MEDIATING AN EXPERIENCE: AN APPROACH TO DESIGNING A COMPELLING SYNCHRONOUS, DISTANT, VIRTUAL COMMUNICATION ENVIRONMENT

A Thesis

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ABSTRACT

The current state of on-line, synchronous communication environments support an idealistic but unrealistic metaphor for the way people interact during a typical presentation. Available solutions purport simultaneous input from all parties involved rather than a presenter-to-attendee model analogous to a group presentation or classroom setting. Independent of the specific context, whether it be education or business, the intent of this inquiry and concept development is to challenge current models of on-line, synchronous communication and conduct practical research to create a model that defines a rich, one-to-many experience.

The end result is a new communication model that employs design rationale and process to improve the state of real world, on-line collaboration. On-line technologies enable users to communicate in entirely new ways and, most significantly, from remote locations. Often a new technology is first expressed as a crude collection of tools—design and human factors are forgotten. Presented here are the user’s expectations, needs and desires, the adaptation of traditional and familiar communication mediums, and the exploitation of current technologies to serve design sensibilities.

To illustrate the usability of the model and the dynamics of the experience, the results of an experiment employing a designed prototype are analyzed. The results indicate that a carefully designed virtual environment can compensate for the lack of physical collocation for a medium-sized university lecture. From a multi-disciplinary perspective, the prototype is evaluated based on a proposed set of criteria for designing a synchronous, on-line experience.
ACKNOWLEDGMENTS

I argue in this thesis that many elements need to come together to create a synchronous, on-line experience. Solely conceptualizing such a complex design solution would fail to validate the experience, therefore, a robust prototype is necessary to make any real judgments about a crafted experience. To create a prototype with this level of sophistication and functionality would not be possible without a whole team of programmers and database developers. In my case, that team consisted of my best friend, Christopher Rathburn, who implemented many of our crazy ideas into a live, working version.

In my first quarter of graduate study at Ohio State, my thesis advisor, Brian Stone, said that he has a theme for each quarter. With a very busy schedule and a pending trip to Brazil to teach for a semester, he told me that the theme for that quarter was “easy.” He did not mean lazy or anything negative; just make things manageable. This thesis paper and project reflects his theme by freely discovering and exploring the experience factor, and then comprehensively testing and writing down the results with due diligence—easy. In addition, much of the critical and abstract thinking written down here is influenced not by Brian telling what to do or what to think during an official meeting, but rather from observing his studio critiques and the side conversations about nothing in particular.

As for my entire committee, I am fortunate to have had the advise of a diverse range of individuals each with his own very different perspective. Though I have attempted to look at a communication problem without the baggage of context, my committee is very much interested in the applied knowledge. Noel Mayo adds his influence as not only a veteran design educator but also as the executive leader of a design consultancy. Steve Acker’s background spans the
domain of communication, and his contribution to this thesis is evident with his expertise of educational pedagogy and knowledge of educational technologies. Unofficially, several people served as informal advisors including Jeff Haase with whom a couple conversations helped me convert my thesis search mode into thesis development mode. I would also like to acknowledge the input and support from Peter Chan and Wayne Carlson.

The ever expanding research experiment grew beyond the original idea and literally commandeered the classes of some very cooperative instructors including Dave Bull, Francie Buschur and Tony Reynaldo. Their combined roster of roughly one hundred anonymous students are the lifeblood of the data presented here. The level of access surrendered to me by these instructors and the enthusiastic, though voluntary, participation from the students was invaluable to the research process.

For this final writing phase, I am indebted to my proof readers Amanda Tracy, Stacy Buttari, and once again, Christopher Rathburn.

In early 2002, in what seemed to be the beginning of some darker times, my return to Ohio State began with a former professor of mine, Paul Nini.
VITA

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FIELD OF STUDY

Major Field: Industrial, Interior, and Visual Communication Design
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<td>CME</td>
<td>Computer Mediated Environment</td>
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<td>Computer Supported Cooperative Learning</td>
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<td>CSCW</td>
<td>Computer Supported Cooperative Work</td>
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<td>MOO</td>
<td>Massive (or Mediated) On-line Environment</td>
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CHAPTER 1

INTRODUCTION: AN ANECDOTE OF DISTANCE COMMUNICATION

The topic of this research inquiry comes from observing a frustrating on-the-job situation. From the standpoint of a designer, this is a situation that should be remedied with a proper design solution. For a fairly large retail interior design consultancy, presenting highly visual concepts and information to clients is the primary mode of doing business. The members of the consultancy’s project team add their rationalization to the design by “walking” the clients through the concepts in an informal, yet orderly, manner. This format is very typical and probably does not represent a revelation to the reader, but if any part of the presentation process is decoupled, the effectiveness of the message is greatly reduced.

For this design consultancy, clients’ companies are located all over the world. Multiple meetings and presentations take place at a number of locations, and as long as everything is prepared, the face-to-face format works very well. However, because of time, travel, schedules, cost, etc., the logistics of meeting face-to-face every time is not possible or practical. So the backup solution is to combine a telephone conference with an electronically transmitted document. It works, but it is awkward and cumbersome. Something is missing from the experience.

Just like for a face-to-face presentation, the visuals are prepared in advance. In this case, they are converted to a digital medium even though the original may have been a large format, hand marker rendering. Most of the time, the final electronic document is much too large to attach to an e-mail, and an alternate electronic delivery is used. Often there are technical
difficulties and learning curves to overcome, and the safest way to ensure success is to get the
document there far ahead of the scheduled conference call. This is where the problems begin.

Inevitably, the client previews the visuals before the teleconference without the benefit of
the design team’s rationale. Whatever impressions the client has formed are without the benefit
of the presentation team’s context. Once the actual meeting begins, literally keeping all parties
on the same page is the next hurdle to overcome. Time is squandered just keeping everyone
synchronized, and this is only compounded with increasing numbers of unique attendee
locations. More individuals or groups in more locations equal more effort diverted from
presentation content to meeting management. But the single biggest source of frustration
comes from a client directing attention to something towards the end of the presentation when
the presenters are trying to explain something on page one. The narrative is lost, and the
meeting proceeds chaotically with the effort always on keeping everything somewhat
synchronized.

1.1 Practicality Of Face-To-Face Meetings

The subtle interaction dynamics of collocated environments are powerful and difficult to
ignore. From the example above, it is clear that the face-to-face environment has traits that a
teleconference call with handouts does not—it lacks synchronicity. Notice that the auditory
experience for both situations remains similar, though the visual experience does not. The face-
to-face meeting is clearly valued and preferred, but it is not always practical or even possible.
But what makes the face-to-face environment succeed and the stopgap teleconference solution
so much less effective? In the face-to-face environment, meeting attendees share both time and
space. The events and activities are synchronous and the people participating in these events
and activities are physically collocated.

A method of distance communication that substitutes for the face-to-face environment
has to recognize and accommodate as many of the benefits of shared space and time as
possible. Within the scope of new media technologies, there are a huge variety of solutions that
manipulate time and space. While most, if not all, make distances irrelevant, some also make
time meaningless. Solutions of this type are both distant and asynchronous; participants share
neither space nor time. The gulf between synchronous and asynchronous on-line virtual
environments is bigger than the scope of this thesis and veers from the intended purpose. The
purpose of this thesis is to focus on the transformation of the environment while supporting
synchronicity.

From the introductory example, it was observed that the synchronous environment is an
important dynamic for this kind of presentation. It facilitates a “show me” style of discourse. This
dynamic is partially persevered by a synchronous teleconference while the visuals or other
supporting materials are not. Although “time is money,” mutual understanding is usually more
valuable. Therefore, the synchronous aspect of any solution is a requirement. Arguably, sharing
space is the more wasteful aspect of a presentation. Time, travel, schedules and cost are all
factors when parties meet face-to-face. Other environmentally wasteful considerations include
the physical facilities and expended energy. From a user’s perspective, the physical and mental
stress of coordinating or attending an event should also be a design consideration. So the
question becomes, what kind of on-line, distance, collaborative, virtual environment is best
suited for situations like this?

1.2 Realities Of Virtual, Collaborative Environments

First and foremost, it is not the ultimate goal of this research project to find a
replacement for face-to-face meetings. Granted, technology might evolve to the point that
individuals may not be able to distinguish the difference between the virtual and physical
environments, but that still does not guarantee that it will be desirable. Using existing
technologies, a properly designed virtual environment can supplement and enhance
collaborative experiences. For example, the first meeting is always face-to-face, or only the most
appropriate meetings are face-to-face because the agenda designates it a superior format. But
other applicable meeting scenarios may not benefit meeting in person. Each case, and even the
culture of the attendees should be considered when considering an alternative method of presentation.

Perhaps advanced technology will change everything in the future, but well designed solutions can offer viable alternatives now. The key is designing to user needs and to resist complicating the solution with features, functions and procedures that impair usability. While there are physical limitations to presenting virtually, there are many other possibilities and efficiencies that are only possible in a virtual environment.

1.3 Possibilities For Both Corporate And Educational Presentations

What has been described thus far is perhaps the archetypal presentation. The introductory example about the concept presentation is only one scenario, but the basic format is common. Anytime one or few presenters impart information to a group of people using written and oral language with complimenting visuals, it fits this pattern. While the business uses may be clear at this point, education often follows this pattern as well.

The classroom lecture environment resembles a presentation in many ways. Though the subject matter and intent is different, the method of communication follows the same basic communication structure. In both instances, a leader with the information imparts her knowledge to a group. There is some level of interaction between the leader and group, but most of the communication flows in one way from the leader to the group.

The intent of this research is to investigate this particular communication structure and how a computer mediated environment, or CME, could allow for an analogous virtual experience—but across vast distances. This particular mode of communication contrasts with the more general and collaborative solutions currently in use. As opposed to fostering teamwork and collective contribution to a mutual goal, the presentation environment is one-to-many with a clear authoritative leader in control. Instead of looking at yet another way in which distant parties can collaborate effectively, presenting information effectively through a synchronous, distant
virtual communication environment is the specific objective of this thesis. Though interactivity and collaboration are important and supported, the needs of the presentation come first.
CHAPTER 2

DEFINING AN EXPERIENCE

The design objective is a compelling experience—not just a good software product. If some kind of computer mediated environment (CME) is expected to substitute for a face-to-face meeting, the CME has to accommodate all the affordances of the face-to-face experience. Such a complex problem involves many levels of design that meet the criteria for ‘experience design’ as defined here:

Experience Design is an approach to creating successful experiences for people in any medium. This approach includes consideration and design in all 3 spatial dimensions, over time, all 5 common senses, and interactivity, as well as customer value, personal meaning, and emotional context. Experience Design is not merely the design of Web pages or other interactive media or on-screen digital content. Designed experiences can be in any medium, including spatial/environmental installations, print products, hard products, services, broadcast images and sounds, live performances and events, digital and online media, etc. (Shedroff, 2005)

With the specific goal of creating a compelling synchronous, distant, virtual communication environment, the attributes of the experience are broken down into a series of design considerations: virtual environment, immersion, interaction, presence and the avatar. For every different kind of CME, these attributes have different degrees of importance and significance. A realistic, computer 3D simulation is very different than an instant messaging session, but both share these attributes, and the success of each depends on the appropriate expression of each of the attributes.
2.1 Virtual Environment

The term ‘virtual environment’ or VE implies something approximating the real thing or an alternate environment substituting for the actual environment. In this sense, a VE is a generic term for any kind of process that does not take place in a physical, first person manner. Is a word processor a virtual environment for a typewriter? Perhaps a typewriter is a virtual environment for writing…and so on. For the topic of this research, the personal computer is the device used to create the virtual environment. For distance communication, the Internet is a key technology to connect multiple personal computers together into a unified, albeit dispersed, collective experience.

At another level, the ‘virtual reality environment’ or VRE or just VR is a very visually rich representation of an environment. Whether accuracy or fantasy is the aim of a VR, three dimensional realism is emphasized. Although VR realism contributes to enhancing an experience, it is not appropriate in all flavors of CME’s. Is there any value to seeing an accurate representation of the distant meeting space in the introductory example? If the purpose of the CME is to present a concept, then the CME’s interface should not upstage the concept. The value of VR must be considered in terms of usability rather than novelty. For the application of this research, the simplicity and minimalism of the virtual environment takes precedence over stylization and eye candy.

The virtual environment has the power to manipulate both time and space to degrees suitable to the application. The technology allows for a great deal of flexibility when manipulating these two variables. For the time dimension, collaborative events can occur at the same time (synchronously) or at different times (asynchronously). A telephone conversation is synchronous, while an e-mail thread is asynchronous. As for the dimension of space, collaborative events can occur with all participants sharing the same physical location (face-to-face) or a number of different locations (distributed). A typical classroom environment is face-to-face, while a live video conferencing session is distributed. This leads to the possibility of four unique combinations for time and space: face-to-face (same time, same place), asynchronous (different
time, same place), synchronous distributed (same time, different place), asynchronous
distributed (different time, different place) (Chandler, 2001).

The built-in flexibility of the virtual environment means that depending on the
collaborative needs, the user’s experience could move through the different time and space
dimensions. Today, an e-mail can be sent rather than making a telephone call, forcing the user to
choose between two clearly different forms of media. In contrast, the CME has the ability to
merge other media. Choosing is not necessary because the task deems what is appropriate. For
example, during a telephone conversation, a visual problem presents itself that requires a
conscience decision to send a fax, thus breaking the continuity of the conversation. A shared
virtual space where participants shared the view of objects would increase co-presence and
allow for conversational continuity (Kraut, Gergle & Fussel, 2002).

