Virtual conferencing in global design education

Dreams and realities

JUDITH A. MOLDENHAUER

Wayne State University
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abstract

The concept and use of the synchronous and
asynchronous forms of virtual conferencing is central
to the experience of global design education. Easy and
ready access to people and information worldwide
is at the heart of a paradigm shift in design practice
and education, defined by collaboration and digital
technology. The dream of smooth, global interaction
via virtual conferencing rests on the concept of
presence, that is the ability for people to feel as
though there are no barriers to their communication.
The reality, however, is to encounter such things
as dropped video or audio signals, rastered images
and e-mail attachments that will not open because
the sender and receiver have different versions of
a software application. This paper explores the
dissonance between the dreams and realities of virtual
conferencing in global design education by discussing
the idea of presence, examining the relationship
between virtual conferencing and contemporary
design practice and education, presenting the virtual
conferencing experiences of three international student
projects and addressing what we still need to know in
order to best use such technology within the context

of global design education. The paper concludes with
comments about providing students with valuable
international design experiences.

Judith A. Moldenhauer is associate professor and area coordinator for graphic design at
Wayne State University in Detroit, Michigan. Her research and work focuses on information
design, especially for healthcare and she has authored papers and journal articles on information
design. She was a partner in the US FIPSE grant, Seeing the Body Elsewise: Connecting
the Life Sciences and the Humanities, and in the US/EC FIPSE grant, Development of Core
Competencies and Student and Faculty Exchange in Information Design. Honors include several
design awards, a 2007 Fulbright Fellowship to Sweden and Life Fellow in the Communication
Research Institute, Australia.
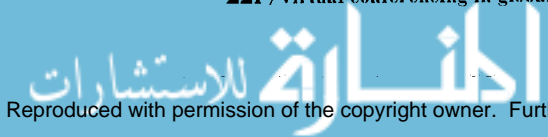
introduction

Virtual conferencing–i.e., all forms of virtual communication that mimic human communication like video, voice, chat rooms, e-mail, telephone, PDFs and all forms of electronic documents–conjures dreams of instant access to information and seamless interaction with anyone anywhere in the world at any time. For design educators, virtual conferencing sets us to dreaming about collaborative international student projects and broadening our students' sense of connectedness to the rest of the world. But the actual experience of virtual conferencing involves coping with adaptations of all sorts–technological, strategic, physical, intellectual and emotional–in order to benefit from digital connectivity. The problem is that the dream of virtual conferencing–creating the "here" presence of someone who is literally at a distance "there"–is still grappling with the realities of technology and of how to be most effective in global design education.

Synchronous forms of virtual conferencing seek to replicate real-time, multi-sensory face-to-face conversation (video/audio conferencing, teleconferencing) and allow for collective decision-making; asynchronous forms of virtual conferencing (e-mail, threaded discussions, interactive websites and databases) change real-time to "my time" and enable individuals to ponder ideas, craft comments and connect with others at his/her own pace. Sharing ideas synchronously is immediate, collective and uses direct personal interaction to communicate meaning; sharing ideas asynchronously is reflective, individualistic and uses artifacts to (indirectly) communicate meaning. Both synchronous and asynchronous virtual conferencing seek to provide "presence"–to connect people in ways that lets them feel as if they were not separated by time or distance. This paper focuses on the dreams and realities of virtual conferencing in global design education by first discussing the concept of presence in understanding virtual conferencing, second by examining the impact of virtual conferencing on framing contemporary design practice and education, third by illustrating both the dreams and realities of virtual conferencing through examples of international design courses and students projects and fourth by asking what we still need to understand about the role of virtual conferencing in design education. The paper concludes with observations about balancing those dreams and realities to provide students with the valuable opportunity of producing and understanding their work in a global context.

