

Designing the Total User Experience: Implications for Research and Program Development

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Abstract

Information design has traditionally focused upon usability as measured by functionality and efficiency in the execution of user tasks. Newer approaches to experience design and new communication technologies such as the so-called Web 2.0 platform and its Ajax engine emphasize total user engagement with the technology and richer collaborations between users and other users. These developments complicate traditional notions of agency by highlighting the role of technology as mediator between and among users. A project in Tech-Mediated Communication at Rensselaer Polytechnic Institute, funded by the Society for Technical Communication, illustrates how these developments impact the development of novel and creative information resources, with several experiments in cross-cultural, community-oriented, and educational systems design. This research also emphasizes the need to develop research agendas and programmatic initiatives that support interdisciplinary collaborative design activities and thus help technical communicators to meet their collective responsibility to influence and shape the mediating technologies of the future by creating more engaging and more collaborative total user experiences.

Key Words

Agency, Ajax, Experience Design, Information Design, Interdisciplinary Collaboration, Tech-Mediated Communication, Technical Communication, Usability, User Engagement, Web 2.0

Biographical Sketch

James P. Zappen and Cheryl Geisler are Professors and Cheryl is Department Head in the Department of Language, Literature, and Communication at Rensselaer Polytechnic Institute. Jim is author of *The Rebirth of Dialogue* (SUNY Press, 2004), and Cheryl is author of *Analyzing Steams of Language* (Pearson/Longman, 2003) and *Academic Literacy and the Nature of Expertise* (Erlbaum, 1994).

Designing the Total User Experience: Implications for Research and Program Development

Changes in digital communication technologies continue to impact technical-communication research, pedagogy, and program development as the processes of storing, retrieving, manipulating, and communicating electronically become increasingly more complex and more powerful (Gurak & Duin, 2004; Lanham, 2006; Manovich, 2001; Warnick, 2005, 2007). Manovich (2001) describes some of the basic features of new digital media, beginning with numerical representation, the fundamental building block that distinguishes new media from old and that permits and enables their modular structure, their susceptibility to automation, their ability to morph into potentially infinite versions of themselves, and their ability to “transcode,” that is, to effect transfers from computer code to the culture at large (27-48). These features, Warnick (2005) observes, challenge traditional ways of thinking about communication as centered in a single text and created by a single author for a mass audience. Instead, she argues, we need to think of digital texts as distributed and destabilized, digital authors as dispersed and at times unidentified and unknown to us, and their audiences as diffuse and disaggregated (329-332). Furthermore, these features have far-reaching implications for research and program development in technical communication. Gurak and Duin (2004) observe that digital communication technologies provide more open access to technical documents and as a result heighten expectations for educational services in both industry and academe, increase opportunities for research and community building, reemphasize the importance of accountability and assessment, and underscore the need for partnerships between academe, industry, and government.

In recognition of these cascading changes, in 2006, the Society for Technical Communication (STC) awarded its largest research grant ever to support the Tech-Mediated Communication (TMC) project at Rensselaer Polytechnic Institute.¹ The TMC project was a collaborative effort of a cadre of Rensselaer faculty aimed at exploring the implications of introducing the new communication technologies into the traditional technical-communication

mix. The project took as its starting point recent developments in information design that have been further complicating and enriching already complex communication processes. We note, in particular, the transition from traditional usability principles to the newer concept of experience design, with its increased emphasis upon the quality of the total user experience (Bolter & Gromala, 2003; Jordan, 2000; McCarthy & Wright, 2004; Norman, 2004; Shedroff, 2001). We note also recent changes in communication technology, in particular the new World Wide Web platform, sometimes called Web 2.0, and its underlying technologies, sometimes collectively called Ajax (Asynchronous JavaScript + XML), which support more dynamic user-to-user and system-to-user interactions and thus enable and encourage more engaging user experiences (Anderson, 2004, 2006; Garrett, 2005; O'Reilly, 2005; Tapscott & Williams, 2006). These developments, though perhaps paradigmatic, are merely illustrative of the fundamental shift in information design from the efficient delivery of information to users to more immersive user experiences, both with the technologies that deliver the information and with other users, who now actively participate in information exchanges as both producers and consumers. Collectively, these developments complicate traditional notions of agency by reemphasizing the role of technology as mediator in communication processes. At the same time, they offer new opportunities to shape communication technologies to meet human wants and needs, including the need for richer and more informative total user experiences.