2.2 Interaction

The phrase “look and feel” is often uttered when discussing a computer application
interface’s qualities. The look is tangibly attributed to the imagery and typography displayed on
the screen. The less tangible aspect is the feel. The human-computer interaction is the essence
of the feel. When a user acts on an interface element, the way it responds and works with the
overall environment give it a sense of realness lucidity. Though it may be reasonable to apportion
a great deal of importance to the visuals to create a realistic environment, the user’s interaction
with the environment could be at least as important (Schubert, 2001).

The sum of these subtle interactions forms patterns of behavior that inform the user’s
navigation and control of the working space of the applications. Beyond graphics, interaction
incorporates more sensory richness like changing control states, animated and audible
feedback, and texture. Though a typical computer lacks any more than visual and aural sensory
output, tactile, haptic and other kinesthetic and somesthetic are either currently possible or in
research development. The more meaningful and realistic the user’s actions, the more immersive
the experience can be.
2.3 Immersion

The qualitative success measure of the computer mediated environment (CME) is immersion. The ultimate conceptual level of immersion is the point where the user cannot distinguish the CME from reality. While this level of realism is improbable, immersion can also be defined as a virtual experience that substitutes for, or is more efficient than, reality. The same scenario in reality is less desirable, unreasonable or even illegal.

What makes a CME immersive? The body of literature is aimed at discovering the components that contribute to immersion. The research can be broken down into studies that look at these general factors: technology, environment, identity and interaction.

When the CME supports a first person (and perhaps second person) point of view, the feeling of presence is heightened. Much like a so-called ‘out-of-body experience,’ the user’s being and actions are transferred to the CME. While the research points to the humanoid avatar as the manifestation of presence, other entities such as vehicles, animals or objects can act as avatars.

2.4 Presence

Presence is the “perceptual illusion of non-mediation” that occurs “when a person fails to perceive or acknowledge the existence of a medium in his/her communication environment and responds as he/she would if the medium were not there.” (Lombard & Ditton, 1997)

Presence is “the degree to which participants subjectively feel that they are somewhere other than their actual physical location because of the effects of” a media of some type. (Shim & Kim, 2003)

To understand the current thinking with regard to presence and the avatar, the wide variety of research must be limited to the pertinent studies. While the overall definition of presence includes other media such as cinema, the research is limited to studies that use the computer as the intervening medium. For the purposes of this thesis, the computer is responsible for creating the environment for which the user can achieve presence.
A computer mediated environment can vary greatly in form. Any interface between the user and the data is considered a translation layer that functions as a CME. A CME can range from a chat client, which is classified as mediated on-line environment (MOO), to a 3D game or virtual reality environment (VR, VRE or VE). A word processor is arguably a CME, but users probably will not experience presence.

2.5 Avatar

While presence can be felt without the benefit of a computer mediated environment (CME), an avatar cannot exist without a CME. Avatars simply act as a graphical proxy for the users in the CME. Avatars can also vary in their incarnation. A chat client may use a simple icon to represent the user, while a 3D game can use a very accurate representation of the user including a full range of movement.

2.6 What Makes An Experience Rich?

Cheating time and space requires the virtual environment's interface to compensate with other devices and cues. The overall goal for the interface is to engage the user's sense of presence. Presence can be defined quite simply as the sense of “being there.” What is real and believable may be a function of physics that Einstein could explain, or it may be something perceptual and ecological that Gibson would be better off defining (Flach & Holden, 1998). In any case, presence is widely believed to have two major components: immersion and involvement (Singer & Witmer, 1999). From this viewpoint, both Einstein and Gibson are happy. Immersion relates to the realism and believability of the environment, which appeals to Einstein. Involvement refers to the task and the way the environment involves and responds to the user, which satisfies Gibson. What takes place so naturally in the physical world poses real challenges and opportunities in the computer mediated environment. Both the user’s perceptual and cognitive needs must be considered.

Once the technology, infrastructure and software are all in place, the hurdle remains in the minds of those who must adopt it. The concept of presence can help to alleviate inefficiency,
difficulty, mistrust and ignorance, but a huge conceptual leap may take generations as people adopt and embrace the CME as supplement or replacement to traditional means.

2.7  Joint Attention

One last crucial component remains relating to the transmission of the message from the sender to the receiver. A study of attention theory reveals all kinds of insight into perceptual and cognitive processes that inform the design of a synchronous, distant, virtual communication environment. How can the component ‘communication’ be best described in the CME? Certainly, a presenter’s intention is to direct attention and make her facts and arguments comprehensible and meaningful. Delving deeper into attention theory uncovered the loosely related concept of ‘joint attention.’

Also referred to as ‘shared attention,’ this theoretical construct describes the sense that at least two individuals are sharing the same object of attention and each person is aware of the other’s common experience. They recognize that they are actively sharing the same experience. In fact, it has been proposed that “raw” joint attention may be at the core of all speech communication:

“Herbert Clark (1992), discussing the arenas in which language is used, notes that there seem to be four requirements that speech communication imposes: (a) that we have a common ground of background knowledge, (b) an awareness of collaborative processes involved in interacting, (c) a sense of how to design our messages for our audiences’ understanding, and (d) a willingness and ability to coordinate and negotiate meanings. None of these requirements can be fully met without there first being a coordination of “raw” joint attention. That seems to be the first step towards achieving full joint attention.
“If we ask, then, what role is served by joint attention, the answer would be that without it, we cannot construct and coordinate the shared social realities that comprise everyday life. I find it ironic that in all the lists of human instincts that used to be offered by psychologists to explain human nature, nobody ever mentioned “the need to share the objects of our attention with others.” Yet, we are the only species that seems driven to do so.” (Chris Moore & Phil Dunham, 1995)

Most of the literature about joint attention is concentrated around early childhood development. It is argued that joint attention is an integral part of language development, sense of self and sense of others. Sharing objects of attention may be an innate ability that is unique to the human species. Is it instinctual for people to share objects of their attention while also desiring to share in the objects of other’s attention? Joint attention can enhance mutual knowledge and understanding resulting in cooperative and collaborative behavior:

“Adamson and Bakemen (1991) have argued that ‘…episodes of shared attention are pictured variously as moments for the mutual regulation of affect and of problem solving, for the negotiation of communicative intentions, and for the sharing of cultural meaning…’” (Chris Moore & Phil Dunham, 1995, p. 15)

Is joint attention behavior only beneficial to infants and children? Does it go away with the onset of adulthood, or is hardwired into the adult brain as well? The argument offered here is that the knowledge sharing behavior of the archetypal presentation involves the fundamentals of joint attention. People can learn individually and independently, but perhaps the need for the “show me” format of demonstration, reinforcement and confirmation is too powerful to be denied. It may become more sophisticated with age, but joint attention is perhaps a fundamental factor for many learning processes. It may be especially useful when complex or abstract concepts need clarification. Using examples and illustrations as shared objects of attention in a presentation clarifies the message taking advantage of multiple sensory modalities.

During a shared experience, directing attention to specific details of the object is accomplished with pointing. The beginning of a joint attention event begins by acknowledging that another is overtly or covertly observing some phenomenon. Overtly, someone may demand
attention by pointing to an object, but someone's gaze can also be covertly tracked to an object. A person's built-in ability to point may be the original tool of joint attention that acts as an early form of language:

“...The use of an outstretched arm and index finder to denote an object in visual space may reflect hominoid evolutionary adaptations of the index finger and thumb, and the precise gesture is species specific to man (Butterworth, 1991a; Hilton, 1986). Theorists do not agree on the ontogeny of pointing. Preyer (1896) considered pointing to be a movement originally expressing a wish to seize. Vygotsky (1926/1962) similarly argued that pointing develops out of the mother’s interpretation of the infant’s failed attempts at prehension. Shinn (1900, cited in Schaffer, 1984) suggested that manual pointing may develop out of the exploration of objects with the tip of the index finger while the baby is engaged in close visual inspection. Shinn also suggested that pointing may begin with the application of the intersensorimotor coordination to an extended space. All of these hypotheses suppose that pointing, which occurs at the average age of about 14 months, develops out of prehension.

An alternative explanation is that the pointing gesture serves a specialized communicative function from the outset. Fogel and Hannan (1985) showed that index finger extensions occurred reliably in face-to-face interaction in infants as young as 2 months. The index finger did not single out a particular object; it was not correlated with the infant’s gaze nor was there any arm extension. However, the point was reliably preceded or succeeded by either vocalization or mouth movement. By 6 months, the hand may have spontaneously adopted the pointing posture when an object attracted the infant’s attention in a social context but again, the arm was not extended. Extension of the arm and index finger, in a communicative gesture, was observed at the beginning of the second year of life (at 14 months on average). According to Fogel and Hannan (1985) the specialized function of the index finger in relation to shared attention may be innate, while the progress to instrumental use of the gesture may be explained by successive acquisition of arm control, fine manipulative skills, and cognitive integration of the communicative roles of infant and adult.” (Chris Moore & Phil Dunham, 1995, p. 35)

Again, pointing is not something that people give up as adults. Pointing exists in many basic forms from the index finger, the head jerk to the laser beam. As a means of directing attention, there are all sorts of creative extensions of pointing mechanisms: computer mice,
flashing lights, ringing phones, bold fonts, alert sounds, bouncing icons, etc. Arguably, pointing in the shared space of the computer mediated environment is an absolute requirement and not just a nice feature. It is a powerful tool for mutual comprehension and understanding.

The scenario where someone is staring into the sky draws curious attention from passersby. One cannot resist looking. Consider someone else's feeble attempt to point out a distant star in the night sky. A telescope is a better pointing instrument in this case, but it can still facilitate a shared experience. Joint attention is integral to socially accepting and understanding information. The need to share, the need to take part in the sharing, and the need to believe that the experience is accurately shared define the joint attention exchange.

2.8 What Makes Something Cool?

New technologies come from invention and are expressed as new devices or processes. Enabling technologies all do something that was otherwise difficult, tedious or impossible. Innovative technologies often solve problems that you did not even know you had. What can design do? Design can take the parts and create the whole. Design can make the product user-centered rather than technology-centered. It is not just useful but indispensable. Design gives it form, functionality, usability and even desirability. Design can make it cool.

Despite the overwhelming etymology of the term 'cool' and seemingly vague colloquialisms, everyone knows when something is cool to them. Whether it is the intent to entice, excite, convert or satisfy users, looking for a cool solution is a worthwhile design consideration. Is it entirely subjective? Do things that are generally agreed to be endowed with coolness share any attributes? Presented here are six attributes that constitute the Cool Factor: slightly recognizable, attitude, secret that is not first recognized, technology, walking the fence, and trendy materials. (Haase, 2004)

2.8.1 Slightly Recognizable

It is ill-conceived to design something that has no way to infer its purpose. The functionality should be easily visible to the user (Norman, 2002). However, too obvious is
decidedly uncool. The use of subtle hints, cues and meaning based on an appropriate metaphor can provide just enough familiarity while maintaining the uniqueness. If the product is truly revolutionary, it only makes sense to reference the familiar product in a minimally respectful manner. The user should infer that this is a radical step forward.

2.8.2 Attitude

The essence of the user-product interaction should express an appropriate attitude. Don Norman often used terms like ‘slick’ and ‘beautiful’ to seemingly disparage a product. (Norman, 2002). While these do not seem like negative terms, attitude can be asserted in a number of ways that pay a compliment to the subject of this research: easy, invisible, intuitive, expressive, efficient, collaborative, and productive. Really good design just seems to have attitude even if it is not brash, aggressive, colorful or loud.

2.8.3 Secret That Is Not First Recognized

Functionally complex products should layer the user’s interaction so that the deeper, secondary controls are hidden during basic operation. The user should also be able to freely explore the system without irreversible errors (Norman, 2002). As a user’s familiarity with a tool increases, she is rewarded with more advanced functionality. Within the domain of computers, this is a relatively easy task. Sometimes, the secret may be within the product itself. In a synchronous, distant, virtual communication environment, the user experience itself has a mystique that becomes very clear once she is engaged in the process.

2.8.4 Technology

Advances in technology create the possibility of innovation. The latest and greatest has a reputation for being potentially risky and unreliable. Cool products, on the other hand, have probably implemented the technology in ways that are effective and reliable. The user forgets about the parts of the mechanism, and forms a perception about the product as whole and its meaningful use. A CME relies exclusively on advanced technology to exist as a product.
However, if the technologies work harmoniously and transparently together, the user will embrace the experience rather than software or hardware.

2.8.5 Walking The Fence

Coolness has to get as far away from the bland, traditional and normal while not pushing too far past the bleeding edge to the point of absurdity or morbidity. The interesting paradox of cool things is that as soon as a critical mass of people acknowledges that something is cool, it ceases to be cool. Perhaps really cool products simply become commonplace or ubiquitous—not a bad situation for the cool product vendor. The initial impression of coolness drives adoption, and eventually this spreads acceptance among users as coolness is backed up with merit.

2.8.6 Trendy Materials

In the real world, objects and environments can make use of a material’s texture, color, form, lighting effects, etc., to elicit a sense of cool style. The materials and the processes to make those materials are also improved and updated with technology. For the virtual environment, the term “materials” seems irrelevant, but the appearance and tactility of materials implies a user-product interaction. The CME can also make use of cool or trendy advances in the interface. Interactive control surfaces, sophisticated feedback and advanced animated visualizations could be considered examples of “materials” on the interactive designer’s palette.
The requirements and expectations for a synchronous, distant, virtual communication environment are substantial. Providing a similar experience to the collocated, physical environment is one of the already established parameters for the CME. At least with current technology, it is not possible to provide the equivalent experience. But an exact replica is not a very worthy design goal anyway. The collocated environment is a starting point; a place to derive information, and inform the model on which the CME is to be based. The real design goal for the CME is to adapt the successful traits of the collocated environment and look for opportunities to improve on the inefficiencies.