presence in virtual conferencing

Lombard and Ditton (1997) describe six conceptualizations of presence and the first three–presence as social richness, presence as realism and presence as transportation–relate to virtual conferencing. They define presence as, "...the perceptual illusion of nonmediation" (Lombard and Ditton, 1997). This means that people, in real-time, do not notice the mediation of the medium–the experience feels like it's happening without the aid of any device, that people act and respond to one another as if nothing was separating them. Presence as social richness "...is the extent to which a medium is perceived as sociable, warm, sensitive, personal or intimate when it is used to interact with other people" (Lombard and Ditton, 1997). Presence as realism is "...the degree to which a medium can produce seemingly accurate representations of objects, events and people-representations that look, sound, and/or feel like the 'real' thing" (Lombard and Ditton, 1997). For presence as transportation, "...three distinct types of transportation can be identified: 'You are there,' in which the user is transported to another place; 'It is here,' in which another place and the objects within it are transported to the user; and 'We are together,' in which two (or more) communicators are transported together to a place that they share" (Lombard and Ditton, 1997).

But virtual conferencing is ideally the sum of all these definitions of presence so that the medium–the computer and the software that make the virtual conferencing possible–all but disappears, enabling us to concentrate on the content of our communication. However, this dream of "interpersonal interaction through synchronous voice, data and visual imagery, a combination that will pave the way for virtual experiences in their truest sense" (Starr, 1998) and of "a truly powerful [asynchronous] anytime-anyplace foundation for successful work" (Lipnack and Stamps, 2000) exists side-by-side with very real gaps of presence that haunt the current technology. Limited bandwidth, dropped signals, confusing interfaces, pixilated images and the incompatibility of software contribute to a diminished sense of presence.

Technical problems and the time spent coping with them are the biggest contributors to a diminished sense of presence in virtual conferencing and it affects the whole experience. While most discussions laud the value of virtual conferencing and are framed by the glow of the utopian vision of all that virtual conferencing can allow us to accomplish, little is published regarding the corresponding problems that can plague the use of virtual conferencing. If anything is mentioned, most often it is tucked into the end of an article or essay or chapter as essentially a footnote to the adulation. While there are many reasons to promote the gains and possibilities

of virtual conferencing, people can be unaware of the "fine print" realities of various virtual conferencing technologies and get caught in a web of difficulties. When this happens in education settings, the diminishment of presence reverberates in the quality of collaboration and the facilitation of learning.

One article that focuses on the problems encountered in using virtual communication was a study of the mathematics education faculty at the University of Saskatchewan who employed video conferencing as a way to circumvent the time and expense of travel to meet with student teachers whose internship placements were spread widely throughout the province (Nolan and Exner, 2009). The study tested various video conferencing products and settled on Adobe Macromedia Breeze. The advantage of Breeze was its "simultaneous audio and video with multiple users; its high 'emote-ability'; its interface is visually appealing; it is highly customizable" (Nolan and Exner, 2009). Its disadvantages were "it supports only flash video; it is deemed by some to have too much 'emote-ability' (distracting bells and whistles); it has a steep learning curve; and its costs are seen by many as formidable" (Nolan and Exner, 2009). What the researchers found was that while the experience "highlighted a few of the promises of virtual mentoring, the desktop video conferencing process in this study was replete with barriers and limitations...such as software costs, technology compatibility issues and the role of student and faculty training in using the technologies effectively" (Nolan and Exner, 2009). Breeze incorporated several communication modes (audio, whiteboard, chat, etc.) that were to enable participants to transfer to another mode if one mode failed. As the following excerpt from the diary of one of the participants demonstrates, problems with technology adversely affected the quality of collaboration and the learning experience.

In general, I found that there were relatively long delay times between actions and the visual representations of them. In addition, we found that the audio feature kept malfunctioning on us. We each tried to be sure that we held down or locked the talk button when we wanted to share something, but for some reason the audio still cut in and out without any of us having a sense of how to fix it. We tried writing more to compensate for the audio problems, but even the chat tool was slow, making the flow of conversation quite a challenge. We tried collaborating on the white board—I would ask the interns to use the text tool to contribute their ideas on how to use the particular mathematics problem to teach students about non-linear functions, but even textboxes were not consistent in format or in delay time; some interns could not even find their whiteboard tools (but they did not experience this problem in our training session!)...All in all, it just seems that too much advance planning is required for technology 'neophytes' to function in a competent manner (that is, to at least be able to

use the tools available) and the technology itself was inconsistent and, dare I say, unreliable? When such barriers are present, one must ask the question: is it worth it? At this point, I would answer no, not yet. With such a steep learning curve on top of issues of unreliability (product and/or environment?), users are just not comfortable. It's my belief that both product and user need some more attention to make things workable (Nolan and Exner, 2009).