The TMC project encompassed several experiments in the design of novel information resources for the purpose of illustrating the capabilities and potentials of the new information design principles and technologies. Each of these experiments illustrates these capabilities in varying degrees, and one of them, in particular, a youth-services information system for local government, draws directly upon both the principles of experience design and the new Web 2.0 platform. These experiments suggest how new developments in information design can impact both research and program development in technical communication. To support these experiments, we developed a variety of new program structures and faculty competencies that

challenged many of our usual ways of conducting business in our research and in our classrooms. In order to make these experiments work, we needed to break out of the temporal, spatial, and social boundaries usually associated with our program. These *breakouts*, we realized, echoed many of the developments that we were observing in the on-line communities that we were studying and designing.

In this paper, we begin with some of the concepts driving the recent changes in communication technologies: the role of technology as mediator in communication processes, the concept of experience design, and the new Web 2.0 platform and Ajax technologies. We then turn to the TMC project and offer a brief overview, an example from the youth-services information system, and a broader discussion of how the TMC project challenged us to break out of our usual programmatic structures. We conclude with some suggestions for research and program development in technical communication more generally.

The Problem of Agency: The Role of Technology as Mediator in Human Communication

The concept of agency has recently received considerable attention and has evoked some controversy (Geisler, 2004, 2005; Lundberg & Gunn, 2005; Miller, 2007; Orlikowski, 2000). We will not attempt to resolve all of the issues surrounding this complex and elusive concept. We hold, however, to a belief in an active human agent, however complex (even fragmented) in itself and however much embedded within a complex of social relationships, as fundamental to an understanding of communication processes, and we would like to explore the role of technology as mediator in these processes. Our underlying premise is that recent changes in information-design concepts and technologies make more visible, more pronounced, and more complex the mediating role of computing technology and underscore the need for research and programmatic developments responsive to these changes.² Geisler (2004) situates communication technologies at a nexus between speaker or writer, audience, and the larger culture (11). What kind of agency, she asks, is being exercised when a speaker or writer uses a

technology, for example, a to-do list on a personal digital assistant, to complete a task? Here writer and audience “appear to occupy a subject position strategically fragmented in order to get work done,” a position at the intersection of “the culture of systematic management,” “the affordances of literate technologies,” and the writer’s “strategic choice” (11).

Citing a variety of examples—from computer programs that simulate humans to (imaginary) automated services for writing assessment—Miller (2001, 2007) observes our fundamental discomfort with automated systems that seek to displace or to replace humans. We seem, she writes (2007), to have a fundamental human impulse “to deny agency to machines . . . especially if the machines threaten to substitute for our own agency” (152). Nonetheless, she also offers a useful framework for thinking about the mediating role of technology in human communication. Traditional rhetoric, she observes, situates agency at a point of origin in the performing subject (145-146). Instead, she argues, agency is not so much “a property or possession of the hypostatized agent” as it is “the kinetic energy of performance,” emergent in rhetorical action at a point of “performativity,” “addressivity,” and “interactivity” (145-152).³ We view technology in its role as mediator in communication processes not as a substitute for our own agency (though it sometimes seems to play that role also) but as a component at the nexus of this kinetic energy of performance, increasingly so as it becomes less a transparent vehicle for accessing information and more a dimension of human experience, both with the technology itself and with other users.

Performance Design/Experience Design: From System Efficiency to User Engagement

Information design is currently experiencing a transformation from its traditional emphasis upon system performance and the user satisfaction that results from system functionality and efficiency to a greater emphasis upon the quality of the user’s engagement with the system. These emphases are not, of course, mutually exclusive since system performance is necessarily a significant factor affecting user engagement and satisfaction.