Just because there is a traditional way a presentation has always been done does not mean it is the only way, the best way, and certainly not the ideal way. First, the clear advantages of physical collocation must be acknowledged, but even they are not without pitfalls. What seemingly has a clear advantage in the collocated environment may simply have a different solution in the virtual environment. These different solutions also lead to a host of unique affordances that are only possible in the CME. In every unique presentation scenario, whenever the affordances outweigh the tradeoffs, users should reconsider their traditional beliefs.
3.1 Collocated Affordances

3.1.1 Gestures

Mentioned before, pointing comes in many different forms, but many other motions of the hands and arms add subtle meaning and energy to the spoken word. Clearly, this is a useful technique for the presenter that may be diminished by distance. How much gesturing is delivered by auditory voice inflection, and how much is purely in the visual modality? For a presentation, what kinds of gestures are relevant? Gesturing is not secondary to speech; it reinforces the presenter’s commitment to the communications (Kolko, 1999).

The actual implementation of the CME delivers the speaker’s voice in a manner as good (or better) than in the physical environment whether through the Internet or via a teleconference. Visually, the CME provides gesturing in the form of pointing, and the user’s actions with the pointer can provide extra meaning and context to the voice from the manner in which the presenter manipulates the pointer. Gesturing may also be an important signal to initiate the desire to communicate (Kolko, 1999). Here the CME can excel at communicating a change in state or a transitional moment with visual and auditory cues.

3.1.2 Body Language

Disembodiment is the reality of virtual reality. Beyond gesturing, how much body language is important for the communication process? Should facial expressions be delivered to the end user to supplement the voice? Telephone conversations occur all the time without the benefit of body language (although some people gesture anyway). If the presenter plans to act or demonstrate, then an alternative has to be planned out in advance for the virtual environment—an animation or prerecorded video perhaps.

It is also possible that a video representation of the presenter can impede communication. When demonstrating complex information or processes, seeing the presenter’s face did not improve understanding. Instead, the person at the receiving end of the tutorial wants the attention focused on the content (Fussel et al., 2000). The instructional message is
more important than the performance of the presenter. In fact, since not everyone is a professional speaker and even fewer are comfortable on stage in front of a group, eliminating the distracting and negative body language can also be seen as an advantage.

3.1.3 Feedback

The communication model for a presentation is one-to-many, or even one-to-very-many. The larger the group gets, the less the possibility for one-to-one interaction to occur. In the collocated environment, a presenter gathers information from many sources. Overtly, a student can ask a question. While this can be accommodated in the CME, there are other more subtler, covert interactions that also inform the presenter, like audience facial expressions in response to a statement. Audience attitudes and interest level can be generally inferred. Could a comedian perform within a virtual environment?

At some threshold, an audience is so big that feedback is more like an average reading rather than a person-by-person assessment. While a performer may face limitations within a virtual environment, a presenter or lecturer requires more general feedback. For a shared instructional task, if the task is simple enough, visual feedback may be unnecessary (Kraut et al., 2002). This may even be truer for a presentation since the attendees share less in the task. The presenter does, however, benefit from receiving confirmation that her message was accurately received. This may be difficult in either environment.

3.1.4 Rich Interaction

One advantage that the collocated environment obviously provides is the “hands-on” experience. Spatially disparate parties cannot have physical contact with shared objects, the presenter, or each other. When sharing the same physical environment, a group activity can make use of all the sensory modalities. For a demonstration that requires tactile interaction with an object, the audience can have a truly somatosensory experience only if they are in direct contact with the object. Collocation also provides a superior sense of environmental spatial if, for example, a demonstration of gravity is conducted.
Interestingly, the mind can complete the spatial gaps in a three-dimensional virtual model, and it can fill it in with sensory information provided by other means (Biocca & Kim, 2001). A mental model of the virtual space can be formed from the given information similar to the way it is conceived in the real world. This suggests that other concepts or perceptions can be achieved even if the input is an “impoverished, incomplete, and often inconsistent set of sensory cues.” (Biocca & Kim, 2001). This is a very exciting challenge to design alternate methods or realities to convey the same experience.

3.1.5 Eye Contact

Direct eye contact is only possible in the collocated environment. Experience says that this is a good method of connecting to an audience and making it seem personal. There is no foreseeable solution to this within the CME. The future of the Internet promises for the ability to easily stream live video, but that would, at best, allow for the sensation of the presenter looking directly at the attendee (and only if the presenter looks directly into the camera). Just like the portrait of the figure whose eyes follow you everywhere, this is just the illusion of eye contact.

Again, the one-to-many nature of a presentation does not allow for eye contact with everyone, but in the event of an individual interaction event, like an audience question, could the system benefit by eye contact through a two-way video conference? This is not an idea explored here given the readily available technology, but a possibility worth exploring.

3.1.6 Shared Experience

Without any specialized cues or intervention, people instinctually sense they are part of a larger group witnessing the same experience. Physical collocation permits joint attention to occur without any special effort. The collocated, shared experience easily allows subgroups and side conversations to take place. Information can be easily exchanged between peers or groups.

Sharing the experience is definitely possible in the CME, but again, the mode of communication operates very differently. Messages and files can freely flow from user to user
with the virtual environment, but the interface’s ability to let the user know that others are also engaged (or disengaged) in the experience is not necessarily evident.

3.1.7 Common Fate

The shared experience also leads to the feeling that everyone is in the same situation and is experiencing a common fate. This may be a comfort for some personality types who crave the social structure of the group. Managing multiple social structures are beyond the scope of this research, but the CME that is modular and reconfigurable could be updated to meet the social needs of individuals or groups.

3.2 Collocated Drawbacks

3.2.1 Poor Sight-lines & Varying Vantage Points

Most of the benefits of the collocated environment involve the social aspect of experiencing group interaction first hand. But the collocated environment falls short where many of the unbending laws of physics are concerned. The common sense conclusion would be that it is always better to experience a presentation first hand, but as the size of the group grows, so does the variability of an attendee’s viewing position.

When communicating to a mass audience with visuals, it becomes more difficult to deliver the information to everyone with the same fidelity. The experience is going to be different for the person in the front row who may benefit by the aforementioned social interactions versus the person in the back row who is one hundred feet away. The clarity and legibility of the visuals is lessened. Other physical obstructions like structural poles or even other people’s heads hinder visibility.

The CME, on the other hand, has the potential to offer each attendee a similar vantage point. The vantage point does not change if there are ten attendees or a thousand. Approximately the same scale and proportion is equal for everyone. Plus, the personal environment can be adjusted and customized to the needs of the viewer. And if there are special visual needs, the system and interface can adapt for that user.
3.2.2 Variable Audibility

The same is true for hearing as it is for seeing. As the group of attendees grows, so does the relative quality of the speaker’s voice or other audio supporting the visuals. This could be both a function of distance and elevated background noise and acoustics. Plus any number of other distracting incidental noises increase in proportion to the size of the group.

Again, the CME can deliver audio in a number of ways to reduce or eliminate unwanted aural anomalies. With a microphone properly positioned in the speaker’s range, all attendees receive a similar experience. Audio delivery through the CME has its drawbacks too. Currently, the sound quality over the Internet can vary since the throughput of the protocol can change from moment to moment. This is expected to improve as the bandwidth and reliability of the Internet improve in the near future. In the meantime, a teleconference is still a viable and inexpensive means to transmit the live audio.

3.2.3 Location-Based

For a group to converge in time and space, time is a matter of scheduling, but space imposes a long list of demands. First, a location must be chosen that is geographically convenient and accessible. Then, a suitable facility must be allocated that is not too big nor too small. Everyone attending must plan his or her trip, dedicate time for travel, and find the facility. It is becoming increasingly important to accommodate the diversity of needs for a whole range of individual abilities.

Much of the cost associated with group meetings lie within the facility itself. Dedicated spaces must be designed and built for the gathering of differently sized groups. They need to be as numerous and spread out geographically and practically as possible. These structures need to be heated, cooled and maintained whether or not they are booked to capacity. Pulling at this thread even more, support systems must accompany the meeting facility including parking, transportation, lodging, dining, entertainment and other personal needs. What else? There is no doubt more.
Of course, the apparent advantage of distance communication is that participating in a presentation is as near as the closest computer. All parties can choose their own existing environment that suits their individual needs. The meeting space essentially becomes the aggregation of all the distant environments that have no geographic connection or relationship. Another compelling and transitional use for the CME is to augment current physical environments with the option to attend virtually. This extends the boundaries of the physical location while offering the choice to preserve the social affordances mentioned above.

3.2.4 Limited Large Audience Size And Interaction

At some point, no matter how well designed the meeting facility is, there is a limitation to its capacity. It can only serve so many. The meeting space also works best if enough people are present to make it feel full. A group of five feels awkward in a hall that seats one hundred and fifty. Again, physics prevents the facility from being very flexible in its scalability.

Eye contact is certainly difficult as a group gets very large, but any individual, presenter-to-attendee interaction is nearly impossible. The range of interaction starts at its highest at fully engaged for a one-to-one exchange and quickly decreases as the one-to-many ratio gets bigger. For a given scenario, there is a critical mass at which the interaction is at its lowest, and attendees become more like spectators than participants.

For the CME, audience size and interaction might be improved, but it will be certainly different. There are still practical and technical constraints for the audience size in the virtual environment, but unlike walls or partitions, the environment is infinitely reconfigurable. The system can also help plan what is and is not feasible for a given audience size. For example, a wide open teleconference is not practical for much over twenty people, and there is no illusion that it would work any better within the CME.

No matter how large the audience is, the CME can collect input from every unique individual. This is not personal interaction, per se, but it is an efficiency of the technology. Data can be automatically collected, sorted and displayed. Could hundreds of people contribute to
brainstorming? Coupled with an increase in real or perceived interaction, could the lack of direct visual confirmation of audience size improve the sense of individuality and autonomy? Is an individual’s slide of “shared presence” enlarged?

3.3 Distance Affordances

3.3.1 Multiple Locations And Venues

A single meeting can be an aggregation of many geographically distributed locations. This is a compelling characteristic of the CME so long as the drawbacks are satisfactorily accommodated. The even more persuasive argument is that every participant chooses and configures her own personal, physical environment for the presentation. Because of technology, a participant can be in nearly any setting—it no longer requires a dedicated meeting facility to join a large group. Perhaps an attendee needs to multitask a few other items while attending, and so the convenience of her own office is appealing. Or she might also take advantage of wasted time on a train, airplane, hotel or airport. But for those who desire a comforting and calming environment, the choices of venue are somewhat anti-establishment: home, garden, cafe, or beach.

3.3.2 Synchronous or Asynchronous

This research deals primarily with the concept of a synchronous, real-time group activity. The components of synchronous, distant, virtual communication environment posited previously are specific to the complicated nature of coordinated, real-time activity. From this perspective, asynchronous communication is much less complicated. However, the ability for the CME to change modes from synchronous to asynchronous could be a useful feature.

Without too much effort, the CME can potentially let the presenter record the live events. Attendees could later review the material under their own individual control and at their own pace. Presentations that are permanently archived can be recalled at anytime for study. In addition, if someone was unable to attend the live event, the archived version acts as the fallback plan. If it is appropriate for the situation, viewing the previously recorded event may lack
much of the experience, but the ability to have the secondary asynchronous option is very practical and beneficial for many presentation situations.

3.3.3 Individual Input

The downside of the CME seems to be the reduced interaction between the presenter and attendees and amongst attendees. And in either the physical or virtual environment, as the group gets larger, interaction is reduced. A presenter cannot spend the time to have a few hundred conversations with individuals consecutively, nor is it possible to have even a few conversations simultaneously. A presenter can informally poll the audience by a show of hands, but if accuracy is important, then counting is cumbersome.

Gathering input from attendees is a technologically inherent strength of the CME. Depending on the nature of the data sought, the CME can collect any sort of response to a question or digital files including speech and video. The presenter can also observe the incoming results of the query in real-time. The data of a simple audience poll could be gathered, analyzed and presented back to the audience in minutes or even seconds. This sense of immersion and interaction should help offset some of the richness lost as a result of not being physically collocated.

3.3.4 Tracking

A side effect of individual input is the ability for the CME to track and monitor every attendee. As an avatar with identification data attached, the CME can potentially gather metrics like attendance, participation, contribution, performance, engagement or simply the results of a poll. For a teacher, the poll could be a quiz or mock test to gauge progress or the effectiveness of the prepared material or teaching style. With the ease of which data is collected, the feedback could be overwhelming—not usually the case for a large group of basically anonymous attendees.
3.3.5 Simplified Technology & Event Planning

For most, the CME’s radical change in the presentation method creates anxiety. Many are likely to be uneasy and unsure of the technology and the break from tradition. However, when considering the dedicated infrastructure and technology necessary for the physical facility, calling up a web site on a laptop does not seem so complicated—especially from the beach. Whereas the facility is an infrastructure of meeting halls, lodging, transportation, etc., the Internet is wireless hot spots, computers, servers and wires. Of course, many of these facilities provide the Internet connectivity so that the people attending the event can access the world they left behind. There seems to be something very backwards about this way of thinking.

3.3.6 Directed Attention

Providing that each attendee is in tolerable control of his or her local, physical environment, the computer screen is the primary focus of attention. The audio source is also localized at the computer. Used carefully to its full potential, the CME can command the desired level of attention in a relatively small and manageable space. Yet from the attendee’s perspective, the CME appears to be very close and personal at a very short focal length. Depending on individual preference, the CME can occupy a range of personal space from foveal vision to the periphery. Motion and auditory cues can help direct attention to maintain the desired focus. Individual input and tracking can also gather reciprocal input through the interface to stimulate the attendee’s attention.

