the multi-user virtual environment Second Life a "data space," then yes, there are indeed condominiums, and a lot more. As visitors to Second Life know, much of the design in Second Life aims to replicate material world structures, crafting virtual spaces that look and feel like the houses, offices, shops and classrooms we know from the physical world. This replication is designed to hide the code substrate upon which Second Life was built, but also, often inadvertently, to recreate traditional modes of interaction and hierarchies of power.

This presentation emerges from questions raised at the 2007 NMC Summer Conference, specifically in two presentations devoted to Second Life. The first was "ClevelandPlus in Second Life," led by Wendy Shapiro, who gave a terrific overview of the development and design of the ClevelandOne Second Life space, which includes the campus site for Case Western Reserve University, as well as key landmarks that represent the city of Cleveland, including the Rock & Roll Hall of Fame. Shapiro talked about the collaboration her group formed with the city to help fund and develop a site that would attract visitors as well as students to the site. She also talked about how useful it was to have replicas of dorms and portions of the campus for recruitment purposes. I was struck by the desire for replication, and wondered how the spaces might be reimaged through the lens of pedagogy and learning.

The second presentation was given by Larry Johnson and his team from NMC and centered on an array of projects undertaken by the consortium to assist various academic institutions in creating Second Life spaces. Once again, it appeared that all of the sites that had been developed or that were in the design phase tended toward the representational, crafting spaces that resembled real world structures.

Looking broadly at the array of campus sites in Second Life, we could ask why the emphasis on representational spaces has been so pronounced: is it an instance of what Jay David Bolter and Richard Grusin call "remediation," in which familiar habits and forms of representation are repeated in the initial stages of a new media form?<sup>2</sup> Is it a process of domesticating – sometimes literally – a space that otherwise seems incomprehensible? Is it simply the desire for the familiar, and the sense of wonder produced when you see the real replicated in the virtual?

I don't know the answer, but at the conclusion of the NMC presentation, I asked if any of the institutions developing Second Life educational spaces had started with a theory of pedagogy as a foundation from which to develop their ideas about a Second Life space. The answer was "no."

This was very curious, and countered the direction that seemed so evident: as we begin to reckon with the radical changes that affect today's learners, and as all of us face the challenges of rethinking traditional modes of teaching, what can the affordances of a virtual space do to enhance that rethinking? Rather than starting with the goal of replicating our institutions, how might we instead begin with a pedagogical objective, challenge or problem, and answer it with some of the possibilities of Second Life?

When I left the conference, it was with the vow to attempt to begin the development of the Second Life learning/teaching space for the University of Southern California's Institute for Multimedia Literacy (IML) with a pedagogical theory or challenge as a starting point, and to develop a space that would not replicate our institution, but instead try to build from a pedagogical principal first and foremost.

I also wanted to do this as a group of users, not by hiring a professional design team. I wanted to take seriously one of the fundamental aspects of Second Life, namely that, as Cory Ondrezka puts it, "residents become engines of creation themselves, working as the producers of content in the world, designing and reshaping the space around their own ideas and interests."<sup>3</sup>

This presentation is an account of our year of experimentation, in imagining and researching the possibilities, in asking questions, in designing and building a space, and in experimenting with students and faculty in that space. And while I am presenting this work, it is very much the result of deep collaboration with several others, namely Steve Anderson, director of the Interdivisional Media Arts and Practice Ph.D. program in USC's School of Cinematic Arts; and Bjorn Littlefield-Palmer, who taught herself everything needed to design and construct the IML space while generously assisting students, faculty and artists with their individual projects.<sup>4</sup>

Before delving into the specifics of the IML Second Life design process, however, I want to sketch the particular context out of which our project emerges.

## **IML Background**

The IML was founded in 1998 in conversations between Elizabeth Daley, the dean of the School of Cinematic Arts, and filmmaker George Lucas, who was interested in exploring visual literacy, with the idea that literacy as we approached the new millennium would need to account for not just practices of reading and writing, but those associated with the visual. Throughout our 10-year history, we have conducted research on the changing definition of literacy within a networked world, as well as on new ways of learning and emerging forms of scholarly practice and production.

