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Designing Virtual Worlds to Facilitate Meaningful Communication: Issues, Considerations, and Lessons Learned

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INTRODUCTION

In many ways, our experiences interacting with one another in traditional, face-to-face environments inform our beliefs about effective communication. In traditional spaces, we rely on seemingly innate abilities to process multisensory cues, sounds, gestures, and inferences both to make and to offer meaning. As such, we often design our communication technologies to amplify the same senses and process of our past environments and project them into future ones. Speakers amplify sound. Cameras expand sight. Haptic devices extend touch, and so on. Together, we use our technologies and our techniques to create communities and to convey shared experiences.

Turkle (1995) suggested that, although humans manifest individual identities in words, deeds, and other media, computer-mediated environments offer a unique medium for embodiment and expression. Simply being unique, however, does not make a technology useful. In fact, the principle of least effort (Zipf 1949) suggests that people will follow the most convenient process and use the most available tools for finding information and connecting with others. For a communication medium to be useful, it must not only enable embodiment and expression, it must also do so in as clear and explicit a way as possible. Computer-mediated technologies, such as social networking websites, online multiplayer games, and some simulations are examples of media developed with the primary goals of facilitating and supporting the social nature of communication. However, these tools sometimes fall short of expectations because they do not provide convenient access to the kinds of communication activities we rely on to connect and to make meaning. Multiuser, immersive, three-dimensional (3D) virtual environments—commonly referred to as virtual worlds—are emerging as favored platforms for supporting communication and socialization more effectively. They do so by extending the participants’ abilities to use the traditional communication cues in ways that web-based environments do not.

DESIGNING VIRTUAL WORLDS FOR COMMUNICATION AND LEARNING

Most people are familiar with the proliferation of the Internet and the Web-based applications that followed. But few are aware of the rise of virtual worlds. Virtual worlds are 3D virtual reality systems through which participants—using digital representations of themselves called avatars—communicate and interact with both content and each other. Most virtual worlds include a 3D view, both audio- and text-based communication, and sophisticated ways to sense the presence of others in real time. Virtual worlds are used for entertainment, online learning, commerce, and general socialization. By some estimates, dozens of platforms or systems exist today (Seiler and Sherman 2007). Popular virtual world platforms include Quaq, ActiveWorlds, Second Life, SimsOnline, and There.

Researchers have studied how design impacts the effectiveness of virtual worlds when implemented to support intentional activities, such as learning (Dede 1995; Dickey 2003; 2005; Mak and Palia 2005). However, little is known about how the key attributes of these worlds facilitate effective communication within them. What should technical communicators consider when making decisions about how to design and implement virtual worlds, especially for instructional pur-
poses? From our experience as designers, developers, and users of a virtual world called AET Zone (Bronack and other 2006; 2008), we suggest that there are three critical attributes of effectively designed virtual worlds:

- Thematic design of space
- Promotion of presence
- Awareness of the unique qualities of human behavior in online social environments

Thematic organization of space

One of the more obvious differentiators between virtual worlds and environments that rely only on web pages is the sense of space: that is, the feeling of actually being in a “place” with others at the same time. Our experience suggests that virtual worlds designed and implemented in ways that suggest presence within a recognizable space support more robust communication among participants within those spaces. We have found that using metaphors as a design foundation has helped us construct our virtual spaces efficiently and effectively.

Metaphors may be considered tools or processes that enable understanding of one thing in terms of another (Nicholson and Sarker 2002) or as constructs of speech that make sense of one concept by referencing another often unrelated one (Tretiakov, Kaschek, and Kinshuk 2004). Either way, metaphors are a core tool people use to make sense of the world around them. Metaphors provide the constructs for our thinking, our perceptions, and our communications with one another. Metaphors give meaningful form to concepts and provide structure for experiences that are not highly structured by their own terms.

Lakoff and Johnson (2003) pointed out that people use metaphors both implicitly and explicitly to make sense of the world around them. They suggest that metaphors are systematic structures mapping one domain onto another, that metaphors may create their own meaning when chained together, and that several classes of metaphor exist. For instance, ontological metaphors use substantive entities to stand for nonsubstantive ones (for example, a cluttered mind). Metonymical metaphors reference an entity regarding another, related one. For example, stating, “Headquarters called” metaphorically refers to the people in charge regarding a location typically associated with leaders. Orientational metaphors, on the other hand, are more conceptual than structural. They extend our physical and cultural selves and rely on social mores and commonly held beliefs for meaning. Orientational metaphors use spatial and directional cues to signify embedded meaning and relationships between signs and intended behaviors. For instance, to be “on top of the situation” or to be “brought down” draw on a shared, general understanding, in this case that having control is “up” and that being the object of control is “down.”