Performance as Functionality/Efficiency

Traditional views of information design emphasize the performance of the technology as measured by the functionality and efficiency of the human-system interaction and thus the simplicity and transparency of the technology that mediates the interaction (Brinck, Gergle, & Wood, 2002; Nielsen, 1993, 2000). Nielsen's (1993) basic and longstanding principles of system performance are applicable to technology in general but translate readily to digital communication technologies in particular, including the Web. According to these principles, a system should be functional and efficient; that is, the system should be easy to learn, efficient to use, easy to remember, should have a low error rate, and, as a result, should also be pleasant and satisfying to use (26-37). Brinck, Gergle, and Wood (2002) offer nearly identical principles as a basis for studies of Web usability specifically. By these principles, a system should be functionally correct (that is, it should meet users' needs), efficient to use, easy to learn, easy to remember, error tolerant, and subjectively pleasing (2-3). In a Web environment, these principles translate as specific guidelines for system performance, including content and scope (functionality), speed (download time), navigation (clarity and effectiveness), appropriateness to task, visual design (functionality and attractiveness), compatibility (with a variety of users and systems), simplicity, consistency, effective error handling, and respect for the user (411-415). Adherence to these principles helps to ensure that users can perform specified tasks with a minimum of difficulty and interference from the system, which, at its best, becomes invisible or transparent to the user.

Performance via Simplicity/Transparency

Transparency, in fact, as an underlying goal in information design, is both admired by its proponents and scorned by advocates of the newer concept of experience design (Bolter & Gromala, 2003; Nielsen, 2000). Nielsen (2000) advocates simplicity and transparency as overarching goals in system development. In the Web environment, on the simplicity principle, every design element is potentially expendable: "If the design works as well without a certain

design element, kill it. Simplicity always wins over complexity, especially on the Web where every five bytes saved is a millisecond less download time” (22). On the transparency principle, content is primary, and everything else is, at best, a necessary guide to content and, at worst, mere window dressing. On the Web, “Content is number one” (100). Everything else is like mere costuming in a theatrical performance: “Of course, good costume design contributes greatly to making the performance enjoyable and to bringing the author’s and director’s visions to the stage. But in the end, the play is the important thing” (100).

In contrast, proponents of experience design deplore the overemphasis upon transparency as an ideal in information design. Bolter and Gromala (2003) maintain that the window was deliberately selected as a metaphor for the computer screen because “the word *window* helps us to forget the interface and concentrate on the text or data inside” (42). In this metaphorical representation, the user seeks data “in the machine,’ just beyond the window,” and “the designer’s task is to make the interface transparent to the data” (42). The “myth of transparency” has a long history and many names: “In the history of writing and rhetoric, transparency was explained by the terms *simplicity* and *clarity*. In the history of painting, the ideal for many painters was to be ‘true to nature’” (48, 50). In the relatively short history of computing, “the windowed interface has defined the way we interact with computers for nearly twenty years” (48). Nonetheless, experience designers seek to replace or to augment the traditional emphasis upon transparency with a new emphasis upon the quality of the total user experience.

Experience as User Engagement

This new emphasis upon the quality of the user experience highlights the user’s engagement with the technology and thus reminds us that the technology is not just a transparent medium but a dimension of the user’s experience and, potentially at least, a mediator between users and other users (Bolter & Gromala, 2003; Jordan, 2000; McCarthy & Wright, 2004; Norman, 2004; Shedroff, 2001). Shedroff (2001) describes our experience with

computing technology holistically as a rounded activity that includes an initial attraction, an engagement that is both unique and relevant to us, and a conclusion that provides some kind of resolution or closure (4). Bolter and Gromala (2003) offer as an alternative to the transparent window the metaphor of the reflective mirror, which invites designers to offer a “compelling experience” rather than mere “information delivery” and invites users to look “at” rather than “through” the interface (67). From this perspective, the designer’s role is not to make the interface disappear but to make it a part of the user’s experience: “Today, we do not operate computers; rather, we interact with them, and successful digital artifacts are designed to be experienced, not simply used” (22). These digital artifacts include even the most business-like applications: “Every application must be an experience” (22).

