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Volume 3, Number 1
Spring 2007

Technology Support for Whole Class Engagement <i>Karen Swan, Annette Kratcoski, Mark van 't Hooft, Deborah Campbell, and Debra Miller</i>	1
Effects of Media Framing on Beliefs and Values Concerning Detainees, Civil Liberties, and National Security after 9/11 <i>JC Barone and Karen Swan</i>	13
Cross-Cultural Issues in Online Education <i>Albert Ingram, Chung-Ming Ou, and R. James Owen</i>	23
Undergraduate Student Reactions to Online Learning Related to Health Promotion and Wellness <i>Corey H. Brouse</i>	44
Book Review: Ubiquitous Computing in Education: Invisible Technology, Visible Impact <i>Leonard Trujillo</i>	62

Cross-Cultural Issues in Online Education

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Regional University had been heavily promoting its online courses for several years and their efforts were really starting to pay off. More and more courses and even entire degree programs were being offered online, and enrollment was up significantly. Regional's growing reputation for quality was starting to attract students from outside the area and, increasingly, from other countries as well. The word-of-mouth among the international community was leading to enrollment of groups of students from specific places as well. At least some faculty members were excited about the possibilities for improving their teaching and reaching more students.

Professor Mary Lou Hartman had, somewhat to her surprise, become something of an expert in using Regional's Course Management System (CMS). She used it to teach several courses, especially a survey course in American History that many students from the region, the country, and even other countries took online. The CMS provided a common interface for her courses that students usually became familiar with either in her course or in another introductory course. Recently Dr. Hartman had discovered that within the CMS she had a great deal of control over the look and feel of the interface. She could change the color schemes, develop and use new icons for key functions such as tests, discussions, chat rooms, textual information, and so on, and adjust the labels on different functions. Within specific "tools" there was the opportunity to make some adjustments to how they work. Therefore, she could not only decide how to use the system but she could also control parts of the interface.

The question she now had was what to do with these capabilities. Dr. Hartman had been reading a little about the issues inherent in teaching people from different cultures, and wanted to set up her course to make it as easy as possible for all of her students to learn effectively. Now that she had students from radically different cultures in her classes, she was unsure about how to proceed. What should she change? How could she make choices that gave each student a chance to learn? Once the course was set up, how could she use it to its best effect?

Dr. Hartman decided to sit down and list the things she could adjust. She thought that she could use this list and the literature she was examining to decide how to proceed. The list included

- *The color scheme of the course, including background, buttons, etc.*
- *The fonts used on the site.*
- *Specific icons for individual tools, information, and links.*
- *To some extent, the placement of icons on the screen.*
- *What buttons and menu items appear for students and their order.*
- *Some characteristics of how different tools work. For example, whether a discussion has a hierarchical (outline) structure or a linear one.*

Professor Hartman, as well as increasing numbers of college and university faculty, is facing a set of issues that we may not have anticipated just a few years ago. How do we accommodate the international students enrolling in our online classes? Will everyone in the class be able to navigate the course materials and make use of the opportunities for interaction that we provide? How can we communicate effectively and sensitively online with all students? Even when we use a standard CMS and other software, the features and interface that it provides may not be neutral and impartial presenters of information and activities. How can we adjust those elements to assist students from all cultures?

Within a CMS, there is less control over or opportunity to design the interface than one would have if designing a program from scratch. Not only is the CMS interface bound to use the graphical user interface of the operating system, but a CMS runs within a Web browser, imposing additional constraints. At the same time, Dr. Hartman's scenario of intercultural learners and limited control over learning technology is a realistic one and likely to become more common. The issues raised extend far beyond the CMS as faculty members develop their own websites and other online educational materials. What can research and practice in cross-cultural psychology, education, and interface design tell us about how to develop and use online course materials? To answer this, we should look at what people from different cultures bring with them when they approach the technology. Various parts of the human-computer interface (HCI) as well as our teaching strategies can be adjusted to provide an experience that works for a greater number of students.

The Interface

"The interface connecting human and machine is subtle, and the success of the entire human-machine system turns on the design of this interface" (Bonnie, 2003, p. 55). The subtleties of different cultures and the manners in which members of cultures interact with one another influence how they interact with computers. Members of various cultures expect different things from computer interfaces, and knowing some of these expectations can help make the interface more effective. In particular, when *two or more* cultures interact using an interface we may find that we can reduce miscommunication and misunderstandings by developing an interface that helps bridge the gap between the students and help them all achieve their goals.

Any interface is composed of a variety of elements: text and language elements, graphical elements, and so forth. Wood and Tinajero (2002) note that images can be used with any and all languages. In globalizing technology, we can employ the idea of visualization as the foundation of computer interfaces, as in today's Graphical User Interfaces (GUIs). Interface elements are now required to address the technology needs of not just one culture or nation, but a more global audience. We can no longer limit considerations of HCI behaviors to a single or dominant culture; instead we must consider how individuals from a wide variety of cultures interact with the technology based on their own cultural proclivities. Global technology use connects humans and cultures to machines. It might now be thought of as a *culture-machine system*.

The culture-machine system affects education because culturally-appropriate onscreen interactions affect the ways in which members of a culture learn. If the HCI coincides with real-world cultural interactions, it is more likely to be used successfully and to enable better and deeper learning, because "the key to a successful education for all students is to take [the] student's background into consideration" (Gillani, 2000, p. 185). As these principles relate to HCI, "in order for multicultural education to be successful, the interface needs design features that bridge personal inner perceptions to the values of [that] culture" (Gillani, 2000, p.187). In other words, the HCI needs to incorporate the learner's culture so that appropriate personal and social contexts help optimize the learning.