The importance of metaphors extends beyond the scope of linguistics. Increasingly, metaphorical processes are guiding the design and development of effective computer-based applications and environments (Carbonell 1982). Virtual worlds offer extended opportunities for information design to support meaningful communication, particularly through the effective application of metaphors. Henry and Crawford (2001) suggested that metaphors are particularly useful in online media, because they may offset the uneasiness caused by a lack of embedded physical or social structure. In a virtual world, you can use space for delineating information or activity much as it occurs in real life. The following examples show how you can effectively use metaphors and the thematic organization of space in virtual worlds:

- Figure 1 offers a glimpse of how we use a structural metaphor in our Introduction to Computers in Educational Settings course. As we designed this course space, we spent a great deal of time considering the overarching affect we hoped students would experience during the course. Because this is the first course in our program, and the content involves emerging and somewhat amorphous concepts, we settled on a “wild, wild west” theme to connote the level of anarchy that still symbolizes much that has to do with teaching and learning through computers.

- In Figure 2, we show another application of metaphorical design with another one of our courses, Advanced Web Design for Educators. This course is one where students progress through levels of knowledge and application, with each level offering increasingly more challenging assignments. Providing a virtual space where students elevate through the levels is an example of the orientational “more is up” metaphor. Metaphors serve as a key bridge in the process of human reasoning, helping us understand abstractions initially as extensions of concrete concepts with which we are already familiar. Metaphors provide structure to our ideas and help us communicate to them to others in ways that facilitate a shared understanding through effective communication.

Role of presence

However, simply providing a virtual space that cues familiar metaphors will not, in and of itself, prompt participants to communicate easily and effectively. We have learned that no matter how well the space is designed, participants will only view it as a useful communication medium when they feel they share that virtual space with others. Said another way, presence is a key component of virtual world design.

Presence is the sense of being in the immediate vicinity of others. Without the ability to sense the presence of others, meaningful interaction online is difficult. In many ways, presence is a precursor to interactivity—among people and between people and information. Regarding virtual
Figure 1. Using a structural design metaphor for Introduction to Computers in Education, a course in AET Zone, a virtual world for learning

Figure 2. Using an orientational design metaphor for the Advanced Web Design for Educators course in AET Zone
worlds, presence describes the awareness of others that comes from being emotionally and cognitively immersed in a shared environment. In other words, presence is about the feeling of “being there.” But where is there? Heeter (1992) suggested three dimensions of presence within virtual environments: environmental, personal, and social.

Environmental presence refers to the degree to which the environment itself reflects the presence of participants and participant interaction. To a certain degree, virtual worlds and traditional web-based environments are most similar regarding environmental presence. Both offer ways of collecting and sharing the residue of participant interactions in ways that foster communication. Discussion boards, chat logs, and blogs are tools that are equally accessible in either type of environment. Virtual worlds, however, offer extended options that are not available in web-based spaces. For example, virtual world participants may do something as simple as leaving a door open in a virtual building or as complex as modifying the shape and texture of an entire island to denote presence. In most cases, web-based environments offer little opportunity for participants to modify the core structures of the environments.

Personal presence is the feeling of being present physically. Again, to a certain degree, virtual worlds offer opportunities to feel present in an environment similar to those available in traditional web-based spaces. For example, there seems little substantial difference between a text or audio chat in a virtual world and one in Yahoo! Messenger or Skype. However, it may be that the provision of gestures, proximity, and other nonverbal cues accessible through avatars in virtual worlds (discussed in more detail in the section on human behavior below) is a significant difference. Regardless, Schroeder (2002) suggested that, even within virtual worlds, a difference exists between virtual reality and “shared” virtual reality when it comes to personal presence. Virtual reality where participants may feel “there,” but not with others, offers a sense of immersion within an environment separate from the one we might describe as “real.” Flight simulators, for instance, might be considered a typical example of this type of virtual reality. A shared virtual reality, by contrast, is one where participants feel not only present within the environment, but also perceive the presence of others at the same time. The ability not only to feel present, but also to feel the presence of others simultaneously is the most significant differentiator between communication in virtual worlds and traditional web-based environments.