the impact of virtual conferencing on design and design education

The picture is slightly different for design and design education. The design fields (especially industrial design and graphic design), whose heritage is the Industrial Revolution, have long been linked to technology. With the advent of computers, designers embraced the dream of virtual communication, enthralled with the hardware and software of the present but hoping for further improvements. *Design in the Information Environment: How Computing is Changing the Problems, Processes and Theories of Design*, published in 1985, contains essays written by enthusiastic designers and educators who talked about the new experiments in computer technology (Whitney, 1985). They could see the day when people would interact with data in a personalized way through voice commands or the touch screen of a handheld device. The vision is there in words, but the pictures show the then limits of the vision–large screen, TV-like monitors with pixilated OCR typography and lots of dials. A decade later in *Design in the Age of Information: A Report to the National Science Foundation*, professional designers and design educators looked ahead another ten years to 2006 and proposed a new paradigm for the practice of design and the education of future designers that embraces interdisciplinarity and virtual learning environments (VLEs) (Krippendorff, 1997). The writing of the report is infused with a sense of wonder at what is already possible and with inspiration for an even more wondrous future. This vision of the future of design lists four overarching and intersecting world altering transformations at the heart of the paradigm shift–digitalization, networking, equity of access and dispersion of design (Krippendorff, 1997).

First, digitalization is the ability to create, replicate and store artifacts using extremely small units and to manipulate them rapidly via computers. This has changed the kinds of objects we can create and greatly increased the venues for design. Next, networking is the ability to link what we have created digitally across time and space to enable people to communicate with each other who ordinarily would not know one another and to provide them with access to more

information than they would otherwise be able to obtain. This opens a wide range of opportunities for design research and collaboration. Then, equity of access is the ability of anyone to find and use information regardless of geographic, cultural or social boundaries. This creates new opportunities for social interaction and for participation in design decision-making. Finally, dispersion of design is the ability for more people to be part of the design process and to address issues through multi-disciplinary groups. This means addressing design problems collectively through teams rather than by single 'genius' individuals.

The new paradigm for design championed in *Design in the Age of Information*–in essence, a design manifesto–is highly collaborative in nature and both grows out of and is dependent on the interactive nature of digital technology's ability to provide tools for virtual communication (Krippendorff, 1997). Based on shared knowledge, resources and decision-making facilitated by technology, the future of design will be non-hierarchical and constructivist in approach, collaborative in process and diversified in use and application. "Designers are asked to transcend their initial concerns with surface appearances and increasingly address issues of meanings and identities, computer interfaces, multi-user information systems, cyberspaces, socially viable projects and discourses for designing design, whose materiality is far less obvious yet of considerable social significance" (Krippendorff, 1997).

Design education would be correspondingly reformed to fit this new paradigm, putting digital technology and collaboration at the heart of university and college level design studies. In fact, of the report's six recommendations for design education, the first one is to provide courses and projects to be carried out by interdisciplinary teams. Virtual Learning Environments would arise from the technological capabilities, enabling people to work together on projects–joining people from around the world and from a variety of disciplines in a common endeavor. Virtual conferencing would become the primary technological means to enable the paradigm shift for design education. While most current design education does not yet resemble the vision of the report, the shift is definitely underway.