Cultural Dimensions and Interface Aesthetic

Hofstede (1983) developed a model of cultural dimensions that provides standard indices still in use today. The model is used in business, academia, conflict resolution, and other fields where global

sensitivity to cultural dimensions is paramount. These dimensions can be represented onscreen to some degree, both to establish cultural and social context and to increase the educational efficacy of the HCI. The dimensions are:

- *Power Distance Index (PDI)*. This dimension represents the degree of equality or inequality among people in a given society. A high PDI ranking indicates a disparity between those with power and wealth and those without.
- *Individualism (IDV)*. This dimension focuses on the degree to which a society reinforces individual or collective achievement and interactions. A low IDV ranking means that the culture operates with a greater collective mentality, focusing more on the needs of the group than those of the individual. A high IDV ranking indicates greater individualism.
- *Masculinity (MAS)*. This dimension focuses on the degree to which a society reinforces a traditional masculine work role model of male achievement, control, and power. A higher MAS score indicates a larger degree of gender differentiation, particularly favoring the male.
- *Uncertainty Avoidance Index (UAI)*. This dimension indicates the degree to which a society will tolerate uncertainty and ambiguity. A lower UAI indicates a society with a greater adherence to rules, one that values order and control over uncertainty and risk. A higher UAI indicates a greater tolerance for uncertainty.
- *Long-term Orientation (LTO)*. This dimension indicates the degree to which a culture embraces long-term devotion to tradition. A low LTO indicates that traditions do not stand in the way of change. It also indicates that change happens more rapidly in low LTO cultures than in cultures with a higher LTO.

Hofstede's model introduces concepts and values that explicitly and implicitly influence what appears in an onscreen interface. Because the dimensions exist in varying degrees in different cultures, there are complex interactions among them. This complexity exists onscreen as well.

The dimensions combine to establish a set of *values* that reflect a particular culture (Güss, 2002). Kerne describes succinctly how those values are made manifest in our world: "aesthetics...is the way we give form to values" (1998, p. 38). A culture's artwork and architecture, communication styles, education, commerce, religion, and day-to-day activities all embody the culture's values. Regard for such cultural aesthetics is gaining momentum, and they have "begun to appear more constantly in the discussions about human-computer interaction" (Kallio, 2003, p. 142). Onscreen the aesthetic is the foundation of the culture-machine system.

The onscreen elements that make up a user interface are tied to one another in a graphical user interface that is sensitive to these values. The resulting aesthetic (Kallio, 2003) is called an "ecology" or "ecosystem" (Forlizzi & Batterbe, 2004; Kerne, 1998), indicating mutually interdependent components and their interrelationships. Interface ecology addresses the "multiple levels of cultural interaction that may occur through a single, tangible phenomenon" (Kerne, 1998, p. 42).

Interaction in an onscreen environment blends many integrated and interdependent components. Aesthetically speaking, a culturally appropriate onscreen ecology establishes a context for education that is comfortable and familiar for the user, making learning more likely to occur. Immersion in one's familiar aesthetic creates an emotional and aesthetic resonance that contributes to one remembering the onscreen experience (Forlizzi & Batterbe, 2004) and the learning situations designed into that experience (Schunk, 1991).

If we include more elements from a specific culture in an interface ecosystem, then more students from that culture will find the interactions accessible and compatible. The presence of cultural elements includes combinations of pedagogical and instructional styles, decision-making activities, and the level and nature of onscreen control, graphics, colors, etc. Educational designers must pay attention to these aesthetics because learning always takes place within a social and cultural context, which the aesthetic represents.

The Onscreen Ecosystem

Interactivity is generally considered vital for online education. The term refers to the mutual effects that user and system have on one another, with the computer, websites, other students, instructor, and many other elements all making up the system. If the components of the interface are part of a culturally appropriate onscreen ecology for a website or other educational interface, the experience will be more effective (Forlizzi & Batterbe, 2004). In contrast, the educational effectiveness of the interactions could be lessened by an unfamiliar aesthetic produced by incompatible onscreen artifacts, navigation, colors, images, or choices. Designing onscreen content and interactivity for different cultures is a crucial step in creating an effective onscreen ecology.

Gillani (2000) offers a list of general questions to consider when making decisions about how the content should be realized onscreen:

- What interface designs will represent the students' cultural dimensions?
- How should the information be structured?
- How should the students communicate?
- What level of interactivity is needed?
- What linguistic style is appropriate?
- What kinds of graphics are culturally appropriate?
- What kinds of media best represent the culture?

By exploring such questions designers can address the cultural components of education and usability. These questions might also spur other discussions that lead to more precise cultural responsiveness within the onscreen ecosystem.

Navigation

Navigation is one means by which the learner communicates with the computer, so one can try to reflect onscreen the manner in which members of a culture communicate with one another. In matching communication styles, HCI designers can establish a cultural rapport and strengthen the culture-machine system. In many Asian cultures, social interactions are circular and follow a winding course of conversation and communication. In contrast, Western cultures tend to be more direct. These differences may be reflected in the HCI. In American interfaces, there tends to be a directional flow to how things are accomplished onscreen. For example, the prevalence of the menu on the left side of the screen implies a top-down order, or the interface may reflect the linear flow of completing a task (step 1, step 2, step 3, etc.). Many Asian websites use a non-linear arrangement of onscreen options that are often circular (Owen, 2004) or concentric. The circular conduct of Eastern social interactions may be reflected in circular navigation elements onscreen. Optimal task flows for learning onscreen may vary depending on cultures and habits of decision-making, communicating, and prioritizing. A key problem arises if the designer has to find a way to communicate with multiple cultures. This can be a balancing act that may not satisfy anyone completely.

Navigation also affects how learners experience anticipatory sets or advanced organizers, prompting and cueing strategies, feedback, and other pedagogical content. If the navigation is inappropriate to a culture, the effectiveness of the educational material is reduced. If the navigation is designed to support the communication styles of a culture, it facilitates the learning through familiar interaction practices. This may be especially important with younger learners; a poorly designed interface may introduce cultural incongruities or confounding elements that must then be remedied.

Appropriate metaphors are important in HCI as cultural elements that bolster an interface's aesthetic. Familiar objects, colors, settings, mythological figures, and so on can fine-tune the cultural resonance of the HCI. Gannon (2002) defines metaphor as "any activity, phenomenon...which members of a given culture emotionally or cognitively identify." Different cultures understand metaphors differently, if they

recognize them at all. Some metaphors may have different meanings in different cultures; others are simply unfamiliar to an audience, rendering them useless as onscreen elements.