This emphasis upon the quality of the user experience embraces rather than precludes or diminishes the traditional emphasis upon system performance conceived as functionality and efficiency in the execution of specified tasks. Jordan (2000) deplores the overemphasis within the human-factors community upon “the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments,” especially where “satisfaction” is narrowly defined as “the avoidance of physical or cognitive discomfort” (7). He insists upon a broader, more holistic understanding that extends beyond mere “task completion” to “the wider role that products play in people’s lives”: “products are not merely tools: they can be seen as *living objects* with which *people* have *relationships*” (6-8). But this holistic understanding complements rather than replaces the traditional view: “After all, what is the point of providing a user with a beautiful product with a vast array of functions if the design of the product makes it difficult to use to its full advantage?” (6). Reemphasizing both the functional and the experiential, McCarthy and Wright (2004) cite IBM’s twofold commitment to its users: “User Experience Design fully encompasses traditional Human-Computer Interaction (HCI) design and extends it by addressing all aspects of a product or service as perceived by users” (10). Norman’s (2004) concept of emotional design elegantly synthesizes these two

aspects of design, the functional and the experiential, and adds a third, the reflective aspect: the visceral is concerned with appearances, the behavioral with “the pleasure and effectiveness of use,” the reflective with “reflective thought,” including “self-image, personal satisfaction, memories” (5-6, 22, 39).

Experience as Collaboration

If experience design heightens our awareness of the mediating technology as a dimension of human experience, does it also address the role of technology as mediator between users and other users? Bolter and Gromala (2003) provide a hint of the potential of digital communication technologies to mediate our collaborations with others. Among many illustrations of experience design drawn from the SIGGRAPH 2000 Gallery, they describe a novel (and somewhat unsettling) experiment called Terminal Time that permits visitors/participants to view historical narratives responsive to their own ideologies, as indicated by their applause in response to leading and even loaded questions. While the narratives, they confess, are not entirely serious, they invite visitors/participants to think about how their reading of history is constrained by their cultural identities and “to see history being rewritten—for us or against us” (134). We need not stretch our imaginations too far to be able to contemplate the possibility of political or advertising campaigns being conducted in this fashion, a very limited (and limiting) kind of collaboration that Warnick (2007) describes as “campaign-to-user” rather than direct “user-to-user” collaboration (75-76). We can see, however, the potential for more direct collaborations via recent developments in Web technology.

The New Web and the Promise of Collaboration

The new so-called Web 2.0 platform and its underlying Ajax technologies have potential to extend and enrich users’ experience with the technology and also to promote collaborations between and among users (Anderson, 2004, 2006; Babin, 2007; Garrett, 2005; Negrino & Smith, 2007; O’Reilly, 2005; Tapscott & Williams, 2006). The Web 2.0 platform is frequently

touted as an economic model for the next generation and is both heralded and criticized as a model for social interaction (Anderson, 2004, 2006; Keen, 2007; O'Reilly, 2005; Tapscott & Williams, 2006). We believe, however, that it offers potential to promote collaborative activity in the interest of both individual users and their larger social communities and that we have a collective responsibility as technical-communication program administrators and faculty to design programs and curricula that help to shape the technology toward these ends.

The Economic Model

As an economic model, the new Web is based upon a fundamental principle of collaboration directed toward new and enriched services for users. O'Reilly (2005) calls this new phenomenon "Web 2.0" and explains it as a "platform" rather than a technology, with power to "harness collective intelligence" through "hyperlinking," "collective activity," and enhanced "user engagement" (1-2). As illustrations, he cites well-known success stories such as Yahoo!'s "catalog, or directory of links, an aggregation of the best work of thousands, then millions of web users"; Google's PageRank, "a method of using the link structure of the web rather than just the characteristics of documents to provide better search results"; eBay's ability to harness "the collective activity of all its users"; and Amazon's "science of user engagement," which offers, on the one hand, countless opportunities for user participation and, on the other, creative methods of harnessing this user activity to produce improved search results (2). The power of the new Web derives in part from its underlying Ajax engine, which Garrett (2005) explains as an aggregation of technologies, hence its name, Ajax, or "Asynchronous JavaScript + XML."⁴ By this account, the basic building block of the Ajax engine is the HTTP request function, which performs actions asynchronously with the user's interactions with the system. The Ajax engine thus permits more dynamic computer-user interactions, such as enabling users to load new information onto a web page without reloading the page.