Social presence, essentially, is the awareness of others we gain through our interpretation of gestures, signs, expressions, and other verbal and nonverbal cues. Baskin, Barker, and Woods (2004) offer three critical attributes of social presence—context, communication, and interactivity—and suggest each plays an important role in activating the various knowledge domains. For instance, Russo and Benson (2005) suggested that students’ perceptions of the presence of other students and the instructor in an online class are significantly related to students’ positive attitudes about the course and level of satisfaction with their own process of learning. Other research offers significant relationships between virtual learning environments with high degrees of presence and all levels of learning, and that a sense of both spatial and social presence plays a positive role in supporting learning (Selverian and Hwang 2003).

The interaction between social presence factors and positive effects on learning is important because it highlights the critical role social presence plays in supporting and facilitating effective communication. A universal complaint of many who have been disillusioned with online learning, for example, has been the feeling of isolation that comes from not being aware of the presence of others. Through the use of avatars and other social presence tools, virtual worlds restore our abilities to sense one another online through both planned and serendipitous interactions and to draw on some of the same communication constructs online that we rely on in traditional media for effective communication.

Presence is the critical attribute that differentiates virtual worlds from other online technologies. We have learned through our experience designing and working within virtual spaces that the role of presence serves as yet another reminder that successful technologies are less about the tool and more about the kinds of activities the tool enables. As Gunawardena (1995) reminded us, it is the people involved who make the difference when establishing a level of community and a sense of presence online.

### Human behavior

Unlike traditional online environments, however, virtual worlds make accessible a sense of agency and presence through the use of avatars. However, avatars are not the magic elements that make virtual worlds appear as effective environments for communication. When it comes to communication, it is the ability to connect in real time with the person each avatar represents that differentiates virtual worlds from other online technologies. Also, simply being aware of the presence of others does not mean that we will communicate with each other. For communication to occur, we each must act. Considering the ways in which people will act and behave within the virtual worlds we design is a critical factor in how successful we will be in our attempts to facilitate meaningful communication within these virtual worlds.

Virtual worlds offer a degree of freedom to behave as an avatar that has an explicit effect on communicating meaningfully within these worlds. On one hand, virtual worlds let us create novel ways of interacting and communicating. On the other hand, they return us to some of the
same behavioral constraints that bind us in traditional communications. For example, some research suggests that avatars enable the use of cues typically relied on during face-to-face interactions—such as gaze, mimicry, gestures, and proximity (Bailenson 2006). How participants deal with issues of personal space and appearance, how participants model acceptable behavior, and the ways with which the communities handle miscreants all play a role in how effectively and efficiently participants will communicate within virtual worlds. Understanding the impact of constructs on the basis of human behavior is of practical importance to technical communicators who wish to design effective virtual worlds. We address these below.

**Personal space**  Context and the awareness of others are critical attributes of effective communication. Having an awareness of one’s place among others impacts the choices each makes regarding participation, movement, and communication. Virtual worlds extend this dynamic into online communications by enabling “socially constructed situated action” (Chalmers 2004) in ways previously unavailable. From a design and usability standpoint, this dynamic can provide both opportunities and dilemmas. In one sense, the awareness of personal space lets participants and designers use constructs with which we are all familiar in face-to-face communications in both novel and familiar ways in virtual worlds. For example, students in our virtual world who want to talk with one another often will move their avatars within sight of each other, even though there is no technical reason for them to do so. On the other hand, reintroducing the concept of personal space into virtual spaces brings some of the same challenges that we face in traditional environments. Our experience and that of our students over the years, for instance, suggests that users who position their avatars too close to others when chatting cause just as much discomfort within virtual spaces as those who stand too close in face-to-face conversations.

Our experience in the AET Zone resonates with what other research suggests; that is, avatar-based communication in virtual worlds often follows some of the same behavioral constructs as that between real-life, face-to-face communication between people. For example, in a recent study (Bailenson and others 2003), participants maintained greater distance from other avatars when approaching each from the front, compared with from behind, and maintained greater distance from avatars each believed was driven by another human compared with avatars each believed to be driven by the computer.

**Appearance**  However, personal space is not the only construct that carries over into virtual world behavior. For instance, appearance seems to matter just as much in virtual worlds as it does in real ones. Interestingly, some suggest a “sweet spot” exists when considering how realistic an avatar is necessary for participants to feel connected with others. Nowak and Biocca (2005) suggested that moderately realistic avatars enable a greater sense of presence than those that are less or more realistic. Too little access to nonverbal cues causes participants to dismiss the avatar as less than representative. Avatars that are too realistic cause users to have higher expectations that often are left unmet.