Icons are one kind of metaphor. These are the buttons and navigation options which are visible onscreen. They can indicate where to click in an interface and communicate quickly what might result from doing so. When designing HCI for use by a culture other than one's own, we must be cautious about using metaphors and icons. For example, to avoid offending learners from another culture, we should not refer to body parts or anatomy as metaphor (Nielsen, 2000), as different cultures regard references to various parts of the body as taboo. Kearsley (1990) warns that it is important to make graphics culturally neutral as well, or even create different graphics for different countries because "stylized icons may not be interpreted or recognized by people from different countries in the same way" (p. 243). Finding those neutral graphics may be difficult, and developing parallel sites for different cultures may be feasible only if there are sufficient numbers of students.

Second, even though much of Western culture permeates the lives of people around the globe, emerging or developing countries might have less knowledge of standard metaphors used in Western and other computer-literate cultures (e.g. envelopes representing email functionality or a diskette representing a save function). Thus, the metaphors might not be offensive, but could introduce confounding elements that may decrease the effectiveness of the HCI.

Third, cultures may have contradictory meanings for given symbols and interface elements. In discussing design for internationalization, for example, Nielsen (2000) cites an interactive graphic of a light switch in the down position that prompts the user "turn this on." He points out that in many of the countries where this graphic would be viewed, the light switch would already *be* on. Likewise, interface designers may adopt common hand-gestures as onscreen elements. Most such gestures are not universally recognized and may be confusing or offensive to non-Western students. For example, the American "quotation" gesture is extremely confusing to many non-Western students and may be regarded as mocking or disrespectful. Others may mean different things or even be considered obscene.

Confounding elements like these likely weaken the educational value of onscreen learning activities. Inappropriate or improper use of metaphors may result in an incomplete learning opportunity, missed information resources, or inaccurate knowledge transfer. Buttons and navigational interaction may be misinterpreted, disregarded out of ignorance, or remain unselected due to anxiety about the outcome.

Metaphor also relates to the broader identity of a culture, or what Forlizzi refers to as aesthetic resonance, where "people interpret particular events and create meaning" (Forlizzi & Batterbe, 2004). Some Eastern-European and Asian countries prefer naturalistic settings for stories, often imbuing nature and animals with human qualities that come to represent certain traits and principles. Americans have a tendency to view themselves as separate from nature, placing higher value on science and technology (Samovar, Porter, & Jain, 1981). Evidence of this can be seen in most Western university websites' usage of large pictures depicting people active in sports, engaged in student activities, or coming together from different cultures. Non-Western universities prefer to use landscapes, scenes, buildings, or school logos as the focal point of their official websites. Pictures of people, sports, or student activities are generally not favored, because they may be perceived as individualistic or egocentric. Similarly, compared to their Western peers, non-Western students prefer images or avatars to represent themselves that are more neutral, ordinary, and non-individual to prevent the criticism that they are "showing off."

To understand new experiences and give them meaning, humans compare novel and uncertain experiences to settings, situations, objects, and ecosystems with which they are familiar. These metaphors are essential: "People rely on analogies with familiar, regularly envisaged domains to build mental models of less-familiar, less-visible domains" (Payne, 2003, p. 140). People evoke metaphor to help connect new learning to what they already know. However, it is important to insure that the metaphors used in online learning evoke the same meanings for all students.

Images

The use of images tied directly to educational content is related to the use of metaphor in supporting a cultural aesthetic. A culture's values are embodied in its visual aesthetic (Kerne, 1998). Of all the elements that exist in differing cultures, "pictures can be used in any and all languages, are easily accessible, and can be used to reinforce literal, critical and creative thinking" (Wood & Tinajero, 2002, p. 48). How can the pedagogical principles behind the use of visuals in education lend themselves to an onscreen ecology?

Reiber (1994) identifies four important types of images: cosmetic, motivational, attention-gaining, and presentational. Each has appropriate uses in the onscreen ecosystem, and each merits careful consideration in educational use:

- *Cosmetic* images can be used in designing an appealing GUI even though they have no direct instructional benefits. Poorly selected cosmetic images can be incompatible with a particular cultural aesthetic, leading to distraction, discomfort, offense, or resentment.
- *Motivational* images can depict success and completion, or serve as a reward. Different cultures may have different definitions of success or suitable rewards, so inappropriate use can result in mixed signals or unnecessarily confuse students.
- *Attention-getting* graphics lead the eye to certain parts of the screen and can keep learners focused on the educational content. If used in a culturally-inappropriate manner, an attention-getting image may confuse the learner and lead to an abrupt end to his/her willing participation in the system. Because attention-gaining is an important initial event in the process of instruction (Gagne, 1985), interfering with it early in a lesson or educational activity can compromise educational effectiveness.
- *Presentation* images are likely to have the most instructional substance. Often presented without accompanying text, they are an effective method for conveying concepts or procedures. Paired with accompanying text, they are a way to help learners form visual mental models of what's being explained textually (Reiber, 1994).

Images are important because according to the dual coding theory (Anderson, 1978), human beings process information using two distinct but interdependent codes, one verbally based, the other visually based (Clark & Paivio, 1991; Paivio, 1990, 1991). Rieber (1994) identifies these two facets as "logogens" (the verbal element) and "imagens" (the visual element). Although the two systems are functionally separate, they become interconnected so that information in one form can trigger or cue elements stored in the other. Dual coding is particularly well suited for the educational use of HCI simply because "Presenting an explanation with words and pictures results in better learning than does presenting words alone" (Mayer, 2001, p. 78).

Further, "referential processing" is the building of connections between verbal and visual systems. Hearing or reading the word "dog" will stimulate the appropriate logogen in the verbal system. When a learner forms a mental image of a dog, perhaps a pet, it implies that the verbal system has directly activated the imagen corresponding to that pet. Pictures may be stored both visually and verbally, while words are less likely to be stored visually. If a piece of information is coded both verbally and visually, the probability of its retrieval is doubled (Rieber, 1994). Therefore, the use of both images and words, combined with the strong retrieval inherent in their joint usage, make them a particularly important facet of HCI.

Ausubel's (1963) theories on *anchoring ideas* can also affect the design of an interface. Anchoring ideas are the "specific relevant ideas in the learner's cognitive structure that provide the entry points for new information to be connected" (Driscoll, 2000, p. 119). They provide a starting point for the acquisition of new information. Similarly, the imagen may be the starting point for retrieval of a logogen, and together they provide an anchor for learning new information. A culturally incongruent onscreen ecology detracts from the connections that anchoring ideas may provide for the learner, so extraneous words, pictures,

and sounds, and onscreen elements that do not make sense to members of a culture should be excluded (Mayer, 2001). Culturally responsive use of images can enhance the educational value and integrity of the interface; misuse may perpetuate cross-cultural misconceptions.