The new Web also permits and enables more dynamic interactions between users and other users—the cornerstone of the new economic model of collaboration (Anderson, 2004, 2006; O'Reilly, 2005; Tapscott & Williams, 2006). Anderson (2006) calls this new economic model “the Long Tail”—the virtually endless chain of supply and demand enabled by the virtually endless reach of the Internet and the World Wide Web: “Just as Google is finding ways to tap the Long Tail of advertising, Microsoft is extending the Tail of video games into small and cheap games that you can download on its Xbox Live network. Open-source software projects such as Linux and Firefox are the Long Tail of programming talent, while offshoring taps the Long Tail of labor” (22, 50). Fueling the development of this long tail are three basic marketplace forces: democratizing the tools of production, democratizing distribution, and connecting supply and demand (53-57). Thus, just as the Personal Computer has made everyone a producer, so the Internet has made everyone a distributor, and the new Web technologies connect supply and demand through more powerful “wisdom-of-crowds” search capabilities and user-to-user interactions in the form of product recommendations and reviews (55). Collectively, these marketplace forces constitute an “architecture of participation,” in which “a once-monolithic industry structure where professionals *produced* and amateurs *consumed* is now a two-way marketplace, where anyone can be in any camp at any time” (83-84). Tapscott and Williams (2006) call this new economic model “wikinomics” and emphasize its fundamentally collaborative character: “Call them the ‘weapons of mass collaboration.’ New low-cost collaborative infrastructures—from free Internet telephony to open source software to global outsourcing platforms—allow thousands upon thousands of individuals and small producers to cocreate products, access markets, and delight customers”—“to collaborate, create value, and compete” (10-11).

The Social Model

These more dynamic interactions extend, however, well beyond the economic realm to encompass virtually every aspect of our social life. Tapscott and Williams (2006) welcome us to

the new Web and “the new world of wikinomics where collaboration on a mass scale is set to change every institution in society” (10). This new Web, Web 2.0, the living Web, they argue, is fundamentally social and communal: “Call it what you like—the sentiment is the same. We’re all participating in the rise of a global, ubiquitous platform for computation and collaboration that is reshaping nearly every aspect of human affairs. While the old Web was about Web sites, clicks, and ‘eyeballs,’ the new Web is about . . . communities, participation, and peering” (19).

Not everyone, however, is so optimistic about the potential for collaboration and community building offered by this new technology. Tapscott and Williams (2006) claim that “the blogging phenomenon” is indicative of the profound changes in our social life and call it “the biggest coffeehouse on earth,” “a running conversation” in which everyone can participate (39-40). Keen (2007), however, regards the democratization of the Internet and the Web as a potentially destructive force: “The cult of the amateur has made it increasingly difficult to determine the difference between reader and writer, between artist and spin doctor, between art and advertisement, between amateur and expert. The result? The decline of the quality and reliability of the information we receive, thereby distorting, if not outrightly corrupting, our national civic conversation” (27). From this perspective, the new Web offers not a promise of collaboration but a cultural revolution that “threatens to turn our intellectual traditions and institutions upside down”—“a digitalized version of Rousseau’s noble savage, representing the triumph of innocence over experience, of romanticism over the commonsense wisdom of the Enlightenment” (36). Similarly, the blogging phenomenon is not the world’s biggest coffeehouse but a filter-free world of “rumors and lies concocted by anonymous (and no doubt amateur) reporters,” user-generated content is merely “user-generated corruption,” and the wisdom of crowds is not collective intelligence but “an illusion . . . no more to be trusted than the anonymous amateur editors at Wikipedia or the anonymous amateur filmmakers on YouTube” (81, 94-95).