3.4 Distance Drawbacks And Tradeoffs

3.4.1 Spatial Orientation And Visual Touch

The virtual environment lacks many of the sensory cues present in the physical environment. The CME discussed here is not intended to be a true representation of the physical space or, in other words, virtual reality, but the question of “the where” in the CME is still important for a user’s orientation. In fact, the environment proposed is largely two dimensional and lacks even the spatial cues that VR could afford. For VR, research shows that when the user
is given alternate cues and information, she can fill in the gaps and even create false sensations
or synesthesia of expected feedback:

“One form of cross-modal interaction, a cross-modal transfer, is defined as a
form of synesthesia, that is, a perceptual illusion in which stimulation to a
sensory modality connected to the interface (such as the visual modality) is
accompanied by perceived stimulation to an unconnected sensory modality that
receives no apparent stimulation from the virtual environment (such as the haptic
modality). Users of our experimental virtual environment who manipulated the
visual analog of a physical force, a virtual spring, reported haptic sensations of
‘physical resistance,’ even though the interface included no haptic
displays.” (Biocca et al., 2001)

Using appropriate stimuli, the perceptual gaps can be filled and completed cognitively.
This cross-modal transfer represents a more complete sensation through alternate modalities or
“visual touch.” It is very important to adapt the interface to the user, but there is no discounting
the user’s ability to adapt to the interface.

The intent of the presentation CME revolves around presence, co-presence and joint
attention. Instead of exploring a space or manipulating objects, users in this space are content if
they can sense a community of others. The successful and proven elements of VR can be
modified and integrated where appropriate. However, this research is not concerned with the
visual wastefulness of creating a facsimile of the physical meeting space and its attendees.

3.4.2 Social Interactions Altered

Leading up to this particular drawback for the CME, it seems plausible that social
interactions between the presenter and attendees and among attendees may not suffer.
Originally, this section was titled “Social Interactions Lessened,” but it may be better to think of
interpersonal communication and socialization as significantly altered. Although the subsequent
experiment gauges attendees’ impression of the presenter and her performance, it is not
intended to reveal changes in the social structure. The adaptability of both the users and the
interface offer hope that another model for socialization is possible.
3.4.3 Emphasis On Speaker’s Appearance Lessened

The speaker’s appearance may not be a significant factor for attendees, but it is a condition that the proposed CME design creates. For technological reasons, live video of the presenter is not possible for everyone. For the intended use of the CME, it is believed that the emphasis should be on the content, rather than on the presenter. Research shows that interaction does not benefit by live video of participants:

“…we caught ourselves making the common, yet indefensible assumption that video should provide more opportunity for persuasion, and should engender more cooperation and truthfulness simply because it affords more visual and verbal cues from a person than written text. Yet, as Sellen discovered, video does not appear to provide benefits in interaction above high quality audio. Thus, our study contributes to this growing body of literature that questions the behavioral effects of video in interaction.” (Bradner & Mark, 2002)

Regardless, without a personal presence, many speakers might be at a serious disadvantage if they believe that part of their presentation skills are tied to their appearance. On the other hand, another kind of qualified presenter could be discovered who might otherwise be too ill at ease to lead a group activity.

3.4.4 Emphasis On Speaker’s Oratory Abilities

With live video of the presenter being absent or marginalized, live audio becomes that much more important. Presenters that have no issue with the physical environment should be able to adapt to the virtual environment. The experiment conducted for this research did not observe the condition where all of the attendees were distant. At least a handful of attendees were collocated for the presenter to present to. The presenter’s oral delivery of the material might be altered if the interface does not adequately provide a sense of an audience.

3.4.5 Uncontrollable Local Distractions

Finally, the best feature of the synchronous, distant, virtual communication environment might also be its biggest challenge. When collocated with her audience, the presenter shares the
same physical environment, so she also shares the same ambient conditions. She has some control over or, at least, shares in the same conditions as everyone else. Issues or distractions are same for everyone, and can be transformed for everyone. The meeting facility was, after all, designed for the purpose of assembly.

Conversely, for those attending via the CME, it is now their individual responsibility to maintain an acceptable surrounding environment. Many might have to learn to exercise some self-discipline or otherwise be victims of uncontrollable distractions. The way society increasingly over multi-tasks, many might have an inability to resist taking part in other activities. For some, the physically collocated meeting space may be the only socially enforcing factor inhibiting them from talking on cell phones, checking e-mail, having side conversations or even napping.
CHAPTER 4

CURRENT STATE OF SYNCHRONOUS, ON-LINE ENVIRONMENTS

One popular buzzword for virtual environments is ‘collaboration.’ This term is usually applied to software-based virtual environments that are marketed to enhance productivity by allowing enhanced teamwork. In the world of business, this type of software is referred to as ‘groupware.’ Rather than presentation oriented, it is process oriented. For an effective collaborative process to take place, complex interactions among team members must be possible. It is also likely that the groupware is tailored with custom functionality to meet the team’s needs. Groupware and its derivatives are the primary focus of research forums like Computer-Supported Cooperative Work (CSCW).

Within the sphere of education, the comparable forum is Computer Supported Collaborative Learning (CSCL). Apparently, the way different groups cooperate is significantly different. Instead of groupware, educational cooperative environments are generally referred to as course management systems (CMS). The general impression from reviewing the information for many CMS’s is that they are generally asynchronous and support thousands of users. Some offer synchronous modes or modules as part of the overall services structure. It is difficult to find a CME for the sole purpose of presentation.

The processes and goals seem very similar for a given project—whether it is education or business. However, in either case, the variety of software advertising to fill the distance need is growing each day. To foster cooperation and collaboration, most available solutions are process-oriented rather than goal-oriented. In other words, they offer a group a cooperative environment to work towards a common goal rather than a synchronous environment to present
information in its final, distributable form. That does not stop the language of the marketing to often promise everything to everyone.

To be fair, for the numerous products claiming to provide a compelling synchronous, distant, virtual communication environment, most can not be critically analyzed unless they are fully experienced. This requires more than just poring over the marketing and hype. At least two participants and some real, purposeful communication must take place in each of the CME’s that meet the criteria. The following list obtained from an independent source, www.thinkofit.com, that compiles various on-line communication solutions show the options available in the “Web Conferencing - Online Meetings & Presentations” category:


From the sheer number of solutions, designing a compelling synchronous, distant, virtual communication environment is seemingly a straight-forward, uncomplicated task. The biggest and most recognized players in this arena are Microsoft LiveMeeting, WebEx, Raindance, and GoToMeeting, but even none of these are household names. Just released at the time of this writing, Microsoft LiveMeeting offers many synchronous presentation abilities to simulate the collocated environment. Again, reading about the experience is not very satisfying, but the following images from the interface are representative of the problems facing users. Illustration 4.1 depicts the initial LiveMeeting collaborative environment using a browser, which differs somewhat from the look of the application. Note the overall lack of organization with controls on all sides of the presentation area. The plethora and variety of controls command a large percentage of screen real estate at the expense of the presentation content. The controls are grouped—but not logically or visually linked to anything else. Some controls are labeled while others are not. Some controls have only text and look like buttons while others have graphical icons. The primary control graphics are color, but the secondary set are grayscale. Although this is the title slide for a LiveMeeting marketing presentation, there are no less than three instances of the logo present in the interface.
The browser implementation of LiveMeeting lacks some of the functionality of the application. The control is visible and clickable which necessitates the need for this cryptic error message shown in Illustration 4.2. First, there is no reason why LiveMeeting is not user-mode aware of the fact that the presentation is utilizing the browser console, but second, the dialog box indicates the nature of the error, but no recourse to fix it.

The import window seen in Illustration 4.3 reveals the lack of regard for the user. The prompt indicates that the user should choose a '.pwp' or '.lmp' file, which is almost meaningless information to a typical user. Plus there is no explanation or help to clarify the arcane file type.
What is the difference between the ‘Alternate Uploader’ and the ‘Main Uploader’? Is ‘Uploader’ an appropriate term for the desired action?

Illustration 4.2: Microsoft LiveMeeting Feedback

This version of LiveMeeting is seen as a huge step forward for the software and synchronous, collaborative on-line environments. It has more questionably useful features and clumsily integrates more functions, but looks more like several applications were shoddily grafted together with no single design vision in mind.

So why are none of the software solutions runaway hits pervading throughout the Internet landscape? Perhaps its naïve to think that computers and the Internet are everywhere—let alone broadband. However, some general observations can be stated from the experience with a handful of these products.

- not user-centered
- no specific intended use or user
- feature laden rather need focused
- complicated interfaces
- poor typography
- rush to market
- overstated and confusing marketing promises

These observations are generalizable to many on-line and off-line software products. Actually, many of these items are true for all kinds of objects, communications and environments
indicative of the lack of design in the development process. Brand new technology and innovative ideas seem to always start by ignoring anything learned in the past. It is always a revelation that a redesign be based on the user's expectations, needs and desires. There should be no reason to wait for a product to mature before applying good design sensibility.
The nature of the CME is defined. The logical next step to test the knowledge accumulated during the research phase is to build an environment with an interface and interaction that satisfies the presenter-to-attendee communication model. A good portion of the learning process is revealed in the building of the working prototype presented here in the research. Many of the nuances of creating a multi-user, shared Internet application become interesting design and development challenges that have greatly added to the scope of this research. The prototype, and the avenues explored to create it, directly informs this research. More importantly, it informs the process of crafting an experience. Without it, there is only a proposed design or a blueprint, and this would fall short of the intended goal of creating an experience. The prototype is an original piece of software designed and developed with the user experience in mind, so a brief tour is in order.

5.1 Welcome To Peer Sight

To initiate or join a collaborative session, the user only needs an Internet connected computer with a browser that supports the Macromedia Flash software plugin. With these minimal requirements met, the prototype can be accessed at http://www.peersight.com. Although the prototype can operate entirely in a browser window, it acts and feels like an application. This “application” or what represents the interface of the CME is code-named and branded Peer Sight.
Peer Sight introduces itself with the obligatory splash animation shown in Illustration 5.1, which functions to introduce the identity and visual language. More importantly, several critical checks are executed and evaluated. Internet connectivity is confirmed as well as the ability to access the Peer Sight server, which is the central point for all communication. This is not meant to be a technical walk-through of the interface, but the user may have the illusion that communication is peer-to-peer. In reality, the central server not only handles all the communication transactions, it is also the location where the bulk of the application and the presentation files reside. Since the technical complexity is not relevant to the user's experience, careful attention is paid to expressing only the details that inform the user.

Illustration 5.1: Peer Sight Introduction

5.1.1 Access

Once the necessary checks are complete, the user is prompted as shown in Illustration 5.1 to enter a 'Presentation Key' to access the specific presentation that she has been invited to. Most users are likely to enter as an 'attendee,' which is the default selection. The presenter differentiates herself by toggling the control to 'presenter.' Depending on the security level of the presentation, the next steps of the process will be determined. This is a key point of
differentiation for many typical on-line services. Peer Sight does not require the attendee to “create an account” or “sign up for service” just to join a presentation that she has been invited to. The presentation key determines what level of access and security an attendee will need.

![Illustration 5.2: Peer Sight Presentation Key](image)

To make the joining process as easy as possible for the attendee, the presenter decides what kind of credentials the attendees will need. The Peer Sight prototype is currently enabled to require a presentation key and single password for all attendees. This prevents those who are not invited from dropping in, but still remains reasonably simple for those who are invited. For situations that require more or less security, the joining process can be modified to allow a truly public presentation that requires only the presentation key, or a very secure process that mandates a unique username and password for only the specific people invited to the presentation.

5.1.2 Authentication

After Peer Sight has recognized the presentation key, the user is prompted to input only information relative to this presentation type. While the attendee may only need a password, the
The presenter uses her Peer Sight logon credentials as seen in Illustration 5.3 to access her privately owned presentations. Unlike the attendee, the presenter must have an administrative account to generate, access and archive presentations on the Peer Sight server. This unique information also informs Peer Sight that she is the presenter, and the presenter has a differentiated interface for the purposes of presenter control and interaction.

Illustration 5.3: Peer Sight Authentication

In addition, the information derived from the presentation key also reveals time zone differences for attendees. The interface can help inform and synchronize attendees with regard to the issues inherent with multiple locations throughout the world. Distance communication is both enabled and encumbered by this unique trait. While physical location and distances are much less significant, the coordination of local times can be very confusing. Unlike the telephone, the visual interface of Peer Sight offers huge opportunities to help indicate and coordinate an individual's sense of time and place.
5.1.3 Attendee Information

The next step after successfully authenticating, the user submits information about herself seen here in Illustration 5.4. Much like introducing oneself at a meeting or during a teleconference, the attendee information will become a part of each attendee's avatar that represent each individual in the CME. The interface also acknowledges that attendees might cluster around a single computer or projection screen and allows a group identity rather than an individual identity. If the presentation is one-to-very-many, say hundreds or thousands, the interface scales back on individuality. Attendees still need a sense of the meeting size, but unique identities with detailed information may only be useful to the presenter.

Illustration 5.4: Peer Sight Attendee Information

Since the user is now authenticated within this presentation space, she can verify the presentation agenda and confirm that she is in the right virtual place at the right time. This is potentially a place to deliver other pertinent information to attendees that they need in advance of the start time. Anything that helps prepare attendees can help expedite an effective presentation.
5.1.4 Green Room

At the next stage, all participants congregate in the ‘green room.’ With luck, the presenter and the attendees all arrive early to the meeting and are all well prepared. In any case, as everyone joins, his or her identity is added to the group with graphics and information marking his or her entrance. Various Peer Sight system sounds also identify meaningful events or actions adding salience and directing attention to certain actions like a new person joining. The green room also marks the introduction of a shared environment eliciting a sense of place and presence. In the green room, interaction is also possible. Not only are all the identities available to all, attendees can also chat with text messages to the whole group or privately to individuals. For those instances when meetings do not begin on time, the green room enables attendees to have a sense of a common fate. The green room reinforces the purpose of the event and attempts to reduce perceived wait time taking comfort in the perceivable fact that everyone else is also experiencing the anticipation or even anxiety.