There may be a correlation between learning styles and the use of images and text, particularly within a cultural aesthetic in HCI. Cushner (2003) surveys the idea of multiple intelligences suggested by Gardner (1983, 1999) in which preferred learning styles and ways of expressing intellectual ability influence aspects of cognition. Some people develop learning strategies that maximize the use of images; others the use of verbal and linguistic strengths. Though it is best for a learner not to rely solely on one learning style, different intelligences are valued to varying degrees by different cultures (Canning-Wilson, 1999). In some cases, teaching and learning styles emphasized by a given culture may override individual pedagogical needs. Even if designers disagree with how a culture structures its education, they still need to create HCI true to it.

Animation

Many cognitive and pedagogical principles dealing with images in cross-cultural HCI carry over to animation. For instance, attention to how animation is paired with text or narration is just as important as it is with images. How animation embodies a cultural aesthetic also has implications for how it fits into a culturally responsive ecosystem. Communications styles and cultural dimensions influence the form of animation as well. There are also issues in regard to animation that are unique to it being a medium of motion, direction, and sequence.

First, like images, animation can be cosmetic, motivational, or attention getting, and sometimes it carries instructional substance. Animation can provide real-time feedback for students, thus lending itself to discovery learning (Reiber, 1994). It might reinforce dual coding (Reiber, 1994) or leverage anchoring ideas (Ausubel, 1963) in developing new understanding. As young learners grow older, their cognitive abilities mature and can accommodate more complex and conceptual materials. Adults are likely to have already achieved the ability to understand complex ideas, concepts, and relationships. The complex onscreen content that can live in animation lends itself to keeping pace with these higher order learning capabilities as the learners and the learning levels advance. In general, animation is used to simplify concepts for learners. It is important to match the animation and what it conveys to the learners and their abilities.

Second, animation can portray complex ideas and relationships, and it can embody complex layers of cultural meaning and interaction. This complexity may lead to incongruity with a given aesthetic. Animation incorporates changes over time, position, and/or direction, and different cultures have varying metaphors for the passage of time, the position of one element in relationship to another, or the direction of the action onscreen. Unlike Western cultures, Arabic cultures read right to left. For them, the progression of time, of start-to-finish, is opposite from the standard Western view. Animation with a start-and-finish targeted at Arabic learners needs to reflect this visual paradigm. It needs to start from the right and finish at the left. Western users would find this strange.

Animations can also represent various dimensions from Hofstede's index. If a designer animates a process in which raw materials are manufactured in an Arabic country and distributed through a supply chain, for instance, the designer would probably not feature female characters in the animation. In an animation that traces an Asian country's inter-office information flow, you would not want to show a secretary communicating directly with other members of the organization positioned at a higher level (Martin & Nakayama, 2000). Both examples violate how that culture understands the proper relationships of its various members.

Third, animation is often added without considering its instructional impact. If students create images internally while they are learning, then external visuals will not have any educational advantage (Reiber,

1994). Therefore, images and animations should focus on concepts for which learners cannot or will not create their own visual representations.

Fourth, animation occupies more bandwidth and computing power than text and images, particularly animation that includes narration or other audio. Poorer nations may not have the infrastructure required to disseminate animation components to a learning ecosystem. Even more fundamental, the computing power of the technology that a developing country has managed to procure (donations, grants, etc) may not be able to store or run the animation in the first place. Consequently, any important concepts conveyed through the animation may be lost.

Fifth, other animation issues are more pedagogical. Novices in a content area may not know how to attend to relevant cues or details provided by the animation (Reiber, 1994). Similarly, cues and details from an animation may not be in harmony with a cultural aesthetic. When something is aesthetically out-of-place or culturally incorrect, it distracts from the educational purpose of the animation or can even be offensive enough to cause an individual to abandon the instruction outright. In either case, learning ceases to occur.

Students may learn better from animation and narration than from animation and text (Mayer, 2001), so cross-cultural language elements need to be considered in developing the narration. Different characteristics of the narration may need to match the cultural aesthetic—male or female voices; the tone of the text; the use of abstract or concrete references and metaphors. If the animation provides feedback, does that feedback match the communication styles of the culture? These questions might need to be addressed by a designer including animation in an educational HCI.

Professor Hartman had been considering these general issues and found that they make some sense, at least in the abstract. She understood that metaphor is important. She saw that making her online instructional materials congruent with the various cultures of her students can be important. And she certainly didn't want to be offensive to anyone! She had been trying to write her materials more carefully, making fewer assumptions about the common cultural backgrounds. She was looking for images and other graphical elements that would convey her meaning more precisely. The question is, how could she put the elements of her course together and use interfaces in ways that work for all her students?

As she thought about the overall approach, Dr. Hartman still needed guidelines to follow to help make very specific decisions. What color schemes would work on her website? Given a choice of icons, which ones would communicate most successfully? How should she set things up so that all students can find what they need? What cognitive implications exist concerning her control over elements onscreen? How would her decisions affect what and how she hopes to teach or the impact it has on her interaction with her students? She finds that because of the recruiting efforts of the admissions staff, she had a large number of Taiwanese nationals registering for her courses, so she had been paying particular attention to issues regarding Taiwanese culture. She knew that she cannot exclude others, however.

Interactivity and Cognition

According to activity theory (Nardi, 1996), cognition is shaped and mediated by the tools and artifacts available to us. How we think and act is partly determined by the tools and symbols we use. In recent times, people from all cultures have been heavily affected by the spread of Western computer technology. A variety of issues arise from that fact, including questions about how people's cognitive styles, communication patterns, and underlying cultures are shaped by Western computer technology. For example, Lin (2000) indicated that over sixty percent of students in Taiwan chat and play computer games rather than seek information related to their learning. Compared to 38% in the United States, only 2% of parents in Taiwan monitor their children's online behaviors and guide them through the online learning process. As Ou (2005a) shows, the introduction of personal computers in Taiwan has contributed to a shift in reading conventions from top-to-bottom to left-to-right. This has occurred even though computer systems have the capability to shift to the top-to-bottom layout congruent with traditional

Chinese reading patterns. What implications do these influences have for how non-Western students learn?