Understanding the role of appearance through avatars in virtual worlds is important for technical communicators and instructional designers concerned about usability. The ability to have some control over how one is represented in a virtual world, through an avatar, is a critical factor in how open users are toward using a virtual world in communicating and working with others (Schroeder 1997). Yee and Bailenson (2007) recognized a relationship between our self-representations through avatars and our behavior both within and apart from the virtual worlds where we use them, a dynamic they term the “Proteus Effect.” Their study suggested that participants who were assigned more-attractive avatars generally were friendlier toward other participants and exhibited more confident behaviors than those assigned less-attractive avatars. These behaviors included standing closer to others and revealing more information about themselves compared with supposedly less-attractive participants. The Proteus Effect extends previous identity-behavior research that suggests people often map their behaviors both to the perceived expectations of others (Snyder, Tanke, and Berscheid 1977) and to their own self-perceptions of expected behavior (Frank and Gilovich 1988) on the basis of how each appears.

**Modeling behavior**  Self-perceptions are an important influence on behavior in online environments, yet they are not the only influence. Multiple factors can also influence behavior: some by design and some similar to those we can use in face-to-face communications. In the real world, for example, our ability to use eye contact as a communication tool is influenced by the rivalrous nature of attention; that is, if I am looking you in the eye, I cannot be doing the same with someone else simultaneously. However, in a virtual world, we are not bound by the physics of reality. Recent research suggests that the use of avatars in collaborative virtual environments lets participants simultaneously maintain “eye contact” with numerous collaborators, and that by doing so, we are measurably impacting our ability to model effective communication with one another in virtual spaces (Bailenson and others 2005). In another study, Bailenson and colleagues (2004) constructed a sophisticated process for modeling and influencing behavior in virtual environments they call transformed social interaction (TSI). This type of virtual environment interaction includes strategically altering sensory abilities, situational contexts, and self-representation to impact communication within a collaborative virtual environment.
Using TSI, participants are able to disconnect actual behaviors from those represented to either augment or suppress certain aspects of communication.

Others have used techniques to model behaviors in virtual worlds in ways similar to traditional spaces. Towns, FitzGerald, and Lester (1998), for example, described their use of a behavior sequencing framework that combines emotive and kinesthetic cues to support learning. Their research suggests that using an animated agent capable of exhibiting context-relevant gestures, facial expressions, and verbal support with learners engaged in a problem-solving activity can help those learners remain engaged and focused on effective problem-solving behaviors. Ryu and Baylor (2005) have studied the use of computer-based agents to support learners and suggested those that are effective are credible, facilitative, engaging, human-like, affective, and perceived as knowledgeable. Their work extends previous investigations (Andre, Rist, and Muller 1999; van Mulken, Andre, and Muller 1998) that suggested the more human-like a computer-based agent is, the more engaging and entertaining learners initially find it to be. Effectively modeling behavior in virtual worlds is a key factor for technical communicators and instructional designers seeking to impact usability through design.

**Griefers** As communication and engagement increase, so does cooperative behavior (Axelrod 1997). However, not all who harness the richness and freedoms of communication in virtual worlds put their new-found powers to good use. In some cases, the social norms commonly relied on in traditional interpersonal communications are not carried over into virtual worlds. Stories abound of “bad” behavior such as Second Life so much so that a tag for those who exhibit aversive behaviors has emerged: griefers. Levels of griefing range from minor inconveniences—for example, inconsiderate placement of avatars—to seriously impacting one’s ability to participate and communicate effectively in the virtual world.

Some (Davis, 2002; Davis, Farnham, and Jensen, 2002) have proposed increasing the social nature of communication within virtual worlds as a means for countering bad behavior. Specifically, Davis and colleagues suggested using audio communications and providing individual user information as ways to reintroduce acceptable social behaviors into the virtual medium. They note that audio communication can be more effective than text communication when building community and supporting social interaction because voice carries “para-verbal cues,” such as pitch, intonation, and other utterances that are difficult to convey when using text. They also suggested that providing individual profiles of members may increase the sense of presence among participants by providing ancillary information about each to the others. However, from their quantitative analysis, Davis and colleagues discovered that audio was more useful than text in deterring griefers and that the provision of profile information had little measurable effect.