Illustration 5.5: Peer Sight Green Room

The green room also features a countdown interface element to help all attendees stay on schedule. Since Peer Sight can run in a single browser window, the attendees can continue
to multitask and work on other things within the computer’s space or in their physical workspace while monitoring the green room. The feeling that time is being wasted is a powerful distraction. Meetings sometimes start late.

The presenter enters the same green room environment as all of the attendees with all the same interface and functionality. In addition, only the presenter has a set of presentation controls also shown in Illustration 5.5. These controls are hidden from the attendees. Using icons from the slide projector and media player metaphor, the presenter can navigate the presentation from these five controls. At this stage, only the ‘play’ or ‘forward’ control is active. Once the presenter is satisfied that all attendees are ready, she simply presses this button.

5.1.5 Presentation Title

Also following presentation conventions, all attendees are simultaneously advanced to the presentation title slide. Without overwhelming the attendee, she is introduced to the interface and presentation title displayed in Illustration 5.6. The user may also notice that at each stage of the joining process the presentation “iris” has been incrementally opening up to this final, fully open presentation space. In a series of stages, the user is acclimated to every instance of interaction as required.
Illustration 5.6: Peer Sight Presentation Title (attendee view)

The presentation title screen also introduces the moment of total synchrony. Like a funneling effect, users entered the environment independently and asynchronously. Systematically, they converge in both time and space on the presentation title slide. Instantaneous synchrony is the ideal; the nature of the Internet is the reality. The interface accommodates the potentially divergent response times for each of the attendees. The technology between each of the attendees and the Peer Sight server is not predictable or static for any given moment. To compensate, the interface offers feedback in the form of a page load indicator. When the presenter advances the presentation, everyone is subtly alerted that a new page is forthcoming. But until the most lagging user has received the content for the next page, the indicator continues to process the request. At the moment the server receives confirmation that everyone is ready to advance, it sends the final command to advance.

Quite a bit is happening behind the scenes, but the essence of the action is encapsulated in a single animated interface element. Perceptually, it maintains the illusion of total synchrony while also prompting the user to an imminent change of state. Since immediate response cannot be guaranteed, the interface supplies important feedback between the acts of
the user specifying the action, and the system executing of the action (Norman, 2002). The indicator is also given context and meaning without the implicit complexity behind it.

5.1.6 Presentation Text

Now that all parties are synchronized, this mode continues for the duration of the presentation. The interface maintains a sense of joint attention with a construct that conveys that the experience is shared. Directing attention further enhances shared experience, and the interface affords this by enabling an analogy to pointing. Illustration 5.7 displays a typical text slide. The action of pointing is embodied in the cross-hair symbol and controlled by the presenter. The coordinates of the cross-hair are shared with all the attendees. Again, the cross-hair shares the hardship of the slide control mechanism; it has to be synchronized for all attendees despite the limitations of the Internet. To achieve this, the virtual cross-hair “follows” the presenter’s cursor as though it is attached with an invisible rubber band. For the presenter only, this action feels like there is some weight attached to the cross-hair as though a more substantial operation is taking place. This not only indicates exactly what is actually happening on all the attendees screens, it adds meaning to the motion indicating the depth of the communication going on behind the screen and beyond the walls.
For the attendee, the cross-hair is the manifestation of the presenter. It is her avatar. The motion and gestural meaning of the cross-hair is the interface’s most basic emissary of presence for both the presenter and the attendees. Through interactive and animated elements like the cross-hair, the perception of being there with others contributes to the overall experience.

Cumulatively, the interface with various levels of interaction represents the basic structure of the Peer Sight experience. Though using the presentation metaphor dictates referring to the content collectively as ‘slides,’ ‘pages’ or ‘screens,’ the possibilities for each of these units are far beyond these terms. Instead, each click brings up a new interactive module. While a simple text slide is very low in presenter-to-attendee interaction, another module could be a brainstorming whiteboard. For example, the attendees could be prompted by the presenter to generate names for a new product. The attendees would actively submit names, and the Peer Sight module would rank them, track them, eliminate duplicates, and distribute the changing list to the whole group.

By implementing a modular system of activities (rather than slides), the types of communication and collaboration interaction are vast. Various custom processes and
procedures can be designed and used as modules from the presenter’s toolbox. If selecting a
module is as easy as choosing a slide template, then the presentation metaphor can be
extended incrementally to suit the user’s needs while maintaining the simplicity and functionality
of the current, familiar presentation.

5.2 Invisible Interface

The overall design intent for the interface in general is to be as unobtrusive as possible.
Controls are only present when necessary, and the color and tone of the graphics are secondary
to the presenter’s message and content. Except for salient indicators and tools, the interface is
mainly monochromatic in order not to compete with content. Interface awareness impedes
presence, so the intent is to only assert the interface’s existence when necessary. The highest
compliment a CME can be paid is that it is not perceived to be there—the immersive illusion of
non-mediation (Biocca, 2001).

5.2.1 Simplified Functionality

The Peer Sight prototype is designed with the one-to-many presentation needs of both
the presenter and attendees. By focusing on a particular intended use, the confusion and
ambiguity of typical CME solutions are avoided. This core functionality is borrowed from existing
presentation norms while adding subtle devices to make up for the lack of collocation.

5.2.2 Good Typography

A particularly beneficial affordance of the Macromedia Flash technology is the
introduction of much improved typography. Though it is not perfect, the rendering of type is
vastly superior to HTML or Java, which many of the other collaborative solutions offer. Legibility
influences readability, and readability helps the perceptual process of acquiring information. It is
a subtlety that is not given enough importance, and the distance version of a presentation
should not be any less legible, which might be internalized by the audience as less professional,
less refined or inferior.
5.3 Presenter-Attendee Communication Model

The model on which the Peer Sight prototype is built simply recognizes that for its intended audience most of the information and communication is flowing from the presenter to the attendee as shown in Illustration 5.8.

Chart 5.1: Presenter-To-Attendee Model Of Communication

The presenter-to-attendee model of communication is not an adverse constraint. In fact, by considering the typical communication needs of the one-to-many presentation environment, the design of the Peer Sight prototype has jettisoned the weighty and lofty demands of true synchronous group cooperation and collaboration.

5.3.1 Active Presenter

The presenter-to-attendee mirrors the physical environment by placing more authority, control and burden on the presenter. The pace and flow of the presentation is determined by the presenter, and the interface aids the presenter in directing attention with specific tools and controls only the presenter sees. In reality, many times multiple people share the presenter’s role.
The design vision beyond the prototype allows someone to request control and for the presenter to hand off her duties to another.

5.3.2 Passive Attendee

Possibly the most beneficial aspect of the presenter-to-attend model is that it alleviates unnecessary burden on the attendee. Though it allows feedback mechanisms similar to the physical environment, the experience for the attendee is largely passive. This approach makes using Peer Sight exceptionally easy for the audience. The argument here is that the process of joining a synchronous, distant, virtual communication environment has to be at least as easy and uncomplicated as either going to class or sitting in on a meeting.
CHAPTER 6

EXPERIMENTAL DESIGN

Inevitably, trade-offs are part of shaping a radically different kind of communication environment. Designing this kind of environment following the aforementioned guidelines begs the question: How does it perform? What kind of evaluation can test the integrity of the distant, collaborative environment? The very idea of distance collaboration means that the people on the other end of the line are not in a controlled environment. Controlled experimental conditions would offset the idea that participants of distance collaboration choose their own environment. If the idea of the CME is to substitute for traditional, face-to-face communication, then a test of how a change in environment affects the experience affirms the CME as an alternative collaborative medium.

6.1 Research Questions

What impact does the distance, synchronous CME have on the experience for a university lecture when substituted for a traditional, face-to-face environment?

Another observation made in the comparative analysis generalizes that many CME’s interfaces hinder the experience. Complicated interfaces and overdone interaction compete with the content and the purpose of the communication. Making the complicated uncomplicated means simplifying the experience so that the interface is nearly invisible and the interaction follows similar rules found in the analogous face-to-face environment.

The design of the CME certainly impacts the experiment and could be considered another variable, but the approach here is to consider it part of the subject’s overall environment.
that also includes her physical location. The quality of the experience is the main topic of the experiment. So, if the CME is an effective, transparent interface, then it should not impact the quality of the experience. In fact, it should not even be noticed.

What attributes of the CME’s interface contribute to the overall success of accommodating the affordances of the traditional, face-to-face environment?

These attributes of the interface are not easy to measure if the participants are not supposed to acknowledge the presence of the CME. Surveys measure the qualitative nature of the experience, but not the CME itself. The attempt here is to draw attention away from the CME and focus on the experience. However, inferences can be made about the interface because: 1) Participants are fully aware of the CME’s novelty and cannot help but to comment, 2) Direct observation is possible on one side of the communication, 3) Any problems or failures of the technology should be accommodated by the CME and are, therefore, issues of the interface.

6.2 Hypothesis

A CME, specifically a synchronous, collaborative CME, could be utilized in many situations that are traditionally face-to-face communication. The CME would have to match or surpass all of the interactions that are possible in the traditional setting. If some part of the communication requires collocation because, for example, an actual physical interaction is necessary, then the CME is useless. A physician might be able to conduct a great deal of a physical examination from a remote distance, but unless some kind of interface (maybe tactile or haptic) provides all the pertinent information, then the CME is limited as a substitute for direct contact.

In some situations where the level of interaction is much less robust, a CME can potentially accommodate all the needs of the users. Some typical educational settings are not necessarily low in interactivity, but many follow the Presenter-To-Attendee model of communication. A representative lecture at a place of higher education consists of a lecturer (or
presenter) communicating prepared information to a fairly large group of students (or attendees).

As the number of students increase, it is reasonable to expect the level of interaction between
the lecturer and the student to decrease under current educational models. Also, the
communication is likely to flow more from the lecturer to the student, and reciprocal
communication to be less frequent. Questions and gestures might be the only real input from
students.

The richer communication is coming from the lecturer. The term ‘lecture’ implies oratory,
but it is common to have visuals to complement and reinforce the speaking voice. To substitute
for this classroom scenario, minimally a CME would have to provide the following:

- Lecturer’s voice.
- Lecturer’s visuals.
- The ability for the lecturer to direct attention.
- Sense of presence for the students.

Since large university lectures are often not highly participatory and interactive,
delivering a comparatively similar experience via a CME is not an unrealistic endeavor. However,
another question that needs to be asked concerns the lecturer’s (or presenter’s) point of view.
Though the lecturer’s experience is also pivotal to the success of the CME, it would be a
confounding variable and should be saved for another experiment. If the lecturer’s experience
can be left unaltered, and she is mostly unencumbered by the experimental conditions, the
student’s experience is not influenced by any variable introduced to the lecturer.

By in large, in this scenario, the lecturer is the sender and the students are the receivers.
And so the focus of this research will concentrate on the large group of receivers and compare
their collective experiences with and without the CME prototype. The conditions are in place for
the independent variable to be the receiver’s environment, and the dependent variable affected
is their experience. The hypothesis is as follows:
For a typical university lecture, attending a distance class via the synchronous CME prototype provides a similar experience compared to the traditional, collocated environment.

If the experience is sufficiently similar, or even preferred, it suggests that the CME is a competent substitute for this type of communication environment.

6.3 Methodology

Even though the experience has been broken down into components to deconstruct the CME, how can the participants in an experiment qualify their experience in terms that matter to them? Since the purpose of the CME is to substitute for a traditional classroom lecture environment, the metrics that are used on a typical student's course evaluation apply. In essence, course evaluations are qualitative surveys to measure a student's experience. Also, the novelty of the technology is a difficult distraction to ignore, so by using measures that concentrate on the experience, the emphasis is shifted to the viability of the CME.

The same qualitative measures can then be used for both kinds of environments. Going forward, for convention's sake, the independent variable is described as one of the two following states: [1] The 'virtual environment' is the CME prototype plus the participants self-chosen physical distant environment. [2] The 'physical environment' is the obligatory collocated classroom. If the same measures are used for both environments, the hope is that they can be compared directly. Furthermore, the data collected from the physical environment is the control group, while data from the virtual environment is the experimental group.

Since many of the participants are used in both groups, it may be more appropriate to consider the physical environment a pre-test. However, not all the participants completed the experiment in the same order.

6.4 Experimental Design

With a great deal of cooperation from instructors and students, one entire lecture from two different courses was delivered using the CME prototype. Each class typified the lecture
environment with important, supportive visuals. In addition, the content was real, and the
student participants had a vested interest in “attending” the experiment. Even so, participation
was voluntary, and in the event of technical problems or difficulties, students were assured that
they would be accommodated.

To receive the audio or oratory component of the lecture, participants require a
telephone to access a conference call. To receive the visuals through the CME prototype,
participants must have an Internet connected computer. In addition, the computer and
telephone are required to be used simultaneously for the duration of the lecture. The
experimental instructions included tips to prepare the individual’s environment to reduce any
external factors that might impair the participant’s experience (See Appendix A). Both classes
shared these similarities, but beyond this, they differed somewhat, and each experimental
design is detailed separately.

6.4.1 Class: Design 160

Design 160 is a general survey course open to all students curious about the Design
program at The Ohio State University. There are no prerequisites, and from personal experience,
many students have yet to declare a major and are in search of one. Almost half are also first
quarter freshman (48.4%) with little experience with the typical college course. Though using the
population from this course is a matter of convenience, the students themselves share attributes
with the population that enroll in this particular lecture course. At the time of the experiment,
forty-three students were enrolled in the class.