Design educators who use virtual conferencing to engage students in international collaborative projects find that their visions, their hopes and dreams for what students will gain and what students will produce, are often adjusted by the realities of the hardware and software that currently define the experience of virtual conferencing. Limits on virtual conferencing are often due to a lack of access to technology and of the quality of available software. While very good virtual conferencing technology exists, the price (and support costs) usually put it out of reach of many universities, especially state supported universities. Skype, which

can be used for free, enables video, audio and chat, but add a third person and the video disappears when using Macintosh computers (as most graphic designers do). The interface of much virtual conferencing software, such as Dimdim and Zimbra, has many options crowded onto the desktop screens that are not intuitive to use or understand. It is easy to get confused with the dizzying visual display and the lack of visual hierarchy-where do you look first? The learning curve for these options can be steep and the tutorials are often visually daunting, filled with jargon and not designed from the user's perspective. The software allows for video participation, but only one person at a time. Individuals "share" the whiteboard and post documents sequentially; the moderator controls sharing. The option for private messaging can be distracting if an individual is in the middle of a presentation. Even e-mail has problems such as limited file sizes for attachments, the contents of simple documents that get scrambled because of incompatibilities between PC and Macintosh formats and files that cannot be opened if sender and receiver have different versions of software. *Design in the Age of Information* does include some acknowledgement of the current limits to its vision because of such things as variations in access to devices, software and knowledge, competing and sometime incompatible hardware and software, and problems with effecting virtual reality (Krippendorff, 1997). It acknowledges the difficulty inherent in trying to anticipate future technological developments, especially as affected by social, political and cultural events and institutions. Competing yet incompatible software and the inequality of access can complicate or inhibit the ability of design students to engage in collaborative projects. It is important to note that the simulation of presence through the technology of virtual conferencing undergirds all of the four transformations of the new design paradigm and is the key to both the dreams of global education and to the realities that impinge upon those dreams. And it is the sense of presence at the heart of the promise of virtual communication that has propelled designers and design educators to envision their future as digital and collaborative-the essence of virtual conferencing.

examples of virtual conferencing in global design education

Perhaps the best way to understand how the dynamic between dreams and realities of virtual conferencing affects efforts to provide international educational experiences for students is through example. The following three narratives

describe three different contexts–an assignment, an online course and a conference project–that utilized virtual conferencing at different points in the educational and design process.

EXAMPLE 1–ASSIGNMENT

My Winter 2006 course on information design at Wayne State University, Prescription Medicine Labeling, held its final critique sessions in April 2006 with David Sless, director of the Communication Research Institute in Melbourne, Australia and author of one of the textbooks for the course, *Writing About Medicines for People: Usability Guidelines for Consumer Medicine Information*. Each student worked with three to five people to design a bottle label and its accompanying Consumer Medicine Information (CMI) sheet based on the informational needs of those individuals. David had agreed to be guest critic for the students' final presentations, which would require two three-hour sessions over two days. The dream of virtual conferencing with David was to provide students with the opportunity to interact with and receive input on their designs from an expert in the field who happened to live on the other side of the world; we would use virtual conferencing to have him be "present" for the final critique. (This was the first time virtual conferencing was specifically and deliberately incorporated into the structure of a graphic design course at Wayne State University.)

Immediately we encountered several realities, each of which contributed to shaping and reshaping the nature of our interaction. The first issue to address was time zones–Melbourne is fourteen hours ahead of Detroit. We negotiated a mutually agreed upon time: 8:30 am Detroit time/10:30 pm Melbourne time. Originally we had proposed a Skype conference call with a separate video and audio connection for each student in our Mac computer lab, but quickly realized that Skype only permits video conferencing between two Mac computers. Then we decided that each student would take a turn presenting his/her work via a Skype connection. A few weeks before the final critique, we tested the Skype connection and found that the Skype video signal consistently broke into pixels or froze in transmission; the audio was garbled, echoed and could only be remedied with headphones (which if used would not permit the rest of the students in the class to hear David's comments nor to ask him questions); that the call itself was often suddenly dropped. We then tested telephone conferencing; this seemed to work. David was patched into a telephone with a speakerphone that also had speakers attached so that his voice could be broadcast in the classroom. However we found that the connection required speaking close to and very deliberately into the speakerphone in order for

David to hear anyone. Since there was now to be no real-time visual component to the final critique, the students sent PDFs of their designs to David a week before the scheduled critique sessions.