**Emotional impact** Controlling the impact of griefers through design is an important component for successful communication within virtual worlds. Our experience suggests that having a plan for enabling participants to represent themselves and engage in behaviors as each individual sees fit is requisite, which others also suggest. Bäños and colleagues (2008), for example, noted that participants who feel a strong sense of embodiment within the virtual world are more likely to enjoy a stronger sense of positive emotions. Kamada and colleagues (2005) explored the use of emotionally expressive avatars within a 3D space called “Community Place” and noted the important role the ability to express emotion plays in fostering meaningful communication. Their environment combines a text chat with an avatar through which participants may express both a range and degrees of emotion by manipulating their avatar’s gestures or facial expressions. Kamada and colleagues suggested that expressing emotions through an avatar increased the participants’ abilities to both articulate feelings and to stimulate additional text-based conversations compared with participants who did not have expressive avatars.

**Communicating meaning** Facilitating the clear communication of meaning is of utmost importance to technical communicators and instructional designers. Virtual worlds offer another dimension by adding gestures, position, and other nonverbal cues to the online communicator’s toolbox. Some nonverbal cues are missing in virtual worlds. Others are available and used naturally with little thought. For instance, our experience suggests that the inability to communicate facial expressions through avatars in nearly all virtual world platforms causes us to rely more on text-based methods, such as emoticons, than we would like. On the other hand, turning one’s avatar toward those with whom one is speaking and honoring the personal “space bubble” of other avatars seemingly is instinctive for nearly all participants in our virtual world.

In text-based online communications, emoticons are the tool *du jour* for expressing positive and negative feelings. People also tend to use emoticons as a substitute for facial expressions and other nonverbal cues because they must. Research suggests that online communicators are more likely to use emoticons when talking with those they know versus those they do not and that they are more likely to use positive versus negative emoticons (Derks, Bos, and Grumbkow 2008). Accessing nonverbal cues in virtual worlds that are normally available within traditional communication modes is an important factor for the successful use of virtual worlds for communication. However, as Smith, Farnham, and Drucker (2000) noted, the more familiar and more comfortable users
become within the environment, the less they tend to use nonverbal cues such as gestures, position, and shared space. This dynamic has clear impact on usability and design as the participants transition from beginner to novice to expert.

Virtual worlds prove an interesting venue for merging text and visual cues to establish identities. For example, one study (Allwood and Schroeder 2000) noted an inordinate number of “you” and “I” words within the corpus of communication studied compared with that which is normally noted in traditional face-to-face conversation. Effective communication in virtual worlds is impacted by myriad factors much like life in the real world. For example, Koda and Ishida (2006) noted cultural differences regarding the participants’ ability to recognize emotive behaviors through avatars, particularly when those emotions are positive. Bartneck, Takahashi, and Katagiri (2004) noted similar differences along gender lines.

CONCLUSIONS

Virtual worlds add another dimension to the conversation about the nature of technical communication, particularly as it occurs online. As an increasing number of organizations move significant components of their online learning endeavors into virtual worlds, it is essential that they do so under the practical guidance of what works and what matters. Since 2001, we have designed and delivered course content and activities in virtual worlds and, as a result, have developed a sophisticated understanding of the possibilities of virtual worlds to support effective communication for learning. As a result, we have learned many lessons about what works and what does not. The principles we discussed above and the behaviors they promote are key to the effective use of our virtual space, to building a sense of environmental, personal, and social presence, and to tapping into human behaviors. Guiding principles and practice include the following:

- Consider the principle of least effort
- Design spaces thematically
- Promote presence
- Understand human behavior

Throughout this article, we offered practical guidance for designers interested in using virtual worlds to support meaningful, effective communication. This guidance is based not only on our own experience but also on the research and experiences of others. AET Zone has developed into a successful virtual environment for facilitating meaningful communication through a combination of design and usability considerations, attention to feedback and behaviors of participants, and adherence to a few core principles regarding effective information design. Over the years, these lessons have coalesced to form the guiding principles for designing spaces and encouraging effective practice we detailed above.

Still many questions remain. As technologies mature, will the ability to create more realistic spaces and more representative avatars change the ways we design virtual spaces to support communication? Will increases in time spent communicating online in virtual worlds influence participants’ views on personal space, attention, gesturing, and other important cues we all use in deciphering verbal and nonverbal interactions? Will the behaviors of a generation that has grown up interacting digitally impact the design considerations necessary to facilitate on-going communication in spaces such as virtual worlds? Ultimately, only experience, experimentation, and thoughtful reflection will tell. We hope the issues and considerations provided in this article will serve as a useful starting point for technical communicators who are just beginning to engage in communication in virtual worlds and as a focused guide for more experienced virtual world users who are considering the impact and meaningfulness of the design and communication in which each is already engaged.

REFERENCES


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