After several years of experiments pairing a broad array of courses in USC's College of Letters, Arts and Sciences and the School of Cinematic Arts with multimedia labs, we developed the Honors in Multimedia Scholarship program four years ago. It is open to students from any school or division on campus, and leads students through a 20-unit curriculum covering histories and theories of scholarly multimedia, and culminates in a thesis project in the student's final year. The Honors Program is somewhat small – we have 130 students in total – and we have the luxury of being able to experiment in how we design and teach our courses. We have experimented with backchannel, for example, encouraging students to use instant messaging as an extension of the conversation taking place in the classroom. We also work with the tools that the students are using, trying to help instill a critical reflexivity that allows them, for example, to create a critical walking tour of Facebook, analyzing the design and ideological implications of the application.

Our second main program is the Multimedia in the Core Program, which unites General Education courses with multimedia labs, inviting students to create media projects rather than primarily writing papers as assignments. There are many challenges with this program, but it is part of a larger mandate at the IML to work aggressively with faculty and graduate students as much as we do with undergraduates. As such, the program has built into it extensive time for collaboration, course redesign and multimedia instruction and experimentation for faculty.

I should also note that unlike many programs dedicated to emerging forms of literacy, we are housed in the School of Cinematic Arts which includes divisions of production, animation, critical studies, screenwriting and interactive media. All of these divisions and the array of issues and skills that they embody, greatly impact not only how we're able to achieve certain kinds of teaching and abilities with our students, but also influences what we teach.

So this is where we started:

- with questions about an alternative space to enhance literacy and scholarly multimedia practices;
- with a program already dedicated to multimedia scholarship, both at the high level afforded by a small Honors program, and broadly, within a General Education curriculum;
- faculty members with broad interests and experience; and
- the desire to push the boundaries of a theory of pedagogy and to do so in concert with the needs and abilities of our programs.

We were also cognizant of several other key issues:

- 1 Second Life does not exist in a vacuum; whatever happened in our SL space would need to expand on and integrate with other IML practices and research.
- 2 The SL space is certainly coextensive with high information density learning environments that many students already participate in; again, the concern here was balancing the specificity of the space with its ability to integrate with larger goals.
- 3 We know that Second Life is only one among many possible multi-user virtual environment (MUVE) platforms. We did not want to ever get into a situation in which we felt that all that we had done was a waste of money and time; hence it was crucial that the project be as much a learning and research project as a production.
- 4 We know that Second Life is not well-liked by many of our students; while many people – especially those with little or no experience in interactive games – find SL exhilarating, many students complain bitterly about how ugly SL is, how clunky and how unintuitive it is for building. We knew we would need to reckon with this overtly.

## Part 2: Concepts and Inspiration

Our next step was the conceptual phase: what are the key ideas that we wanted to start with? What would form our theoretical foundation?

We had two key concepts that we wanted to put into play.

The first is infrastructure. I borrow the term from two essays. The first is by Genevieve Bell and Paul Dourish and is titled “The Infrastructure of Experience and the Experience of Infrastructure: Meaning and Structure in Everyday Encounters with Space,” which is dedicated to understanding the ways in which pervasive computing will impact space and the ways in which we use spaces.<sup>5</sup>

The second essay is “From Interaction to Participation: Configuring Space Through Embodied Interaction,” by Dourish, as well as his colleagues Eric Kabisch and Amanda Williams; once again, this essay is dedicated to understanding the impact of pervasive computing on everyday interactions.<sup>6</sup>

In “From Interaction to Participation,” the authors note that space is never merely a container for our actions, but instead “a setting within which we act.”<sup>7</sup> For the authors, the word “infrastructure” captures the back-and-forth movement between what a space affords as a setting, and how a space is produced by the activities that take place there.

They also note that infrastructures describe the ways in which we encounter spaces, not only through physical components such as walls or streets, but through information, the practices of use that make a space have specific meaning for users, and the social interactions that occur at any given moment.

While infrastructures are often considered merely part of the backdrop against which various activities take place, they also structure, whether overtly or indirectly, the cultural practices that take place within any given space.

Infrastructures, Dourish and Bell point out, are also “crystallizations of institutional relations,” and they “reflect and embody historical concentrations of power and control.”<sup>8</sup>

Dourish and Bell further explain that the organization of infrastructures work to frame how we experience the world. Infrastructures may be invisible, but they become visible when they break down or problems occur.