The students presented their work in real-time to the class and David could follow along as he viewed their work on his computer in Melbourne. The problem here was that he could not experience the physical dimensional nature of the label and Consumer Medicine Information (CMI) sheet mock-up nor could he assess the quality of the mock-ups. A few students had sent him a PDF showing a three-dimensional model of their labels on bottles and of the folding sequence of the CMI; most PDFs were flat layouts. As a result, most students spent a fair amount of time explaining their design decisions within a three-dimensional context. David was, however, able to comment in-depth about the students' choice of type (size, weight, wording), sequence and hierarchy of information, type/image relationships, color, etc. He could hear the students state their design objectives and explain how those objectives framed their finished designs. He could also engage them in conversation about their visual choices and the testing of the designs that the students conducted with their participants.

In spite of the limitations, the students were enthusiastic about David's participation in the course. They expressed awe at being able to talk with someone whose work they knew and admired and at the ability to talk with someone so far away. They were impressed that he stayed up late specially to meet with them and they found his insights about their work to be very helpful. This experience opened the students' designs specifically developed to address the needs of people in Detroit to become part of the global dialogue on the design of medicine labeling.

EXAMPLE 2—ONLINE COURSE

In 2007/2008, Lennart Strand of the Information Design program at Mälardalen University in Eskilstuna, Sweden, developed and twice taught a ten-week infographics course, the first course offering of the Information Design University (IDU). The idea behind the IDU, operating under the auspices of the university, was to offer online courses on the study of information design to people anywhere. Lennart received special release time to develop the course and then taught it as part of his usual course load for the year.

The infographics course examined the presentation of charts and diagrams, especially those found in newspapers and magazines; its focus was on theory and analysis. Students had assigned readings and wrote reports; they did not design infographics. Lennart's class crossed many geographic boundaries–the students

came from the USA, Portugal and Austria-and crossed disciplinary boundaries-they were professional graphic designers, writers, teachers and university students. The course was divided into five modules of two weeks each and included a real-time "seminar discussion" chat session at the end of each module. Lennart established a virtual classroom website for the course and his Study Guide explained the procedures for accessing the website and stipulated that assignments were to be uploaded to the website three days before the scheduled seminar. The papers were to be read by other class members and their comments uploaded no later than one day before the seminar (Strand, 2008). Additionally, Lennart prepared and posted podcasts on his website as additional information sources for the students.

One of the challenges for Lennart was that the course took much more preparation time than he initially anticipated (Strand, 2009). Another was finding a time slot that would work for students living in different time zones; 6:00 pm Central European Time (12:00 noon Eastern Standard Time in the USA). His comments on the technical experience of this online course include the problem of staggered, lag time that occurred in the seminars' chat sessions: different responses took different amounts of time to write and their appearance often interrupted both the content and flow of the conversation, creating gaps or overlaps that made the thread of the conversation ragged. To address this issue, Lennart found that he needed to assign people turns to respond. This, however, seemed to reduce the amount and spontaneity of conversation. As a result of his experience with this course, he recommends a test session of the software connections with all students before the course begins to make sure that everyone has good connections and can access the website and download materials. He would also present his teaching materials in more varied formats, e.g., lectures in PowerPoint, PDFs and Word and post his lecture ahead of the seminar so that students could have them in advance and be prepared to discuss the contents of the lecture. And he would hold shorter, more focused seminars that covered less material so that students would feel "less weighted down" by seminar preparation.

Along side access to technology (all his students had good computer skills and were disciplined and motivated individuals), the most important issue for the success of the course was to make people feel involved. Students had the option to work on assignments as individuals or in groups; the students in groups stuck with the course and seemed to have the most interaction with the material and each other compared to students who worked independently (a few of whom wound up dropping the course). Lennart would take more steps to broaden the contact and interaction that students have with one another (Strand, 2009). One of the good

things to come out of the course was to see the influence of cultural context in the students' designs analyses, such as the different associative values and meanings of colors. He himself became much more aware of cultural differences and perspectives in visual aesthetics and had to adjust his expectations of how to interpret visual material. Lennart reports that the collaboration on the projects broadened the students' cultural understanding and ability to work in virtual teams. He says that the students' evaluation of the course was high, saying that they learned a lot and had a very positive learning experience.