While some may regard the Web and other computer technologies as neutral and free from cultural influences, there is reason to doubt this. According to Chase, Macfadyen, Reader, and Roche (2002), cyberspace itself has a culture and is not a neutral platform for information exchange. People unfamiliar with the rules of this culture might not fit in well and consequently withdraw in confusion and frustration. Poor language proficiency (English is the major language of online communication) can generate misunderstanding and thereby hamper the willingness of non-native English-speaking users to communicate.

Attitudes and beliefs toward online learning may differ among cultures, especially attitudes toward Computer-Mediated Communication (CMC). According to Ou (2005b), the cultural dissonance between the reality of online learning (which is often more demanding than traditional classroom settings) and international students' assumptions causes major challenges. People from non-Western cultures are more likely to have field-dependent cognitive styles due to the learning environment in which they were raised. They may not be used to Western linear thinking, and they may be easily disoriented and lost due to the larger cognitive load imposed by a Western interface. As a result, their performance may be seriously hampered (Chen & Macredie, 2002).

Cultural discrepancies also cause miscommunication and misunderstanding. As McLoughlin and Olver (1999) found, international learners may question the value of participating in online learning and end by feeling disfranchised and frustrated. Online learning then turns into a negative experience, and learners with lower self-efficacy and inadequate English proficiency are more likely to be the "victims" of online learning: dropping courses, no longer actively participating, or avoiding such courses altogether.

Online learning researchers must examine the extent and the ways learners from non-Western cultures are cognitively and psychosocially affected by Western-based computer technology. We should examine how to design culturally adaptive computer interfaces that provide people from different cultures a bias-free and interculturally friendly online environment. Ligorio and Veermans (2004) noted that there is a need to develop culturally sensitive web-based technologies, not only for the sake of learning, but also for practical considerations, such as economic and social factors. Some pedagogical or motivational strategies which may work well in the U.S. are not appropriate in India or Japan ("Cultural Adaptation," 2005).

Reexamining several external structures of Web interface design, such as color, readings, and icons may be a practical beginning for online learning researchers to address the cross-cultural human-interface issue.

Color

Many color combinations carry specific meanings in different cultures. Although people's responses to color may seem universal, the use of color sometimes implies specific ideological stances, attitudes, or biases. Different colors can convey a variety of implicit meanings to various online audiences, so the color issue should be approached cautiously (Shiraev & Levy, 2001).

For instance, black is the color of mourning in Western culture. It may also be regarded as the color of mystery and fashion. In most Eastern cultures black is an ominous color, implying a sudden loss of life due to wars or accidents, or it may refer to black witchcraft. It is considered inappropriate in formal situations. In Western cultures, white symbolizes purity, elegance, and matrimony, but in Eastern cultures, it represents bad luck and implies death and the funeral ceremony. Black, white, or their juxtaposition as in stripes (which is regarded as ominous to the Japanese) should be adopted cautiously for interfaces, especially when targeting audiences from non-Western societies.

Red, pink, and purple are preferred in Asian countries for weddings, but are taboo in some countries such as Iraq, Saudi Arabia, and Iran. Yellow or gold were traditionally viewed as the “Emperor” color in ancient China, and thus is still favored by the Chinese. Red, an aggressive, energetic, and sometimes violent color, carries political implications (e.g. Communism) and should often be avoided for fear of offending people with different political beliefs. Red also affects students from Asian countries because it is associated with instructors’ comments, written boldly in red. Thus, red may be threatening and indicate serious dissatisfaction with their academic performance. Finally, some cultures feminize colors. For instance, yellow, pink, and purple may be offensive to people from certain patriarchal cultures (Shiraev & Levy, p.109).

Readings/Texts/Layouts

International students in the U.S. may find that computer interfaces do not take their needs into consideration. For example, downloaded programs may not be compatible with their original language system. In university libraries or computer labs a specific language encoding system may not work, so that e-mails or websites written in their native language may not be readable. Students from non-English speaking countries are unlikely to find suitable computer hardware such as keyboards with their native language’s characters on them. Westernized fonts may also not be suitable for other languages, such as Chinese or Arabic. As a result, international students may not be able to get local help, and getting overseas assistance can be time-consuming and expensive. In the worst-case scenario, international students may be deterred from taking online courses.

Even the humble checkbox may present problems. In the U.S., the check mark is popular, but it can be confusing and wrongly interpreted as “crossing out” an item by users from some non-Western cultures. Other check marks might be more neutral and hence cross-culturally appropriate in designing surveys or questionnaires.

Most Web design tools (such as Microsoft FrontPage® or Macromedia Dreamweaver®) are Western-oriented, and website design all over the world is now being channeled into limited choices. Although the Web should allow almost unlimited creativity, website design is ironically confined by current software tools. For instance, traditionally Chinese characters are read and written in a top-down and right-to-left manner. However, due the influence of Western technology, the current Chinese writing layout has been transformed into the Western left-to-right and top-to-bottom layout. The traditional Chinese layout is disappearing even on purely Chinese sites. Ou (2005a) has shown that different layouts (top-down versus left-to-right) affect Taiwanese high school students’ reading of Chinese, including reading speed and comprehension scores. While taking quizzes in the Western left-to-right layout, high school students in Taiwan who have been taught to read Chinese Classics in paper-based textbooks (with the top-down manner) perform significantly worse than those who are not going through this training process.

Non-verbal communication, such as colors, sounds, icons, animation gestures and images, carry culturally specific and implicit messages which may be meaningful to people from a certain culture but confusing to another. If interface designers equipped themselves with cultural knowledge related to different usage, they would be more likely to design a culturally sensitive website and interface that adapts to its audience. This might enhance intercultural communications and make the human-computer interaction proceed more accurately and smoothly (McLoughlin & Olver, 1999).