They conclude their definition by noting, “Infrastructure, then, is analytically useful both because it is embedded into social structures, and because it serves as a structuring mechanism in itself.”<sup>9</sup>

The users and developers of Second Life – both those at Linden Lab and the collective users who generate so much of the building in-world – are in the process of crafting infrastructures, and what makes one’s experience in Second Life often so interesting are the ways in which we can witness that process occurring, and further, the ways in which the normally invisible infrastructures that condition our physical existence are reflected back as users attempt to replicate them – or increasingly, reinvent them – virtually.

The second term that we came across that was instrumental in framing our investigation derives from the work of Ed Soja, who in turns derives it from the work of Henri Lefebvre: the term is “trialectics.” We came across the idea most fruitfully in Kevin Leander’s essay “Reading the Spatial Histories of Positioning” in the collection titled *Spatializing Literacy Research and Practice*, edited by Kevin Leander and Margaret Sheehy. Leander describes three kinds of space: perceived, conceived and imagined.<sup>10</sup>

Perceived space is the everyday space we inhabit; it is the everyday routine space that seems entirely transparent.

Conceived space is planned space; it is dominated by ideology.

And imagined space is formed in relation to both of these: while representations of conceived space appear natural, they also often don’t align with our own particular experiences; so imagined space is full of contradictions, which always prevents the production of a final, fixed, stable space.

With these two terms, then, we had a foundation for thinking very abstractly about the ways in which space is produced through interactions: how could we take this knowledge and imagine crafting a space that would not only embody or convey this process – as an aspect of contemporary literacy even – and also be attentive to the changing needs of a space as it is lived and produced?

The final component of our introductory research led us not to other Second Life campuses but to the experiments of a number of artists and architects. Indeed, we found that an array of artists and architects are using Second Life to interrogate the relationship between immaterial and material spaces, reckoning with and creating new forms of spatiality and social interaction, and designing ways of comprehending both that contribute to the redefinition of literacy that we are currently witnessing in broad – and urgent – terms. I will quickly point to five examples:

The work of **Brad Kligerman** (known as Kliger Dinkin in Second Life) and his *Ars Virtua* artist-in-residence project, which deployed the material traces of avatar wanderings in the construction of the gallery space the avatars eventually inhabited, offers an example of work that is attentive to Second Life’s specificity.<sup>11</sup>

The *Ars Virtua* Artist in Residence (AVAIR) project, initiated in 2006, is itself an art project by James Morgan, Amy Wilson and Jay van Buren. Kligerman was *Ars Virtua*’s first resident, and during the first quarter of 2007, he developed a series of tools to experiment with the flows of information in a digital space. The most compelling of these experiments allowed the information gathered through an avatar’s presence in Second Life to become manifest in the gallery space. The history of each avatar contributed to the production of the representation of the space of the gallery.

In his proposal documenting how the project would function, Kligerman explains that teleports would send avatars to other Second Life spaces containing “spaces and machines designed to extract in-world data.”<sup>12</sup> Once there, avatars would encounter one of three land-types, each of which held different types of data that would be captured by avatars using a Heads-up Display; that data would in turn be sent back to the gallery space, constructing the space of the gallery itself.

The avatar that had gathered information could return to the gallery space to witness the transformation inspired by the journey. “Visitors moving through the gallery space, over, under and within its formal-textural construct, make critical connections between in-world conditions and deep structures of disparate SL environments that are represented,” writes Kligerman.<sup>13</sup>

While Kligerman’s project was never fully realized, the artist’s thinking about the possibilities highlights a critical concept in considering the relationship between virtual and physical spaces, specifically in reckoning with new forms of spatiality and social interaction, and designing ways of comprehending both. Kligerman’s project specifically pointed to the potential of making visible the substrate of information gathered within an avatar. Further, the project was designed to reflect the notion that space is produced by its inhabitants, an idea discussed at length by numerous

theorists interested in how the spaces that we inhabit are never just passive arenas within which activities are enacted. Both of these achievements, then – namely, visualizing the substrate of information gathered and foregrounding the fact that space is produced – contribute two key elements to a new facet of contemporary literacy.

There are several other artists and architects who focus on manifesting or making visible infrastructure and the processes of social interaction within information spaces, either by disrupting conventional patterns of interaction that align with the physical world, or by visualizing the flows of information that generally remain invisible.