Unfortunately Mälardalen University withdrew support for the IDU and Lennart has not been able to offer the infographics course again; bureaucracy, politics, money and resource allocation issues became insurmountable obstacles. Other administrative problems arose forestalling the dream of IDU providing online courses taught by the best faculty from around the world. If someone at one school teaches a course that is taken by a student at another school, which school gets to 'count' the student as part of its student numbers and claim the student's tuition? How are the requisite tuition and fees at US schools reconciled for European students whose higher education is free in their home countries? Conversely, do US students still pay tuition and fees when taking a free European course? What about a university policy that requires its adjunct faculty to be physically on campus or at least reside in that country in order to be on the university's payroll?

EXAMPLE 3–CONFERENCE PROJECT

"DD4me" was the student project portion of the conference, Data Designed for Decisions: Enhancing Social, Economic and Environmental Progress (DD4D), that was held in Paris, June 2009. Co-sponsored by the International Institute for Information Design (IIID) and the Organization for Economic and Cooperative Development (OECD), the conference looked at how statistics influence our everyday decision-making and students from around the world were asked to participate through DD4me. Students were invited to examine when, where and how statistics enter their lives, how statistics and the visual representation of statistics influence their interests and thus their decision-making, what relevance statistics have to their lives (why and why not) and what new ways of evaluating and understanding statistics can be devised (e.g., how would you change the way statistics operate in and impact your lives) and ultimately to prepare a project for presentation at the conference.

A DD4me website was created through the Ning social network host by Veronika Egger, deputy director of IIID and coordinator of the DD4me project and those

interested in participating signed up as "members" of DD4me. By the time of the conference, one-hundred-fifteeen students and their faculty advisors representing thirteen countries across Europe and the Americas had become members and twelve projects from nine schools were registered (eight projects were actually presented at the conference). Veronika posted a set of broad guidelines for developing projects and deadlines for project statements and submission of finished work (projects could be developed by individuals or groups of students). The website enabled students to upload images, video, text, create discussion forums and send messages to each other. The website was free form in that the use of the site depended on the contributions of the participants. The hope for and intention of the website was that students from the different schools would use the site to share information with each other and create forums to discuss their research, thoughts and design processes–in other words–the students would be engaged in active dialogue about the topic.

Instead there was no dialogue via the website (Egger, 2009). Members from one university posted some photographs and videos of their research and a couple of groups posted their project statements. There was little activity except for the burgeoning list of members. The DD4me Ning homepage listed all the members, their university affiliation, their location, the groups and their membership and a running tally of the number of members. This allowed people to get a sense of who was involved and interested in the project. A click on the picture or name of any member or group took you to that individual's or group's DD4me page.

While the expectations for interaction via the website were not met, the site created a community of people who shared a common interest. People who had never met (or even knew each other existed) and might never meet face-to-face were now connected. Veronika found that it was "mind-boggling to see how many people were interested" (Egger, 2009). For the few students who were able to attend the conference in Paris, the website became their introduction and established the common ground for their face-to-face exchanges. And the impact of DD4me continued to resonate worldwide as the work of the twelve students group projects was presented at the Organization for Economic and Cooperative Development (OECD) Third World Forum in Busan, South Korea, in October 2009.

Veronika's assessment is that the website did not generate the interaction expected because the site required a higher threshold of involvement–the public nature of the site (what was on the site could be seen by everyone else), meant that you had to really think about what you were willing to say–something more than a quick, personal note in texting shorthand on Twitter. She recommends doing three things differently in the future.

1. Have several people commit themselves to be actively engaged with the website who will keep after others to stay involved.

2. Have someone in charge of moderating and monitoring the activities on the website to keep the pace going–otherwise activity will wither and die.

3. Maintain a regular flow of information, activities and task deadlines through the website to sustain people's interest and engagement.

The challenge for IIID and OECD is to find a way to sustain the DD4me connections and channel the shared interest into future design projects. Students attending the conference testified to being amazed at seeing the work of others and thrilled to be part of something bigger than their own school.

questions remaining

All three stories end with optimism for the future, even with their technical difficulties and shifts of expectations. All suggest changes for next time and are invested in the future of virtual conferencing. But as convinced as design educators are about the benefits of virtual conferencing, there are still two important questions implicit in these stories that will continue to hover over proposals for future international student design projects. And these questions bring us back to the issue of presence.