The lecture is taught by a teaching associate who is also a master’s candidate in the
Design program. Her teaching style is congruent with the typical lecture structure discussed
earlier. The course is centered around visuals in the form of textual, photographic and video
content. With the support of the lecture’s oratory, students are expected to gather most of the
course content from the visuals.
Both the lecturer and the students are briefed on the requirements of the experiment and encouraged to participate and receive a reward. The lecturer is willing to count participation in the experiment as an option to one of her extra credit assignments. The experiment will consist of two parts, and each part will be rewarded, but, for full credit, each participant must complete both parts.

Approximately eight weeks into the ten week quarter, two class days are earmarked as experimental days. On day one, no experimental variable is introduced. Students attend physical class as usual. A survey about the class experience is conducted after class to get a baseline reading for that particular class. To protect anonymity and to track results, each participant uses a nickname to identify his or her survey results. Participants are thanked for their effort and encouraged to participate in day two. In order to participate in day two, they are reminded that will not come to the classroom, and they need to prepare their distance environment for class (See Appendix A).

Before committing to day two, willing participants are encouraged to test their respective technologies and environments. And, of course, they are told not to come to class (though they still must attend virtually). If any problems surface, they are then encouraged to simply come to physical class.

To prepare for day two, with little alteration, the visuals are transferred into the CME prototype. The lecturer is encouraged to conduct the class with her usual style and understands the nature of the virtual environment. The lecturer sees and controls the visuals in the same manner that she is accustomed to. A microphone is placed within the lecturer’s zone of movement, and it will relay her voice to the conference call. The participant’s voices are routed through the lecture hall’s house system (the experimenter monitors the volume). Though the physical attendance is sparse, the lecturer is able to proceed normally.

In addition to hearing the lecturer and seeing the visuals, participants can also see some gesturing from the lecturer if the ‘virtual pointer’ is moved on the lecturer’s computer. Whatever location or movement is made by the lecturer’s pointer is duplicated for each participant.
Once the lecture portion has concluded, the last “slide” of the presentation allows all participants to link to an on-line survey to collect information about each student’s virtual experience. They are instructed to use the same nickname that they used in the previous survey, and they are presented with all of the same questions as well. For both the physical and virtual environments, the survey is conducted immediately after the lecture has concluded.

6.4.2 Class: Design 253

Design 253 is a required course for all students majoring in design. Again, this population represents a convenience sample, but still represents a sample of all students, in their first year, majoring in design. At the time of the experiment, fifty-eight students were enrolled in the class. Unlike Design 160, only one of the six participants in Design 253 is a first quarter freshman. Because of the Design department’s entrance rules, there is some doubt that even this one subject could be a first quarter freshman, but it is possible that this individual is a transfer student. Otherwise, the other five participants reported that they had been at the university four or more quarters. The hope is that even these few seasoned students help balance the population from Design 160, and cumulatively, they will represent the sample.

The lecture is taught by an adjunct professor with the help of a teaching associate. The lecturer’s teaching style is the familiar lecture format, however his use of the media differs. Paper-based handouts cover the bulk of the factual information delivered, and the students expand upon the information with their own notes. For the duration of the lecture, the black and white handouts are given context with the aid of projected, full color imagery. The extent of the slide show consists of 35 mm slides to supplement the handouts.

During the same eighth week of the quarter as Design 160, two days are reserved as experimental sessions. Once again, everyone is briefed on the procedures for participating. Unlike Design 160, there is no reward system in place to encourage participation. Along with all the technical requirements that might disqualify participants, participation appears to be
somewhat influenced by potential for reward. Other factors are also present and will be discussed later.

To help reduce the influence of testing order, the participants of Design 253 attend the virtual environment on day one and the physical environment on day two. Once again, the visuals are transferred into the CME prototype with a high degree of fidelity. Some of the images may have been improved by the transfer process because of automatic color correction, etc., and is recognized as a potential bias. However, from the lecture’s perspective, the technology operated similarly to a slide projector. Also, because so few participants volunteered to attend virtual, it is unlikely that the lecturer perceived six of the fifty eight students absent.

Another issue is also accommodated by the CME prototype. As mentioned above, a prepared handout is distributed at the beginning of class. Like the lecture, the handout was distributed virtually (screen shot). While waiting for class to start, virtual attendees were able to download an electronic version of the handout. It would then be possible to make a printed copy or even view it on the computer along with the CME prototype. Again, the CME prototype provided an analogous experience through an alternative environment.

The nature of this image-based presentation necessitated the lecturer to utilize the virtual pointer more to not only gesture, but to point out relevant details of the image. The subject matter of the class required deconstructing the various images from design history. In this case, the lecturer needed to make a conscious effort to use the virtual pointer. He would at times catch himself resorting to physically pointing to the screen projection, but otherwise, the technology did not appear to interrupt his style of presentation.

Like the Design 160 session, the Design 253 session, when the virtual and physical sessions concluded, participants are asked to immediately complete the survey. While only six virtual surveys were collected, quite a few more physical surveys were collected. Unfortunately, most were incomplete without many answers to the open-ended questions. Instead of including the incomplete surveys, most were rejected. Of the physical surveys included in the data, as many of the six participants who completed both sessions are automatically included. The
remaining are selected if the participant answered all or most of the questions. The hope is to have as many total physical surveys as virtual surveys. Many factors, including the lack of a reward system, may have contributed to the disappointing response levels in the Design 253 class.

6.5 Findings

The survey instruments used in all phases of the experiment were identical. Though the physical and virtual surveys are on different media, the questions are the same. Questions are numbered from one to eleven, but many had multiple parts. The total number of unique questions equal thirty-two. The bulk of the questions are ordinal responses on a Likert scale and attempt to elicit the participant’s individual experience for that particular session. Three of the questions are open-ended responses. It was no surprise that the responses to the open-ended questions for the physical environment focused on the lecture content, while many of the same responses to the virtual environment commented on the technology.

After a few demographic questions, one of the first questions summarized in Chart 6.1 is probably the most broad without implicating any individual component of the experience:
Neither environment received an ‘Extremely Dissatisfied’ rating. The physical environment earned two ‘Somewhat Unsatisfied’ while the virtual environment earned four. Interestingly, the audio component proved to be the most criticized component of the virtual environment. Ideally, the audio component would be delivered through the CME prototype rather than the telephone. But the technological hurdle would be too high—not only for the delivery mechanism, but also the unknown capabilities of the end user’s computer. From an experimental standpoint, it was hoped that the familiar, tried and true telephone would be a solid performer. Here are a few of the comments from the open-ended questions:

“Make the audio coexist with the slides on the website. The phone was not fun by any means and very inconvenient.”

“...hard to pay attention with others breathing and talking on the phone as well as the phone cutting out [every] few minutes.”

“I had to call the 800# many times before I got connected and there weren’t many instructions on the screen.”

The next group of questions shown here in Chart 6.2 rated the subject and content of the day’s lecture. It cannot be understated that day one and day two were entirely different
lectures. This set of questions is another attempt to draw attention away from the novelty of the technology.

![Chart 6.2: Subject Matter](image)

| The depth in which the topic was covered met with my expectations: | ![Value] 3.83 3.50 | Physical Environment | ![Value] 3.67 4.00 |
| Today’s class contributed to my knowledge of design: | ![Value] 4.00 3.83 | Physical Environment | ![Value] 3.83 3.79 |
| Having attended today’s class, I feel knowledgeable in the topic: | ![Value] 3.69 3.93 | Physical Environment | ![Value] 3.93 3.79 |
| Today’s class increased my interest in the topic: | ![Value] 3.69 4.00 | Physical Environment | ![Value] 3.79 3.86 |

Chart 6.2: Subject Matter
Rate today’s subject matter: (1 = ‘Strongly Disagree,’ 5 = ‘Strongly Agree’)

It is reasonable to acknowledge the influence of the day’s topic when comparing the virtual and physical environments, but regardless of the fact that the virtual environment scored lower, no score was more than 0.4 points difference on the five point qualitative scale. Though it could still suggest that something was missing from the virtual experience that would help bring the subject matter “to life.”

The next group of questions in Chart 6.3 is aimed at evaluating the instructor’s presentation of the material. Only the instructor’s voice is being relayed through the CME prototype; there is no video representation. Once again, evaluations do not typically ask about the instructor’s appearance, and so again with this series of questions, the importance is placed on the content delivery, not the mechanism itself.
Chart 6.3: Instructor & Content Presentation
Rate the instructors presentation of today’s class: (1 = ‘Totally Agree,’ 5 = ‘Disagree Completely’)

This time lower numbers are better. Once again, both environments show similar responses except for ‘communicated clearly,’ which scored almost half a point worse in the virtual environment. The comments point to the poor performance of the conference call as a factor, but it must be conceded that the CME prototype does not allow for much nonverbal communication, gesturing or eye contact. But then, the real surprise is that the question about ‘encouraged student interaction’ actually scored slightly higher for the virtual environment. For good or bad, the conference call allowed the virtual participants to talk among themselves. This may have influenced the feeling of interaction. Also, the participants were able to request some of the visuals to be redisplayed at the conclusion of the lecture. And perhaps the on-line survey itself made the interaction seem more salient.

Though there was a great deal of preparation to make the experiment as noninvasive as possible to the lecturer, their real and perceived performance is affected by the CME prototype.
From Chart 6.4, the average difference between the environments overall is 0.47 on a five point qualitative.

![Chart 6.4: Instructor Performance](image1)

Several factors could be influencing the scores for ‘instructor performance,’ but it is important to point out that this group of three questions showed the worst lag in responses for the virtual environment compared to the physical environment. Again the topic of each lecture might be a factor, but it is perhaps being compounded by other factors. There is no data here to ascertain the lecturer’s comfort level with the technology and change in routine, and no assumptions can be made about how that might impact each lecturer’s teaching style. To add to the confusion, minor technical difficulties afflicted both sessions of the virtual experiment, and this will be discussed later. However the glitches did not derail the experiment, but it no doubt interrupted the flow of a normal class.

The next set of questions detailed in Chart 6.5 attempt to measure the relative importance of several sensory factors that impact each environment in different ways. In retrospect, the questions in this series are a bit vague and open to interpretation, but the data show that the relative importance is consistent between environments. What is deemed as important or unimportant holds true for both scenarios. As expected, for this general style of
lecture format, ‘reading slides,’ ‘seeing the visuals,’ and ‘hearing the instructor’ are between important and extremely important while ‘interaction with other students’ and ‘seeing the instructor’ are between somewhat important and not very important. It is by no coincidence that the CME prototype, as primitive as it is, is designed to accommodate what the data show as the most important dimensions for replicating a lecture environment in virtual space.

Chart 6.5: Importance of Environmental Characteristics
Please rate the IMPORTANCE of the following characteristics when attending today’s class. (1 = ‘Extremely Important,’ 5 = ‘Insignificant’)

With the data from this set of questions in Chart 6.5 there is no better or worse. It is more validating that the results are close in value for both environments, but some interesting observations can be made. Though all of the participants have a clear idea of the experimental procedure, the actual experience might have influenced their perception of what is important. For example, physical comfort became a more important factor in the virtual environment with a
difference of 0.33 on a five point qualitative scale. The dilemma here is whether participants realize that comfort is more important to them because the virtual environment is really more comfortable, or that they now appreciate the lack of comfort of the classroom environment. One participant entered the single word “comfort” in reply to the open-ended question about what she enjoyed most about attending the virtual environment. The following are some other selected quotes:

“It was raining and I [didn't] have to walk to class! [And] besides that I also had a comfortable setting and besides it being hard to hear, the times when people [weren't] having conversations or breathing into the phone I could hear her pretty well. Even with all the difficulties I think it’s a great thing to do once all the little details have been worked out and everyone gets the hang of it. I’d take a class online during the winter.”

“[I] was able to take the class in the comfort and convenience of my own home.”

Participants may now realize that seeing the instructor is less important after the virtual session. Here one of the biggest differences between the environments occurred—though still not a full point. On a five point qualitative scale, seeing the instructor scored 0.79 points less important than in the physical environment. Even so, the average scores for both environments still fall between somewhat important and not very important. Of course, they cannot see the instructor at all in the virtual environment, but it is interesting to note that this question scored as least important overall in this series of questions. For the one participant who responded that seeing the instructor is extremely important, she commented:

“I really liked the idea of having class from a computer, but there are some things that still need to be [dealt] with. For example, seeing a teacher is a lot different from just hearing them...
“I did enjoy the idea of not having to go to class on rainy days, or perhaps if I had to go home for an emergency I could still go online and “go to class.” I think there are many things that have to be worked out but it is a really good idea for the future. Still, I don’t think anything can beat actually attending lecture.”

For the last series of questions, the participants are asked to generalize their classroom experiences. Chart 6.6 shows that the data averages around the center, which means that, overall, both the physical and virtual environments hovered around ‘similar’ when compared to other classroom experiences. For this series, it is once again important that the two environments track very closely, but it must be pointed out that for each question, the virtual environment scored better than the physical environment, though by a very small margin. This may help vindicate the CME prototype as a viable alternative, but the novelty of the whole experiment may be influencing the results.

![Chart 6.6: Quality of the Experience](chart)

Comprehension of the material: 2.86 2.86
Topic of lecture: 2.97 2.86
Pace of the lecture: 3.10 2.83
Quality of the experience: 2.12 2.85

Chart 6.6: Quality of the Experience
Compared to your other classroom experiences, how would you rate today’s class on each of the following: (1 = ‘Much Better,’ 5 = ‘Much Worse’)

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For example, it seems evident from the comments from the larger physical environment sample that the participants really enjoyed the topic and the video that was shown. In fact, both physical sessions had a video as a large component of the lecture. For the one physical session, the compelling video or “movie” garnered many compliments for everything from the topic to the way it broke up the pace of the class. Now that the data has been analyzed, the movies appear not to be a run away factor for satisfaction.