Online Communication

Online education is enhanced by online communication. Done well, online learning can result in more student-to-faculty and student-to-student communication than usually takes place in face-to-face classes, as well as more active learning, which tends to be more effective. For example, an online course can provide improved opportunities for students to ask questions of the instructor and one another, work on collaborative projects together, and actually perform the intellectual work that they are supposed to be learning to do. However, cultural differences can hinder free-flowing interactions. Although the United

States in general has a culture that allows and encourages students to challenge one another and even to dispute issues with an instructor, other populations may be more diffident and respect positions of authority more strictly, thus making the online communication experiences different. So the question becomes, how can we optimize online communications for various cultures?

The interface of different communication programs is one such place. The primary distinction made in CMC is between synchronous and asynchronous communication. Synchronous CMC refers to communications that take place in “real time” or close to it, such as telephone calls, instant messaging, chats, or audio and video conferencing. There are many systems and programs available to support such communications over the Internet. Currently these may include

- Voice over Internet Protocol (VOIP) such as Skype;
- Instant messaging or chat programs such as AOL Instant Messenger, MSN Messenger, or Netmeeting;
- Audio conferencing such as I-Link and Eluminate;
- IP-based video conferencing such as Polycom and iChat; and
- Systems that may combine these capabilities, such as I-link and Elluminate.

As different as these systems may be, they are all aimed at productive synchronous communication through computers and networks. The goal of the interface designers is generally to remove as many barriers as possible between users and communications. Often the expressed aim is to make learning using these systems as similar as possible to a face-to-face classroom, but the success of that endeavor might depend on the different cultures of the students.

Asynchronous CMC refers to communications which take place over time, with individuals making contributions (and reading others' contributions) on their own schedules, without regard to whether other participants are online at that moment. On the Internet email, discussion boards, and more recently blogs and wikis, are the most common forms of asynchronous CMC. Other technologies, such as audio- and video-based technologies are being added to the list frequently as the Internet evolves. As for interface issues, a variety of “netiquette” suggestions have been promulgated, the way that your email client works may be customizable, and there are at least two major ways to implement an online discussion board.

Second, when looking at cross-cultural issues in CMC, another fundamental distinction is likely to be important. Although most CMC for the past decade or two has been text-based, the current trend is toward audio and video. How does this distinction affect how people work and learn together? Asynchronous CMC groups may have wider participation than face-to-face classes. This has been a positive result of text-based CMC and especially of asynchronous discussions. With all the emphasis in some software systems on synchronous communications and “duplicating the classroom” online, we may actually lose such advantages. Students from cultures that do not encourage confronting ideas may be more likely to learn to do that in the safer asynchronous environment than in synchronous communications using audio and video. It will be interesting to see how the recent rise of asynchronous audio and video tools changes this, if at all.

One interface issue that has yet to be explored well concerns the differences among some CMC systems. Chat rooms can be purely textual, but they can also be either two-dimensional graphical representations of an environment (e.g. The Palace) or three-dimensional virtual reality presentations (e.g. ActiveWorlds, Second Life). Asynchronous discussion boards can be organized hierarchically (with replies to a posting at any level shown indented), chronologically (with postings within a topic shown in the order in which they are made, with few indications of which ones reply to which other ones), or as a network (with postings linked to as many others as applicable). Although asynchronous communications have been primarily textual up to now, that is changing, with the advent of podcasting, video blogs, and other technologies.

Intercultural Communication Issues

In using online communications within a culturally diverse course, it is important to attend to more than just the technology. How it is used in the in communicating between teachers and students and among students is probably even more important. According to Samovar & Porter (1982), intercultural communication occurs as messages produced in one culture are conveyed to and perceived by the other culture. One of the greatest advantages current information technology advances provide is to enhance our opportunities for cross-cultural communication and interaction. UNESCO (2005) has indicated that one important goal of education should be to develop intercultural communication competence. Yet, people from different cultures still misinterpret and misunderstand each other.

As we encounter people from other cultures we may inaccurately interpret their behaviors, values, and beliefs, due to our lack of knowledge, previous experiences, or biased sources. These beliefs are “cultural frameworks” or stereotypes (Brislin, Cushner, Cherrie, & Young, 1982). Our cultural framework reflects our cognitive reductionism as we attempt to understand what we see; by doing that, we may categorize and over-simplify the essence of other cultures and implicitly or explicitly impose our beliefs and values on them. As a result, intercultural miscommunications occur; these unresolved intercultural misunderstandings may accumulate and feed our incorrect cultural frameworks.

To break this vicious cycle, we must cultivate intercultural awareness to enhance people’s intercultural communication competence. We have to be aware that the cultural universe is the dynamic summation of the language, history, customs, values, belief systems, and religion of people from other cultures. When we do, we are more capable of interpreting their behaviors and thoughts accurately. We should try to interpret people’s thinking processes and behaviors by referring to their own culture rather than ours. Furthermore, we should learn to appreciate cultural diversity. A Chinese Sage, Lao-Tzu, may best reflect this philosophy in his work: *Tao Te Ching*. He wrote: “The reason why rivers and seas can be lords of the hundred valleys, is that they lower themselves and gather all sources without discriminating; therefore they can be lords” (Cleary, 1994, p. 40)

How can a culturally adaptive interface design help break down intercultural communication obstacles and enhance our intercultural awareness and communication competence? Two dimensions are important: language and pedagogical issues on one hand and cultural issues on the other.

Language and Pedagogical Issues

Native English-speaking instructors may never know how much time and effort English as a Second Language/English as a Foreign Language (ESL/EFL) students must invest in mastering both subject matter and language issues in online courses. To these students, there are no casual writings or conversations. Each email, discussion posting, blog entry, or instant message is an exercise in applying their cognitive resources to express themselves competently.

How effectively and efficiently we use language to receive information, communicate, and interact to attain our goals is probably the most important thing influencing how effective we are in intercultural interactions (Ou, 2005b). Those who must use a non-native language, usually English, must work especially hard at this. For example, one of the major concerns among international students studying in the U.S. is using English to communicate with instructors and peers, because it may determine how they function as a competent learner.

There are ways of alleviating the struggle of international students. Online instructors and peers can provide instant and productive feedback with understanding and considerate tones. This can boost ESL/EFL students’ self-efficacy toward online learning, which is an important predictor of online learners’ performance and success (Joo, Bong & Choi, 2000). According to Cushner, Ou, Lin, & Chen (2004), as international students’ psychological readiness has increased, English proficiency and intercultural

competence has improved as well. Students often need the willingness to practice extrovert-oriented coping mechanisms to deal with intercultural challenges.