1. When and how are the best ways to incorporate virtual conferencing into the learning process and thus into the shape of the project?

2. What do we really mean by collaboration and do we really understand what is necessary for students to work in virtual teams?

We have bought into the dream of virtual conferencing and see its potential but do not know its pitfalls–only discovering them as we stumble over them and then try to adjust, work around and figure out what works and what does not. One of the most important things we do not know about virtual conferencing in design education is when to utilize it. We think we know how virtual conferencing can be used, but we are riding assumptions from our past experiences in other media, in other constructions of social interaction. What is the best place to incorporate it into the educational experience for students? We really only have a vague idea of how to use it effectively and we learn as we go. "The adoption of computer-mediated communication (CMC) in higher education has far outpaced our understanding of how this medium should best be used to promote higher-order learning" (Garrison, Anderson and Archer, 2004).

Usually the question of how and when to use virtual conferencing is left wide open as in the report on Martti Raevaara's paper presentation, Interlinking Studio and VLE–Promoting a Dual Space for International Cooperation in Art and Design Education, in *Interface: Virtual Environments in Art, Design and Education: A report on a conference exploring VLEs in art and design education* (Hanrahan, 2009). Raevaara's approach to e-pedagogy is to let the teachers figure out what works through trial-and-error. "There is no one way to deliver an excellent e-learning course and especially in art and design–where we don't have much experience of using VLEs–Raevaara thinks that it is important to try out different approaches and experiments all the time" (Hanrahan, 2009). Some studies have specifically attempted to determine the best use of virtual conferencing in the development of a student's process of critical thinking–the afore-cited study by Garrison, et al. is one reference that could help design educators frame the discussion of international collaboration work and figure out how and when design students can best take advantage of virtual conferencing.

The study by Garrison, et al. seems to suggest that students use virtual conferencing most effectively as an avenue for exploration and investigation (Garrison, Anderson and Archer, 2004). The authors evaluated the content of messages exchanged between students during two computer conference courses to assess the impact of virtual communication on the process of critical thinking exhibited through four phases of practical inquiry–a triggering event (an issue or problem to be addressed), exploration (brainstorming, questioning and exchange of information), integration (constructing meaning out of discovery) and resolution (action or result). The greatest frequency of the content of the messages (forty-two percent) related to the exploration phase. In that phase "people feel free to share their insights and contribute relevant information" (Garrison, Anderson and Archer, 2004). The surprise was that the frequency was so low for integration (thirteen percent) and resolution (four percent). One reason "...for the lack of resolution responses could be that the medium (i.e., computer conferencing) does not support this kind of activity. Application or testing of ideas is difficult...given its vicarious, and even contrived, aspects" (Garrison, Anderson and Archer, 2004). The authors note that while all four phases employ "...moving between private and shared worlds–that is, between critical reflection and discourse," their work suggests that virtual communication can be more useful in some phases rather than others (Garrison, Anderson and Archer, 2004).

The first part of their assessment is that "for a computer conference to serve as an educational environment, it must be more than undirected, unreflective, random

exchanges and dumps of opinions. Higher-order learning requires systematic and sustained critical discourse where dissonance and problems are resolved through exploration, integration and testing. The guide (i.e., practical inquiry model) must be the full cycle of the critical-thinking process, which includes interactions between the public shared world and the private reflective world" (Garrison, Anderson and Archer, 2004).

Thus collaboration, one of the goals of the new paradigm of design education, must be structured and purposeful. Lipnack and Stamps in their book, *Virtual Teams,* underscore this and would support the observation described by Garrison, et al. in the work flow of virtual teams, that is, the rhythm of "together/apart" (Lipnack and Stamps, 2000).