**Jon Brouchoud** (known as Keystone Bouchard in Second Life) is also a virtual architect and founded the experimental architecture space Architecture Islands in Second Life last year.<sup>14</sup> His projects include a gallery of reflexive architecture in Second Life, as well as Studio Wikitecture, which uses Second Life as a space to consider ways to harness the collective intelligence of a group in designing architectural spaces. He has also conducted a series of experiments exploring forms of responsive architecture, which shifts to accommodate the habits and patterns of use in a space.

His notion of “Carvable Architecture,” for example, uses wall panels that move backward in response to the approach of avatars; as spaces become well-used, they increase in size; as they are less used, they grow smaller. Similarly, places that are well-worn in terms of the paths walked by avatars indicate that wear, effectively making visible the patterns of use.

Brouchoud also talks about “Architecture On Demand.” In the build embodying the idea, he uses a single block that grows or shrinks as an avatar approaches. When this block is placed in close proximity to others, it creates a collection that becomes a field condition. The individual blocks act in unison to create a field effect that gives the impression of a single membrane reacting as a singular surface. The resultant undulating surface is both elegant and visually complex and contains many more architectural applications as wall surface, floor surface, or spatial element.

Brouchoud’s experiments suggest ways that we might rethink learning spaces as responsive or reflexive. Rather than creating spaces that allow us to continue lecturing, or holding office hours, or conducting the real-world endeavors in a new environment, we might think about how our educational spaces might track use, or adapt to patterns and behaviors.

**Michael Ditullio** is an architect based in New Haven, Connecticut, and known as Far Link in Second Life. His work also centers on experimenting with architectural form in Second Life. Indeed, on his Web site, he highlights a series of new terms for this kind of architecture, using the terms “active, reflexive, reactive, responsive, reflective, 4D, flexspace” and so on.<sup>15</sup> He notes that there tend to be key reasons for working in this manner, whether for “collaboration, entertainment, challenging perceptual norms, a focus for socialization, or a tool for simulating and testing real world interactions.” He adds that “while these virtual builds contain particular reactive qualities such as response to movement, presence, voice or other behaviors, I feel that they also allow for a more robust form of interaction rarely taken advantage of in SL builds (with certain recent exceptions).” His primary experiment takes form as SONAR, which refers to “Self-Organizing Nebulous Architectural Response,” a project that seeks to create “emergent architectural forms” that are based on the interactions avatars have both with scripted objects, the environment and other avatars.

Once again, using Ditullio’s experiments, can we imagine teaching and learning spaces that are similarly “self-organizing” in response to the movements of avatars? Can we imagine designing a space that was attentive to the movements and interactions of avatars within a space?

Designed to interrogate the power of architecture in Second Life, **Archidemo** brought together over 50 different participants from various backgrounds to collaborate on experimental architecture.<sup>16</sup> Hidenori Watanabe, an associate professor at Tokyo Metropolitan University interested in collaborative work in the realms of Architecture and Environmental design in tele-existence and the metaverse, was one of the organizers of the project, and advocated the notion of “contents-oriented space,” by which he means that because elements such as walls and ceilings are no longer the key components in virtual architecture, we need to think instead about issues such as navigation. He also advocates interweaving real space and the spaces of Second Life, so that there is a kind of layering of realities through the mapping of 2-D images and information into a 3-D space.

In particular, one of the experimental projects in the Archidemo space brings together a series of panoramic 2-D still images that collide with each other; as users move through the space, they connect with differing representational modes that suggest a blended space, disrupting the easy binary distinguishing “real” and “virtual.”

Archidemo's experiments are uniquely attentive to the intersections of the physical world and an information space that, for our purposes, could be a pedagogical space. Indeed, from a pedagogical perspective, it is worth noting that the space of the physical classroom where most of us teach is already an information-space where students inhabit a mixed reality learning environment of their own via ubiquitous wireless networks, cell phones, SMS, instant messaging, etc. Once fixed boundaries between the learning spaces of the classroom and the world outside are now fluid and permeable and the literacy that students need to traverse these spaces is part of their ability to navigate a much broader media and information ecology that extends far beyond learning institutions into the streets and across informal peer communities, social networks, virtual environments and more.