Ware (2004) has suggested that ESL/EFL learners prefer online asynchronous CMC discussions over synchronous ones. In the asynchronous environment, students have more time to digest and reflect on what they have learned and greater opportunity to correct their English (including grammar, spelling, and sentence structure). Therefore, even in courses which stress synchronous learning through text, audio, and video we should not neglect asynchronous discussion boards as a fruitful way of encouraging and enabling productive discussions. Often, students should be given choices.

In addition, English language assistance should be embedded within the interface design. Spell check, grammar and sentence structure suggestions, and a dictionary or thesaurus are all beneficial to ESL/EFL students. Instructors should encourage their use for all kinds of writing, including discussion postings, emails, and other asynchronous communications. Similarly, ESL/EFL students who lack typing skills may have difficulty in online communications, so we may need other ways for students to input their ideas. Alternatives for both displaying and inputting information might include a variety of non-verbal communications, including emoticons, avatars, images, and animations. These must be used carefully as well, of course, taking into account their cultural meanings. Sometimes, however, they can communicate in ways that words cannot, in the same way that young children can respond to questionnaires by marking happy or sad faces rather than reading.

Online collaborative learning using problem-solving projects is an appropriate pedagogy for international students. During the online collaborative process, if properly guided by competent instructors, non-native-English speaking learners can perform as well as native speakers with language assistance provided by others in the group. When English speakers help out in this way, it may increase their understanding of, and sensitivity to, the cultural differences. As non-native English speaking learners are exposed to an authentic learning environment full of various cultural, communicative, linguistic, and cognitive dissonances, they are forced to assimilate and accommodate their meta-linguistic schema to reach psychological and linguistic equilibrium. As a result, according to Greenfield (2003), improvement in target language proficiency and learners' meta-linguistic awareness (how to express what, when, and for what reason), accompanied by the gradual maturation and development of intercultural competence and self-efficacy, can be rapidly promoted and enhanced in a short period (O'Malley & Chamot, 1990).

As an online collaborative problem solving project progresses, the relevant information and tools should be available in different languages, if possible. For example, in a psychology-related problem solving project, supporting websites and data analysis software programs written in participants' native languages should be available and easily accessed whenever learners need them. In addition, in a culturally adaptive interface, learners should be able to access relevant political, geographic, or cultural knowledge of their partners from different cultural backgrounds online. If American learners work with Turkish partners online, for example, a brief introduction to the country (e.g. demographic features, population, language, etc) should be accessible.

Cultural Issues

Besides the language issue, some well-established cross-cultural psychology research, such as Hofstede's (1983) cultural dimension index, or cognitive styles research (Morgan, 1997) can provide useful ways to interpret intercultural communications online. How might Hofstede's dimensions affect communication across cultures? How might this communication be reflected in HCI, in the *culture-machine* system?

According to Hofstede's model, one dimension is *individualism* (versus *communitarianism*). Individualists regard themselves as "individuals" first rather than as members of a community; they value personal responsibility and self-fulfillment, attributing their success or failure in reaching their goals primarily to their cognitive capability. In contrast, communitarians are encouraged to regard themselves as part of the

community. They appreciate group efforts and achievements, and they are willing to compromise their needs by placing the groups' needs first.

The next dimension is *uncertainty avoidance*. Cultures with high uncertainty avoidance try to avoid ambiguous situations and tend to regard ambiguity as an unpleasant experience. People in these cultures tend to adopt introvert-oriented or even escape-oriented coping strategies to deal with ambiguities. Teachers and authorities are highly respected because they are supposed to be the knowledge keepers and providers. Learners in low uncertainty avoidance cultures are encouraged to challenge and constantly revise knowledge by discussing, debating, and commenting on open-ended questions.

The other dimensions in Hofstede's view are Power Distance, Masculinity, and Long-term Orientation. Cognitive style may also play a role. The field dependent (FD) versus field independent (FI) distinction in cognitive styles is also useful in interpreting intercultural communication patterns. FD learners prefer to follow outlines or be provided with an overview of the learning materials first. They learn more effectively if the connection between part and whole is represented to them explicitly. FI learners are self-regulated thinkers. They are more comfortable with discovering and constructing their own rules and interpretations of knowledge. They learn best using inquiry methods, such as logical thinking and hypothesis testing, to reach the answer by themselves (Witkin, Moore, Goodenough, & Cox, 1977).

Many cross-cultural psychologists and online learning researchers have indicated that FI learners perform better in online learning environments which can be confusing at times and filled with information (Ellis, Ford, & Wood, 1993; Kim, 2001). Online learners need self-regulated strategies and meta-cognitive strengths to monitor their own learning pace and examine learning materials constantly. They also need to discover answers and discover patterns on their own. These cognitive tasks present tremendous cognitive loads on FD learners, and FD learners tend to feel overwhelmed and lost in online learning environments. If properly assisted by online learning instructors and peers, and supported by the HCI design FD learners can perform as well as FI learners (Kim, 2001). For example, we can provide a framework of the content in advance and build in opportunities for instant and corrective feedback.

Designing a Culturally Adaptive Interface to Enhance Online Communications

American culture tends to be individualistic, specific, achievement-oriented, and high uncertainty-avoidance oriented with an emphasis on FI cognitive styles. How can online instructors use these dimensions and cognitive style theories to increase our intercultural awareness and help our students from different cultures learn? What interfaces might better enhance the communications competence of all our learners?

Showing modesty and keeping harmony among group members is regarded as virtuous in most non-Western cultures. International students in the group may express humble statements such as, "forgive my poor English" or "I have lot to learn from you," even if they have reached a high level of English proficiency and are doing well in the course. Even when they know the answer to a question, they may be reluctant to provide it in public (such as on a discussion board) for fear of showing off. Instead, they may send private e-mails to the instructor to discuss details. These behaviors should not be interpreted as "insincere" or "pretending;" instead, they are ways to show the virtue of modesty.

Compared to their American peers, international students may emphasize "off-task" behaviors, such as establishing interpersonal relationships. If they cannot do this, they may suffer. In online learning, they may prefer to start postings with greetings or by sharing personal information or emotions to strengthen the kinship with classmates. They may expect the same in return and be puzzled or upset when they do not receive it.