6.6 Discussion

6.6.1 High Ecological Value?

If there is anything significant about the findings of this research experiment it is that they are real. For one day, a group of students can choose not to come to class, but yet they still attend class. To reiterate, participation in the experiment is voluntary, but the content is one day of real course material. Despite the “coolness” of not going to class, it sinks in quickly that there is no shortcut to listening, absorbing the information and taking notes. The design goal for the CME prototype is that if it works properly, attending the virtual environment should not be any more difficult than physical environment.

Each student chooses her own location and virtual equipment. So much is out of control of the experimenter, yet it all seems to work. It has nothing to do with the viability of the technology or the instructional delivery. It has to do with designing the system, so that the system is not in the way of the intended goal: attending class. If she can surf the web, she can attend class virtually. Of course, preparation is key, and the instructions for the experiment are absurdly simple (See Appendix A). Each student is about four clicks from getting to class. In a conscious effort to be technology agnostic, the instructions direct the participant to go to http://www.peersight.com. There are no platform requirements, configuration specifications or preferences to set. From that point, the experience is largely passive and much like physical class.
For this sample population, the availability of the Internet is hardly a factor. And because the CME prototype relies on a web technology that has 98.2% saturation on Internet-enabled desktops (Macromedia Flash Player Statistics, 2005), the near 100% successful, active participation is possible. Though no catastrophic failures were recorded, in one case a willing participant tested his computer, and mentioned that it “crashed.” Since he discovered the problem in advance of the actual experiment, he wisely chose to come to physical class. In another case, one participant out of thirty-six had some difficulty getting signed in to the virtual class. It is not known where the error occurred, but she was successfully talked through the procedure via a telephone conversation.

So which is easier? Thirty-six students managed to find their way to virtual class in a few clicks in a few seconds as opposed to the time and effort to drag themselves to physical class. Some potential participants forgot about the experiment entirely (or were not completely informed due to absence). For the session that had no reward structure and only six of the fifty-eight participated, some other factors also contributed to the low participation. Unlike the other session, the Design 253 potential participants were not explicitly reminded of the experiment within forty-eight hours as in the case for Design 160. A weekend had passed, and for a class that only meets two days a week, the virtual session was scheduled for the first class of the week. Several non-participants also revealed that they were already scheduled to be physically on campus before and after the virtual session, and it affected their decision to participate. It would have been less convenient to go home and then return.

Of the demographic data collected, here is the best place to mention where the participants chose as their location. In Chart 6.7, as predicted almost all chose to attend from either their campus dorm or their off-campus apartment. Of the three who responded ‘other,’ one person attended from a “work PC.” It is not known if this person was “on the clock” and/or working while attending class, but this could be construed as a negative implication for this kind of distance activity. It is outside of the scope of this thesis to comment on the reality of multi-
tasking and the potential stress factors, but this is a new responsibility for the learner to choose a suitable environment.

Control is a feature of the physical, classroom environment for the lecturer. If there are distractions, they are mutual and can be mutually dealt with. Control is also a feature of the remote, virtual environment; however control now is the responsibility of each individual student. Here is the reality from a few of the participants’ comments:

“I think that my attention was lacking (during lecture I talked to my [roommate] and checked my email) and I can’t honestly say that I [paid] full attention to everything I was writing. I will [definitely] have to go over my notes from class today to fully understand them.”

“More enthusiasm. [It’s] hard to get excited about something when you are just sitting in a dark room taking tons of notes.”

For others, the level of control is to their liking when responding to what they most enjoyed about class that day. This type of anecdotal evidence simply reinforces that learning
styles vary, and that a dark room for some is still a lot better than school desks and classrooms.

Here are a couple positive (though cynical) comments from participants:

“Being able to type the notes in word instead of struggling to write them, and being able to relax in my room at my computer free from the restriction of those desks.”

“Not being in a class room.”

6.6.2 Equal, But Why Not Better?

There is no desire here to change the entire educational or business presentation paradigm, but there may be alternate means in which to achieve the same goal and the relative advantages of the Peer Sight CME might trump the use of other practices for a given presentation scenario. The key is to understand the technologies available and integrate them where appropriate (Russell, 2001). A class like Design 160 or Design 253 could meet in the physical environment for half of the class sessions, but virtually for the other half. Not much is lost, but many efficiencies and other possibilities are gained.

Time and time again, advocates of the newest technologies want to transform the educational landscape and reshape the way in which teachers teach and students learn. Pre-recorded television lectures were destined to replace live lectures. That did not happen, but video is actively used as a component of the lecture experience. Like the television and the video tape media, Peer Sight and the Internet are together the delivery system—not the content or the message. Is this CME a potentially adequate, or even superior, means of delivering any given subject’s content and message?

If many research studies covering a wide range of distance education technologies are compared, the result is that no one technology is significantly better than its traditional counterpart. And just as important, the technologies are not necessarily worse either (Russell, 2001). From The No Significant Difference Phenomenon, Russell proposes a more practical,
common sense list of items to evaluate the distance technology rather than trying to prove that it is much better or much worse:

1. lower cost of instructional [technology] by a factor of 100, perhaps 1000
2. increase course offerings by a comparable number
3. attract, by a similar factor, more volunteer instructors
4. fulfill many more education needs of the community
5. serve very small as well as large publics
6. respond very quickly with finished, readily updated distance instruction
7. under certain conditions where revenues (tuition) can be generated, provide self-supporting, even profitable, operations

The list boils down to the efficiency of the medium and cost incurred from implementing the CME. As long as students are still learning, does the CME represent any kind of savings for the institution? Something to consider before the next multi-million dollar education facility breaks ground.

6.7 Conclusions & Limitations

6.7.1 May It Rain On Your Data

Natural phenomena are sometimes serendipitous confounding variables. Ten of the thirty-six participants (27.8%) attending virtual class reported that avoiding the rain was the thing they most enjoyed about the day’s class. It is not known, but is it doubtful that any of the participants were located far enough away to have different weather conditions. Not only is this a potentially influential variable, it is also an interesting supporting argument for the convenience and perhaps an emotional factor benefiting virtual class. From the experimenter’s point of view (collocated with the presenter in the physical facility) the rain was not really observed. Should the CME indicate some kind of information about each attendee’s local environment? The idea of awareness is another area of prospective research for the CME. Awareness could help promote community and enhance the shared experience (Cadiz et al., 2002).
6.7.2 Solving the Audio Problem

The audibility of the presenter was correctly predicted and identified as a major component of the success of both the virtual and physical environments. The clarity and fidelity of the presenter's voice was identified by many participants in the virtual class as an issue hampering the experience. Since the varied technology of the end users was unknown, any attempt to deliver live, streaming audio through the CME would be risky though, in fact, that was the very recommendation many participants offered. Voice over IP is definitely the future implementation, but the conference call could have been more robust. The teleconference service did offer a lecture mode that would have eliminated much of the noise and crosstalk that participants complained about. However, the Peer Sight prototype offered no feedback mechanism to the presenter at that time, and the teleconference lecture mode would eliminate any input from the audience. A simple instant messaging feature may have remedied the situation though it could have been even more disruptive as well.

6.8 Future Reference

6.8.1 Exploiting the Interactive Potential

The Peer Sight prototype built for this research study fulfilled the very basic needs of a distance presentation. In other words, the goal was to provide an environment that was no better or no worse than the physical environment in order to measure the experience. This supports the viability of the Peer Sight CME as a competent alternative to the physical environment. Going forward, the potential for complex and coordinated interactivity, tracking, data gathering and mass customization is enormous. Discovering and tapping into the unique abilities of the CME will further the cause for implementing the distant alternative.

6.8.2 Longitudinal Study

The next iteration of testing for the Peer Sight prototype would be to integrate it into a longer term study. After the problems discovered in this limited experiment are addressed, a more aggressive implementation into a representative population would illicit more valuable
information about the CME’s viability. Within the educational domain, a study that utilizes Peer Sight for the duration of a course could provide data indicating that the distance method is sustainable. Would the novelty disappear and change the attitudes of the participants? The recommendation for any implementation of the virtual environment is to use it as a part of the overall classroom experience—not as a universal solution. The ideal experimental design consists of three groups for a given course: a control group using traditional methods, a balanced experimental group using Peer Sight integrated where befitting the situation, and an extreme group using Peer Sight exclusively.
CHAPTER 7

EVALUATING AN EXPERIENCE

The Peer Sight prototype may have been designed against worthy criteria and tested well with a relevant group, but upon what merits should it be evaluated? Like other new products and services, just because it works, does not mean anyone will actually use it. Especially if the thing pushes the boundaries of conventions or traditional methods, the user’s expectations, needs and desires. Too different, too irreverent, too unorthodox is contrary to good design. Even the cool factor purports that an object should be slightly recognizable. Like any complex product, the Peer Sight prototype is evaluated based on typical tenants of design.

7.1 Usability

For a single product that involves more than one user simultaneously, usability becomes a more complex notion for the Peer Sight prototype. First and foremost, the attendee is considered because they were the subjects of the experimental conditions. For them, the design goal is ease. The presenter, however, is the user that initiates the process, and they need the ability to conduct a presentation with the confidence that the experience is as meaningful in this virtual space as it would be in the physical space.

7.1.1 Useful

The allure of distant communication is obvious for those seeking efficiency and flexibility. The sheer amount of research and developing software products indicates that there is a need. As stated before, Peer Sight and any other CME should not be positioned to replace and eliminate every other collaborative process; it should augment them. Another misstep is to
develop a be all solution for any collaborative or communication event. The intended use cannot be ‘anything,’ and the intended user cannot be ‘anyone.’ This is the surefire way to develop a product that is not particularly useful to anyone at all. Yet the same software that is meant to be used for project development is also the same tool for presentation. Peer Sight is useful for presentations that are one-to-many mimicking the communication environment of a presentation or lecture.

7.1.2 Usable

There are certain expectations when people attend a presentation, and the presentation takes place in a variety of forms and venues like a conference, product demonstration or economics lecture. These users hope to absorb information from a source in a largely passive manner. The virtual environment should not be any more complicated. If anything, users will appreciate the experience of the CME if it is easier—like if it is raining outside. For the presenter, Peer Sight enables her with at least all the tools available in the physical environment in some form or another. Once the presenter overcomes any anxiety and is comfortable in the CME, the secrets that were not first recognizable become evident. The presenter is likely to discover uses that have not been foreseen.

7.1.3 Used

The carefully designed Peer Sight experience is futile if no one chooses to use it. In this case, the presenter drives the initial use, and there may be little choice for the attendee. However, considering only the presenter as the primary stakeholder is a bad design decision. The only way to sustain use is to satisfy the many parts of the one-to-many equation. An individual attendee may not have chosen Peer Sight as the presentation mode, but the collective response of all attendees determines whether or not it will be considered for the next event. With only an Internet connected computer, the user is attending a presentation with only a few clicks of the mouse. The ease of access plus the rich experience are the main contributors to reoccurring use.
7.1.4 Universal

The very nature of the CME has potential to expand the reach of Peer Sight to a broader range of users. The confines of the collocated, physical facility impede the geography, accessibility, and diversity of the audience. As previously discussed, the CME bridges distances to make time and space malleable conforming to the needs of a group that spans the world. Beyond that, Peer Sight is already beneficial to those with some mobility, auditory, visual and learning impairments. Because software can be customized, Peer Sight can be enhanced specifically to meet an accessibility need.

Distant and diverse individuals also means connecting people of different cultural and social backgrounds. Mass customization and interface options can allow users to tailor their experience. While this research does not specifically address the challenge and issues of global socialization, at the very least it is technically possible to offer multilingual versions of a presentation. A presentation could even be translated on the fly, and the future may even allow for the speaker's voice to be transcoded into another language in real-time. Elegantly building such features into Peer Sight would enable more and more potential users, making it a better, more universally designed product.

7.2 Incremental Innovation

Giant leaps forward with new technologies are often the ones that cause the most anxiety and apprehension for the intended user. It is more comforting for the user who is unfamiliar with the new technology to provide a methodological approach to introduce the product in stages to help acclimate the user to a new presentation paradigm. While easing the transition is important, there is a certain amount of disruption that helps create intrigue as well.

7.2.1 Familiar Metaphor

Since Peer Sight is designed to be presentation software, the familiar presentation metaphor is a strength that promotes incremental innovation. Many of the interface elements have analogs like on a slide projector and a DVD player. If people are comfortable operating
these devices, then they can transfer that knowledge to Peer Sight. The interface also features ‘drawers’ to easily access deeper information that is normally not meant to be particularly salient. The progressive disclosure of the deeper functionality hides the powerful underpinnings of what is otherwise a simple, straightforward interface. Other interactions are meant to mirror languages and processes pertinent to presenter-to-attendee meetings.

7.2.2 Existing Technology

The deeper workings of Peer Sight rely on a widely adopted software platform that is nearly ubiquitous in its deployment on personal computers. The minimum requirements for the software and hardware are very modest, and for the most basic presentation, even a slow Internet connection is sufficient. Peer Sight transparently allows the user to use any browser supporting Flash to join a presentation, while also giving the option to run a small application for full screen display.

7.2.3 Minimum Effort, Maximum Effect

The design goal here is for Peer Sight to just simply work without any apparent intervention by the user. For the passive attendee, the effort is minimal to enter into a rich experience. For everyone, the type is clear and crisp, and the interface is purposely inconspicuous and uncomplicated to promote the presenter’s message and content. If the interface is sufficiently invisible, perhaps the user will forget the technologies active mediation and concentrate on the purpose of the meeting.