Yet another interesting set of experiments is being conducted by **Drew Harry** (aka Zetetuc Aubret), a graduate student in MIT's Socialable Media Group who creates responsive meeting spaces that explore new ways of representing information and participation.<sup>17</sup>

In his conference room project, Harry created a means to make the location of one's avatar have meaning. You choose a position within the space depending on how you want to represent your feelings on a particular topic. Other signs are deployed to show certain decisions: when someone agrees to undertake a particular task, for example, a green cone appears above the avatar's head. Similarly, tall cylinders show that people have held the same opinion for a long time. Harry expects to change the design of this feature, since he has found in tests that people deliberately moved their avatars out of the cylinders to avoid feeling trapped.

In short, these experiments all avoid the dutiful replication of the real world, along with its infrastructures and practices of use, opting instead to explore new infrastructures and how they might impact new practices of use. Our goal, then, was to see how these might mobilize new learning practices and foment broader literacies.

### **Part Three: The Real Meets the Conceptual**

With some conceptual ideas in mind, we next looked at what we actually had to work with, but keeping in mind some other considerations:

- a small seed grant from the Provost's office to establish a space
- one full-time person dedicated to learning how to script
- two courses that would use the space specifically
- two Honors Program Thesis students wanting to work in SL
- two faculty members with a project needing a home
- the need to show how the space could, despite its unusual structure, serve as a recruitment or showcase tool

We started by delineating four levels. We decided that projects would incubate below ground, rising upward as they neared completion.

The main level would be the central meeting area; it would be designed by its users. We were intrigued by the Decka-Decks and the Holodeck, existing structures that we thought might jumpstart our process. We bought them, and they've rarely been used.

Indeed, our best projects and learning objects have developed from the inside out as we realized that we had specific needs based on occurrences within the context of teaching. Here are some of the projects we've built:

#### ***Panopticon/Immersive Syllabus***

We developed an immersive syllabus based on the need to have screening and lecture materials on hand for students who might want to review the material. Using a metaphor from the course itself, namely the Panopticon, we developed a syllabus in which each week is a box; inside the box, students would find the readings, screenings, slide presentation and lecture for any given week. Ideally, these boxes would become mini-archives, in which students would add material to craft a much richer experience for each week. The process would then encourage a process of remix and curation, two endeavors that we find incredibly fruitful with our students.



### **Tufte Tunnel**

We also are developing an object called the Tufte Tunnel, which transforms one of Edward Tufte's key texts into an immersive experience that students move through. The space also allows students to craft their own versions of the text, adding a critical analysis component that can build over time. Eventually, the Tunnel will include links and supplementary videos as well as pop-up notecards. Here, we are experimenting with creating immersive lesson plans around foundational texts.

Another pedagogical project centers on the learning space itself, and how it dictates or structures what is to occur. We've had several incarnations that are specific to the classes for which they were designed.

### **Building Tutorial for IML 104**

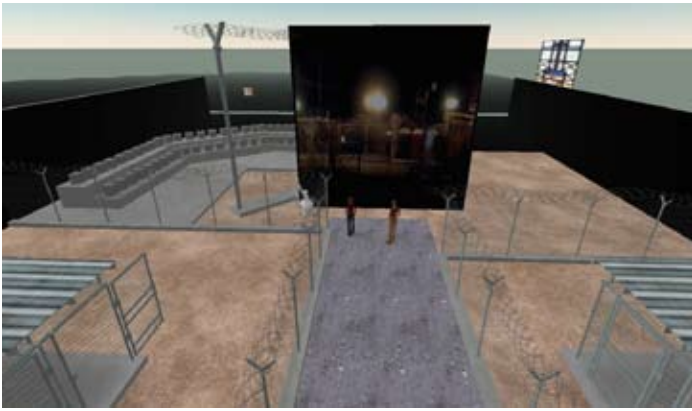
The course titled IML 104: Life in the Network examines the virtual environment as a trope in fiction, philosophy and film, and investigates a series of virtual worlds, from Virtual Lower East Side and Second Life to World of Warcraft and Club Penguin. The goal is to consider a full range of issues, from identity and ethics to cultural norms and institutional regulations. While we held several class discussions in Second Life, using the space as a meeting room, the space was far more useful when it was there for a reason. In one instance, the goal was to use a tutorial and, working together, teach each other how to build a chair. Once the chair was finished, the group had to figure out how to shoot up 100 feet, where we would hold the discussion; this was one of the most successful classes all semester.