For several non-Western cultures, authority figures, professionals, and teachers are highly respected. It is appropriate for online instructors occasionally to guide and instruct international students using a more teacher-centered manner, providing instant and clear feedback, clear-cut solutions, and "what-to-do-next"

directions. Knowledge delivered and verified from authorities rather than peers generally enjoys more credibility and attention from international students.

In the online asynchronous learning environment people from diverse cultures tend to experience harsh comments toward their opinions and postings on discussion boards as threats, warnings, or attacks on their personalities. If they are “attacked” on the discussion boards, they are more likely to take these attacks very seriously because the separation of one’s opinions (what you say) and personality (who you are) is not encouraged in other cultures. American students, in contrast, are more likely to make that distinction.

Finally, providing guidelines or detailed instructions for activities and communications in a course in addition to the learning materials is highly appreciated by FD learners. Here, we suggest these practices to help meet the language, cognitive style, and cultural needs of students from other cultures.

Language Practices

- Encourage non-verbal communications, such as concept mapping, colors, sounds, and images, to provide contextual cues for online discussions.
- Encourage posts that are short and concise and that use simple words.
- Encourage writing and knowledge building based on the context students are familiar with: prior knowledge, experiences and cultural backgrounds.
- Provide language-learning support (e.g. peer volunteers in the online class to explain language idioms and references).

Cognitive and Communication Styles

- Provide a face-to-face orientation class that focuses on the technology and curriculum. Clarify the syllabus and explain the purpose of online learning. If this is not possible, then provide clear online instructions for using the technology and succeeding in the course.
- Teach students how to take other perspectives, argue, and critique. Encourage them to be masters of their learning, explore new territory, and participate in collaborative learning and problem-solving tasks with their peers. Explain that these values are respected in the host country. They may not agree, but it is another education paradigm that they should explore.
- Understand that international students may respect the status quo, authority figures, and professionals. They may believe that professionals should lead them throughout the class instead of leaving them to fend for themselves.
- As online instructor, use your influence on international students well. An open-minded, caring, listening, but decisive leader fits in their cultural image of the role of a teacher.
- Provide instant and concrete feedback. Explain why you might be delayed in responding to questions. If students ask for help, the problem may have become urgent - they might not approach you unless they really needed to talk.
- If you can, provide steady and constant technology support to international students. Do not assume they have mastered even basic computer skills before entering your class.
- Be aware of sensitive financial, political, and multicultural power issues in an online class with

international students. There may be inter-cultural conflicts between your culture and your students (or between several cultures in your student population) that will affect communication and learning.

Coping and Acculturation Strategies

- Encourage students to seek help and pursue available resources.
- Teach students to interact rather than to withdraw, to be open-minded, and not to hold a sojourners' attitude toward online learning.
- Enhance students' self-efficacy for online learning and CMC technology by orienting and preparing them as thoroughly as possible.
- Teach students to be tolerant of the ambiguity and frustration occurring in online learning and to see them as learning moments in which they can exercise their introspective-reflective skills.
- Understand that self-disclosure may be difficult for students from cultures that nurture introversion. Have them record their thoughts in spaces they may find more comfortable, such as online blogs or even private journals.

Designing the Culturally Adaptive Interface

A culturally adaptive interface should provide technological functions which can maintain a learners' privacy (e.g. a student could choose to allow a posting to be viewed only by the instructors) if possible. Technological functions which support off-task, non-verbal, and relationship-building communications are necessary. In an asynchronous communication environment, learners should be able to choose appropriate emoticons, avatars, color schemes, or templates to express their implicit meanings and covert emotions. A good interface should meet the needs of learners with differing cognitive styles. For difficult or unfamiliar topics, there should always be clear links to basic explanatory information.

So what is Professor Hartman to do? Through her research in multicultural HCI, she is better able to respond to the culturally diverse student demographics, but her teaching has become more complicated. She can no longer create a course assuming that all of her students come from a relatively homogeneous culture, or even a handful of subcultures within it. She must now find ways to reach students from a larger variety of cultural backgrounds.

One place to start is the HCI, to the extent that she has control over it. Her CMS is customizable, so she can look at several things she might change:

- *Does the color scheme avoid colors and combinations that might be offensive or misleading to students? Does it convey a positive message to those who take the course? She knows that next semester she will have mostly American and Taiwanese students, so she can find color combinations that work for both. In a class with more cultures represented, this may become very difficult. How can we find acceptable color schemes without making our sites too bland?*
- *Are the icons understandable to people from other cultures? Can she replace questionable ones with more informative pictures? She has gone out onto the Web and found sites with free icons. Before putting them into her course website, she now makes a practice of trying them out with a few members from each culture to be sure that they can all recognize their function.*
- *Does she use other pictures wisely? Dr. Hartman is now careful to choose and place pictures with a view toward supporting the learning of all her students. She concentrates on images that contribute to the material, saving the ones that are merely cute (and that may be misinterpreted by some) for other venues.*
- *Does Dr. Hartman place elements of the course on the screen in a way that encourages everyone to use them in the order in which she intended? Can she use other elements to guide people through the course? Can she take into account the fact that people from other cultures may not think as linearly as she might? She is careful to make distinctions in her course materials between units that need to be done in a specific order and those that can be looser in organization. For the first, she uses the built-in tools of the CMS to walk students*

- through the materials. For the others, she has learned to set up more circular interfaces to stress learner control.
- In online communication, does she use elements of the interface as well as her own online behaviors to enable everyone to communicate successfully? Throughout the course she ensures that tools such as spell check and a thesaurus are available. She makes her expectations about the netiquette of the course clear and provides multiple interfaces for student communication.

As evident from the above, Dr. Hartman now addresses many of the specific onscreen issues and is aware of how different cultures approach the HCI. She also realizes that each course has its own subject matter that affects how people approach the HCI. She knows she must also prepare for cultural issues that arise from course-specific content and continue to find ways for students to communicate effectively despite language, skill, or cultural problems. She must use the available resources and interfaces to support students in finding information, interacting with one another, and communicating successfully in all directions. She recognizes that the instructional system must be geared toward all students, and that this includes the interface, her actions within it, and the reactions of students to it.

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