> Most work combines a pattern of individual and group tasks, time spent working alone and time spent working with others... For best results, time together is planned, prepared for, and followed up on...Virtual teams need to be more explicit in their planning and their plans [than collocated teams—that is, teams who work face-to-face]. Clarifying goals, tracking tasks, and accounting for results are all part of elaborating process time in a manner visible to all members of the team (Lipnack and Stamps, 2000).

The authors suggest that while virtual teams often employ various forms of synchronous and asynchronous forms of virtual conferencing, each form may be best suited for a different kind of task–the virtual conferencing forms correlating to the together/apart rhythm of the project. As the second half of the Garrison, et al. assessment says:

> The complexity and challenge of facilitating this educational process...necessitates skilled facilitation. Collaborative learning in an educational sense is more than a mindless free-for-all. Interaction must be coordinated and synergistic. This requires an understanding of the medium of communication, the process of higher-order learning, and the critical role of teaching presence in attaining higher order learning outcomes (Garrison, Anderson and Archer, 2004).

Another issue to address concerning student collaboration on international projects is language. English has become the de facto language of international communications; it was the language used in the IDU online course and the DD4me student project. Unfortunately, the command of English falls hardest on those for whom English is not their first language. Language skills, a non-technical limitation on virtual communication, can affect all students' experience of collaboration in

international projects and courses. While a discussion of the pros and cons of a common educational language is beyond the scope of this paper, it is important to factor in language as an element vital to the planning and success of global design education efforts. The various modes of communication within virtual conferencing can help serve as work around options to problems of language that may surface.

While collaboration is a term often tossed about in design education, understanding its use and incorporation into global projects and online courses is in flux. We are still groping to understand the rhythm of together/apart for virtual collaboration and thus to know the best ways of synchronizing the various modes of and current capabilities of virtual conferencing to the planning and pacing of virtual collaboration. When we figure out how to insert virtual conferencing most effectively into the learning process and into the patterns of collaboration, we will be able to more easily adapt the technical realities of virtual conferencing to the process and patterns that will provide students with the best sense of presence as they work together across borders and disciplines.

conclusion

So finally, what can we take away from an examination of the dreams and realities of virtual conferencing in global design education?

1. The simulation of transparent presence–especially as conceptualized by Litton and Ditton (1997) in terms of social richness, realism and transportation–in virtual communication is the dream to easily enable international student collaboration and learning. The reality is that the sense of presence in virtual communication is compromised by limitations in two categories: Technology and Design Process. Technology, the design of human/computer interfaces; and issues surrounding the accessibility of hardware and software. Design Process, figuring out the best use of virtual communication in developing critical thinking; and understanding the rhythm of virtual collaboration and then determining how to best integrate virtual communication into opportunities for international student virtual collaboration.

2. Given the limitations of reality, we must cope with the relationship between the virtual and the real–that is, dealing with the realities to sustain the dream–to ensure the most amount of presence.

3. The experiences of those in design education who have used virtual communication in its various permutations for global initiatives have found that we must deal with two essential interconnected issues: Time-accommodating time

zones, preparation and testing, learning curves for software and procedures and any other unforeseen events or issues; and

4. Planning—understanding the pacing of tasks and events when using virtual communication; anticipating additional preparation for and facilitation of virtual communication in relationship to the tasks and events of a project; and being better prepared to revise schedules and expectations when problems with virtual communication arise.

The shift to the new paradigm of design education is happening and those in design education who have worked to balance the dreams and realities of virtual communication in international projects and courses are helping manifest the shape of the new paradigm. The end of the report on Raevaara's presentation puts the situation well, "despite the obstacles to be overcome, the new visions of international cooperation not only enhance the learning opportunities available to students, but also have a lot to offer the teacher/researcher" (Hanrahan, 2009). This certainly proved to be true for all who participated in the Wayne State University prescription medicine label course final critique, the Mälardalen University online infographics course and the DD4me conference project. As further research into the technology and usability issues surrounding virtual conferencing provides a greater sense of presence for the synchronous and asynchronous forms of virtual conferencing and as more universities invest in changing design curricula to support international student collaboration, we are able to work more effectively and collaboratively with one another across the world. The elusive dream of seamless, vivid virtual conferencing is becoming more real.

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