### **IMD: 505**

The other class that used the space was the Interactive Media graduate seminar titled 505. The students in the class are a mix of production, critical studies and interactive media students; in other words, they have wildly different skill sets, interests and needs. Often the course is a struggle to manage because of these conflicting needs. However, the Fall 2007 semester saw the development of several productive collaborations, one of them being a project in Second Life that brought together students from each of the three divisions. The assignment was to introduce the readings and lead a discussion with them. However, the assignment had to be completed using some element of social software. The group that chose Second Life as the software ended up creating a game show in Second Life in which contestants see a series of nine videos made by the student group that illustrate key concepts from the reading, and then compete to answer questions about it. The students brought the game up in the lecture room for the course, and the result was an interesting "window" into a second space. The different skills needed in creating a smart project in this case were addressed by the different abilities of this particular group of students, and the project was instructive in that way.

### **Student Showcase**

The space was also home to two Honors Program thesis projects. In one, *Rivenscry*, the student, Matt Lee, who is majoring in engineering and theater, created an experiential analysis of Shakespeare's *The Tempest*, playing on a central trope, namely that interpretation is performance, and performance is interpretation. The project's name combines the word "riven," which means broken and "scryr," which means reading, and he argues that a text without its context is somehow broken. His project tries to invent a context for *The Tempest*. It takes as its starting point the character of Sycorax, the mother of Caliban; she is dead at the time of the play's beginning, but resonates through the memories of the other characters. Lee argues that Sycorax represents a history of silenced female characters, and his project is in some ways a testament to her role in that he is making a space for what is invisible in the play. For users, the project unfolds as he/she moves through the space, gradually accumulating information and analysis within the space. The project leads users from an upper level and primary sources to a lower – or deeper – level of more extensive critical analysis. The experience of moving through the project the first time is revelatory as one discovers ever more compelling bits of the argument.



### **Gone Gitmo**

Another project is the “Gone Gitmo” project co-created by IML faculty member Peggy Weil and her partner Nonny de la Pena. The project creates an immersive experience of detention, and in September 2007, the space was incorporated into the Seton Hall School of Law event titled “Virtual Guantanamo,” a conference in which participants discussed the political and legal questions regarding detention at Guantanamo. The conference proceedings were streamed live into the “Gone Gitmo” Second Life space.



### **Synchronous Events**

Yet another project emerged from the 24/7 DIY Video conference organized by Mimi Ito and sponsored by the IML which extended over several days; we wanted to make the conference proceedings available to those who were not at the event by streaming them live in our space. The IML space has since been home to a few other similar events, again, emerging from our desire to make this information more readily available.

### **Mobile**

In our most recent experiments, we are working with the idea of making Second Life more conducive to mobile media and to the practices we’ve grown accustomed to with our physical world media devices. Many of us have become quite used to carrying cellphones that play media, or that are equipped with navigational tools, or that allow for the easy sharing of media. Why can’t we do that easily in Second Life?

Second Life is predicated on a geographic metaphor, with travel and mobility being key components. However, SL does not easily accommodate mobile “devices” per se. It can be very difficult, based on how spaces are controlled by ownership rights and permissions, to show media beyond one’s own SL space. So we’ve been working on creating a mobile media player that you can carry with you as part of your avatar, as well as a suite of tools – a video projector and slide projector, for example, that allow you to take your media tools with you as you move through Second Life.

We are also working on ways to make showing this material easier, working from commands typed into the chat box, rather than an object that is stored in your inventory.

In short, then, working backwards from what we actually needed, and using the information gleaned in real interactions in our space, we now have a space that includes these aspects:

- experimental pedagogical space
- presentation space for student and faculty research
- project development and display space
- synchronous event space
- iterative design process

What I can tell you now from our own experience is that the process, while clunky, is productive. It is also very nonlinear!