7.3 Adoption

A pervasive, familiar technology depends on the intended users willingness to adopt it. A technology like Peer Sight could start very slowly, but build momentum as members of a social system embrace it. Design and marketing may be top notch, but this doesn’t guarantee wide adoption. According to Everett Rogers in the book, *Diffusion of Innovation*, an innovation’s success and rate of adoption are dependent upon the five following attributes:
7.3.1 Relative Advantage

“Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. The relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption (Generalization (6-1). Overadoption is the adoption of an innovation when experts feel that it should be rejected. Preventive innovations, defined as new ideas that an individual adopts now in order to lower the probability of some unwanted future event, diffuse more slowly than incremental (nonpreventive) innovations.” (Rogers, 2003)

Peer Sight has to be better than the collocated alternative to a degree that in the users' minds it is superior. Convenience is certainly one dimension that would drive adoption, but if the cost savings is clearly perceived, then many more will show interest. Ongoing adoption might then be influenced by features unique to the CME environment and the expanding and flexible audience size.

7.3.2 Compatibility

“Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. The compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Naming an innovation and positioning it relative to previous ideas are important means of making an innovation more compatible. Change agents often ignore indigenous knowledge systems, which provide one means by which individuals give meaning to an innovation.” (Rogers, 2003)

Usability greatly impacts the perceived compatibility for Peer Sight, and usability is dependent on disciplined incremental innovation design methodology. Rather than promising the Swiss Army knife of CME’s, Peer Sight is positioned to do one thing very well: one-to-many synchronous, distant, virtual communication. Provide everything a user might expect from past presentation experiences and promise nothing more than it can actually do. Peer Sight will then be compatible with the intended user’s expectations.
7.3.3 Complexity

“Complexity is the degree to which an innovation is perceived as relatively difficult to understand and to use. The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption.” (Rogers, 2003)

Advanced electronic computer technology is scary. For introduction, Peer Sight should be as lean on complexity as possible to avoid unnecessary confusion and anxiety. Software is very susceptible to feature creep since changing code is relatively easy compared to tweaking a tangible product. In fact, because Peer Sight is server-based, it can be continuously changed and updated for even the users who already possess the product. The users themselves will impact the evolution of the CME, but any enhancements should undergo the most careful scrutiny. Features should also be integrated rather than tacked on. If that means redesigning and rebuilding from the bottom up, so shall it be.

7.3.4 Trialability

“Trialability is the degree to which an innovation may be experimented with on a limited basis. The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.” (Rogers, 2003)

Another huge advantage a web-based software product has over most other products is rapid deployment and distribution through the Internet. Anyone with an Internet connected personal computer can access Peer Sight easily. Demonstrations and trial versions are also possible making the cost of experimentation insignificant. Of course, the first impression has to be positive.

7.3.5 Observability

“Observability is the degree to which the results of an innovation are visible to others. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.” (Rogers, 2003)
The most novel adoption attribute for Peer Sight is that it has a built in mechanism for observability for the social system. Most new users are probably exposed innocuously to Peer Sight as attendees. If the experience is positive for them, and they can envision relative advantages of using Peer Sight for their own benefit, then the spread of innovation should increase exponentially.

7.4 Implications & Thoughts

What is critical here is that the synchronous, distant, virtual communication environment can have a profound affect on when and where society learns and works. Whereas the phonetic alphabet has civilized man and created uniformity and conformity (McLuhan, 1964), Internet technologies may have the power to tear that apart. If the phonetic alphabet has impressed a rigid hierarchy on literate societies and stripped mankind of his imagination and emotions to promote civilization, can new media hope to balance this with non-linear freedom? Again, the Internet can take advantage of nearly every type of media in endless numbers of combinations, so the written word is not gone, it is reformatted and repurposed into chunks that meet a user’s time and space needs.

As the ultimate translator, data on the Internet can be messaged into any form and delivered for any combination of visual, aural and tactile sensory modes. While the movies may be a hot medium and the telephone is a cool medium (McLuhan, 1964), it will be difficult to classify technologies like Peer Sight because it provides the abilities of both those media plus more. For example, an instructor can present rich imagery, live video, and respond verbally to a single student's question. How will Internet technologies like Peer Sight successfully compress and fragment time and space? For the dimension of time, if communication is intended to be real time, it must be instantaneous or it fails. It has been shown that even very small differences in the timing of events can derail collaboration. The focus of the discussion and synchronization must be maintained (Gutwin & Penner, 2002). If the task is collaborative requiring input for all participants, awareness of other's real time progress is necessary. While obvious in a face-to-
face situation, CME needs other indicators to show the progress of events. Graphical indicators, or awareness widgets, help determine the group’s progress (Gutwin, Roseman, & Greenberg, 1996). When the group’s size is hundreds or thousands, individual time is greatly restrained. It may be possible for real time audio conferencing, but it is an unrealistic tax on time (Rapanotti, Blake, & Griffiths, 2002). The other option is where time has less importance: asynchronous communication. Often, tasks are completed to a higher degree of quality when group members can work at their own time and pace, however the amount of time required to complete a task may be greatly increased (Chandler, 2001).

With regard to space, how do people deal with the abstraction that this dimension creates? First, the group must acknowledge the fact that the work doesn’t really exist in any one person’s hands. It exists somewhere in cyberspace and may be pulling information from multiple sources and input devices. It may be necessary to conceptualize the work as some kind of organized “datacloud” (Johnson-Eilola, 2001). The data has no location. In addition to trusting that the data does exist out there somewhere, groups must deal with the fact that members may be physically distant. Group members may initially be inclined to deceive, be less persuaded by, and cooperate less with a person at a physical distance, but become more cooperative as familiarity increases (Bradner & Mark, 2002). This may actually be social distance, rather than a physical distance that the system must compensate for. It is also difficult to define what should be represented in the space. Many studies have shown that video showing facial gestures and body language may have little impact on the communication of a complex task (Fussel, Kraut, & Siegel, 2000). In one case, a shared view of the task, ideally from the presenter’s point of view, was the better visual context. Finally, no amount of distance can be virtually traversed if the users do not trust the CME. Some incarnation of social relationships must be possible to promote effective communication (Kelly & Jones, 2001). No amount of technology will suffice if it does not accommodate the group’s social needs.
CHAPTER 8

SUMMARY

The stage is set for a shift in the way many forms of communication operate. Because of the limitations of traditional media, face-to-face communication remains the preferred way groups interact. This includes everything from the business presentation to the classroom lecture. In these two particular examples, the communication model is one-to-many. One person, the presenter or lecturer, is communicating ideas to many, the audience or students. A fundamental change in this model of communication represents a monumental change in business and education.

The future of the Internet presents the possibility of one-to-many communication without the need for the audience to be physically present in space or time. Technology will not replace the need for the classroom or the business meeting, but it promises to reduce the unnecessary travel and sprawling facilities. With the Internet infrastructure in place and the technology in development, the factors that will drive the transition and adoption are the subject of current and extensive research.

As part of an overall research thesis project, this inquiry looks at the challenges this potential communication model faces. From an interactive standpoint, the usability and utility of the system’s interface is a major challenge to the designer. But even if everything works flawlessly, what will drive users to substitute or even prefer technology to face-to-face communication? And with respect to the future of communication, how will this change communication when time and distance are meaningless?
Description
Instead of attending class as usual, willing participants of this study can attend class using the Internet from a remote location of their choosing. The lecture will be delivered visually through the web and audibly through the telephone. The date that you may attend virtually will be determined. A survey will be conducted after the lecture within class time.

Requirements
Willing participants must have access to computer connected to Internet. Participants also must remain continuously connected to the Internet for the entire lecture and survey. Participants must also have access to a telephone for the duration of the lecture only. Please consider that the phone call can be up to 90 minutes (cell phone minutes and battery considerations). You must be 18 or older to participate.

Rights
If you agree to participate in research, the experiment will take place during normal class time, and the time it takes to complete the process will be less than two hours. The confidentiality of the information you provide will be protected. Participation is voluntary. You can refuse to answer questions that you do not wish to answer, and you can refuse to participate. You can withdraw at any time without penalty or repercussion.

Contact
If you have questions or concerns about the research, please contact A. Christopher Murnieks at The Ohio State University, murnieks.2@osu.edu, 614-747-5558 or Professor Brian Stone, stone.198@osu.edu, 614-292-5936.
Which day do I attend the virtual class?
On Monday, November 15:
All participants attend physical class. Come to class as usual.
Survey 01* will be conducted after class.

On Wednesday, November 17:
All participants attend virtual class:
Survey 02* will be conducted online after virtual class.

*Both Survey 01 & 02 must be completed for the full extra credit.

Can I test my computer before virtual class day?
Yes. You can go to http://www.peersight.com, and you should see the prompt asking for a "Presentation Key." The key may not be functional until class day, but if you see this screen your computer is set up properly.

How do I access the virtual class?
Go to http://www.peersight.com
On Wednesday, November 17:
Presentation Key "design160"
Password "wednesday" (all lowercase)

Instructions for the telephone access will be presented here on screen.

What else should I do to prepare for virtual class?
Get everything set up 5-10 minutes before class.
Test your computer (see above).
Be prepared to take notes as usual (while possibly holding a phone, writing surface, etc.).
Create your own acceptable learning environment (caution your roommates, reduce noise and distractions, etc.).
Know your phone, speaker phone or cell phone. Make sure your cell phone is fully charged or use the power cord for the duration of the lecture.
Consider muting your phone so that noises in your environment do not bleed through.

What if I have technical problems?
Just come to class! This is an optional extra credit assignment. There will still be another standard extra credit assignment offered.
I may be able to help in some situations:
A. Christopher Murnieks, murnieks.2@osu.edu, 747-5558 (cell).
Participant Instructions: Design 253

Experimental Procedure: Design 253

Which day do I attend the virtual class?

On Tuesday, November 16:
All participants will attend the virtual class.
Survey 01* will be conducted online after the virtual class.

On Thursday, November 18:
All participants will attend the physical class. Come to class as usual.
Survey 02* will be conducted after class.

Can I test my computer before virtual class day?
Yes. You can go to http://www.peersight.com, and you should see the prompt asking for a "Presentation Key." The key may not be functional until class day, but if you see this screen your computer is setup properly.

How do I access the virtual class?
Go to http://www.peersight.com
On Tuesday, November 16:
Presentation Key “design253”
Password “tuesday” (all lowercase)
Instructions for the telephone access will be presented here on screen.

What else should I do to prepare for virtual class?
Get everything set up 5-10 minutes before the class.
Test your computer (see above).
Be prepared to take notes as usual (while possibly holding a phone, writing surface, etc.).
Create your own acceptable learning environment (caution your roommates, reduce noise and distractions, etc.).
Know your phone, speaker phone or cell phone. Make sure your cell phone has a full charge or use the power cord for the duration of the lecture.
Consider muting your phone so that noises in your environment do not bleed through.

What if I have technical problems?
Just come to class! I will also be available to show you any visuals you might have missed.
I may be able to help in some situations:
A. Christopher Murnieks, murnieks.2@osu.edu, 747-5558 (cell).
Comparing Educational Lecture Environments

1. Give yourself a unique nickname or code and please use it for both surveys. (Maybe a pet name?) This allows me to correlate the data, but also protect the confidentiality of your answers.

2. About how many quarters of college have you attended?
   - 1
   - 2
   - 3
   - 4 or more

3. How are you attending class today?
   - Class as usual.
   - From my dorm.
   - At my off-campus apartment.
   - From my parent’s home.
   - Other, Please Specify

4. Overall, how SATISFIED are you with today’s class in general?

5. Rate today’s subject matter
   - Strongly Disagree
   - Disagree
   - No Opinion / Neutral
   - Agree
   - Strongly Agree

Today’s class increased my interest in the topic

Having attended today’s class, I feel knowledgeable in the topic

Today’s class contributed to my knowledge of design

The depth in which the topic was covered met with my expectations
Classroom Survey: Questions 6–8

6. Rate the instructors presentation of today’s class

<table>
<thead>
<tr>
<th>Total Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Disagree Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicated clearly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicated candidly and constructively</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Has advanced my knowledge of the subject</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Showed enthusiasm toward the subject</td>
<td></td>
<td>2</td>
<td></td>
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<tr>
<td>Used helpful examples and references</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encouraged student interaction</td>
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<td></td>
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</table>

7. Compared to previous classes, rate today’s PERFORMANCE by the instructor

<table>
<thead>
<tr>
<th>Total Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Disagree Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared for today’s class</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Maintained positive learning environment</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Made today's class enjoyable as well as educational</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

8. What aspect of the today's class could be enhanced, to MOST improve your level of satisfaction.
9. What did you ENJOY most about today's class?

10. Please rate the IMPORTANCE of the following characteristics when attending today's class.

<table>
<thead>
<tr>
<th></th>
<th>1 Extremely Important</th>
<th>2 Important</th>
<th>3 Somewhat Important</th>
<th>4 Not Very Important</th>
<th>5 Insignificant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing the instructor</td>
<td></td>
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<tr>
<td>Seeing the instructor</td>
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<td>Seeing the visuals</td>
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<tr>
<td>Reading the slides</td>
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<tr>
<td>Feedback from the instructor</td>
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<tr>
<td>Interaction with other students</td>
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<td></td>
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<tr>
<td>Physical comfort</td>
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<td></td>
<td></td>
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<tr>
<td>Free of distraction</td>
<td></td>
<td></td>
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</tbody>
</table>
Classroom Survey: Questions 11–12

11 Compared to your other classroom experiences, how would you rate today's class on each of the following:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much Better</td>
<td>Better</td>
<td>Similar</td>
<td>Worse</td>
<td>Much Worse</td>
</tr>
<tr>
<td>Comprehension of the material</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Topic of lecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Pace of the lecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Quality of the experience</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

12 While you were attending today's class, did you experience any problems?

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LIST OF REFERENCES