## Conclusion

As we've developed the space through an iterative process, what are some of the new learning practices and broader literacies? For us, Second Life has become a space where we can look back at the infrastructures of learning and ideology in our physical campus. In this way, the space helps disrupt invisible conventions and unsettle unseen infrastructures. Indeed, our experimentation in Second Life has allowed us to focus specifically on the reading of infrastructures. We feel strongly that we need to teach our students how to look at the institutional relationships embedded in infrastructures, but we also should consider reflecting new relationships within the spaces we construct. Second Life in many ways makes apparent or overt many of the things that remain invisible, but this could also be a goal in our building practices, namely to construct disruptive spaces that interrupt habits ported in from real world spaces, or that bring to the fore spatial practices that tend to remain hidden.

Further, taking advantage of Second Life as a space that might be responsive, how can we build spaces that can be shaped by their users? We continue to ask this question, and hope to move toward more innovative, reflexive builds soon.

One of our final realizations is an awareness of the necessity to understand infrastructures in the manner suggested by Dourish and Bell, namely with the notion that they are always relational. Just as a relational database allows users to discern unforeseen relations among sets of data, so too does relational literacy help users discern the invisible or unacknowledged linkages and connections among data streams around us at any given moment.

## Notes

- 1 Bill Viola, "Will There Be Condominiums in Data Space?" in *Multimedia: From Wagner to Virtual Reality* (NY: W.W. Norton & Company, 2001).
- 2 Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA: The MIT Press, 2000).
- 3 Cory Ondrejka, "Education Unleashed: Participatory Culture, Education and Innovation in Second Life," in *The Ecology of Games: Connecting Youth, Games and Learning*, Katie Salen, ed. (Cambridge, MA: MIT Press, 2008).
- 4 The IML's Second Life space was funded through a Provost's Seed Grant for Teaching With Technology; the initial proposal was titled "Distance Learning in Virtual Environments."
- 5 Paul Dourish and Genevieve Bell, "The Infrastructure of Experience and the Experience of Infrastructure: Meaning and Structure in Everyday Encounters With Space," *Environment and Planning B: Planning and Design* 34(3), 2007, 414 – 430.
- 6 Amanda Williams, Eric Kabisch and Paul Dourish, "From Interaction to Participation: Configuring Space Through Embodied Interaction," *Proceedings of the Ubicomp 2005, LNCS 3660*; retrieved August 1, 2007, from <http://www.ics.uci.edu/~jpd/publications/2005/WilliamsKabischDourish-InteractionParticipation-Ubicomp2005.pdf>
- 7 Williams, Kabisch and Dourish, 1.
- 8 Bell and Dourish, 416.
- 9 Bell and Dourish, 418.
- 10 *Spatializing Literacy Research and Practice*, edited by Kevin Leander and Margaret Sheehy (Berlin: Peter Lang Publishing, 2004).
- 11 Kligerman's work is showcased on his Web site: <http://metaverseterritories.com>
- 12 All quotations come from Kligerman's Web site describing the project during his residency: <http://transition.turbulence.org/AVAIR>
- 13 Artist Annabeth Robinson (known as AngryBeth Shortbread in Second Life) has recently focused on the role of the avatar in influencing surrounding space as well, by reading the key or unique ID number associated with each avatar. She is currently working on musical instruments that incorporate avatar information in the creation of chords that when combined make music.

14 See Bouchard's site for further information. <http://clearnightsky.com/>

15 Virtual Interactive Architectures: <http://interactivearchitectures.blogspot.com/>

16 See the Archidemo blog for further information. <http://archidemo.blogspot.com>

17 See documentation of Harry's work on his MIT Web site: <http://web.media.mit.edu/~dharry/>

### **About the Author**



**Holly Willis** is a Research Assistant Professor in the School of Cinematic Arts at the University of Southern California, as well as Director of Academic Programs at the Institute for Multimedia Literacy, where she teaches, organizes workshops and oversees academic programs designed to introduce new media literacy skills across USC's campus and curriculum. Willis' current research centers on the intersection of media art, graphic design and rhetoric, and the ways ideas and formal strategies from each might inform contemporary scholarly practices. She oversees the IML's research in the pedagogical uses of multiuser virtual environments and promotes the use of numerous online tools for writing and research. Willis is also the editor of *The New Ecology of Things*, a collection of essays on the potential of pervasive computing, and she is the author of *New Digital Cinema: Reinventing the Moving Image*, which chronicles the advent of digital filmmaking tools and their impact on contemporary media practices. Ms. Willis has written extensively on experimental media practices and emerging pedagogical models for a variety of publications.