We take these observations (insofar as we take them seriously) as a challenge and an opportunity to shape the new and emerging communication technologies toward productive collaborations for the purpose of building stronger social relationships and stronger organizational and social communities. The “architecture of participation”—the “global, ubiquitous platform for computation and collaboration” effected by Amazon, eBay, Google, and other commercial enterprises (Anderson, 2006, 83; Tapscott & Williams, 2006, 19)—seems to enable a kind of beehive-like responsiveness to others, a minute co-ordination that can become nearly invisible—as Google’s search results, for example, enable a co-ordination of interests between ourselves and many unnamed others. But this same architecture of participation can also become dramatically visible—as Terminal Time, for example, dramatically visualizes the responses of real, immediate, and readily identifiable audiences. In either case, the mediating technology is not merely a transparent vehicle for transmitting information but a nexus of activity that helps to shape the activity and becomes a component of the user’s experience. This mediating technology is not mere noise in the system but a facilitator and an enabler—not the coughing in an audience that interrupts and disrupts a speaker but rather a microphone that permits the speaker to speak over the noise or a microphone that is passed among members of the audience or, to fully extend the metaphor, millions of microphones of a kind that permit everyone to speak at once but to listen only to those they choose to hear. If, as we suggest, the role of technology as mediator in human communication processes is becoming increasingly more visible, more pronounced, and more complex, then the collective responsibility of program administrators and faculty to help to shape the technology of the future only increases accordingly. Rensselaer’s TMC project is a small contribution to this collective effort.

The TMC Project

The core concept behind the TMC project is that technical communication has been fundamentally altered with the introduction of the kinds of mediating technologies that we have

been describing (Geisler 2006). In other words, TC—Technical Communication—*becomes* TMC—Tech-Mediated Communication—with the insertion of the M—for Mediation. The TMC project began in the Fall of 2005 with a one-year planning grant and grew in the Fall of 2006 with the award of a three-year research grant. We conceived this project from the start as a collaborative effort among several members of our faculty who had ongoing research projects and interests in the design of communication technologies for the community and the classroom: graphic design for health education and information exchanges across cultural boundaries, the development of information resources for local governments, the implementation and testing of a variety of communication tools and resources for distance education, and the use of wikis and other collaborative software in the classroom. We felt that we had a better chance of success if we based our experiments in ongoing efforts and interests rather than in new initiatives with no history or experience. We also felt, intuitively, that a coalescence and convergence of these interests might add up to a whole that transcended the limitations of each of the individual parts.

As a collective and collaborative effort, the TMC project attempted to move beyond concepts of efficiency and transparency to answer a fundamental question: What makes tech-mediated communication usable in the broadest sense? In particular, we sought to develop a set of design heuristics to guide the development of tech-mediated communication and a set of metrics by which to evaluate their effectiveness. We also designed new test protocols more appropriate for testing user experiences. In the process, we had to revisit and reshape the fundamental components of the usability toolkit.

Because our question was a broad and elusive one, we looked for answers by exploring specific instances of tech-mediated communication, through interactions among five faculty-led teams pursuing distinct but complementary on-going projects:

- *Cross-Cultural Graphics*, led by Audrey Bennett, which looked at how to create HIV-awareness in Kenya through tech-mediated graphic design;

- *Wikis for Collaboration*, led by Jan Fernheimer, which explored the ways that wikis can be used to facilitate team collaboration;
- *Distance Education*, led by Robert Krull, which examined how distance technologies can facilitate the development of a classroom community;
- *Cultural Websites*, led by Patricia Search, which investigated how websites can function as cross-cultural communication between indigenous tribes and the mainstream culture; and
- *Web Galleries*, led by Jim Zappen (and discussed further below), which explored how online galleries can serve to inform and engage children, teens, and adults in the programs and activities of local community organizations.

To encourage interaction and involve students from both our undergraduate and graduate programs, we organized ourselves through an annual spring seminar that punctuated the on-going work of these five teams with seminar meetings of the whole. To make the process more complex and more interesting, we invited participation by students in both our on-campus programs and also our distance MS program—all of whom have made invaluable contributions to our ongoing efforts.⁵

For participating faculty, this complex organizational structure created an unprecedented mechanism for close and continued interactions between and among ourselves and our students over substantive issues in tech-mediated communication. For our students, the structure provided hard-to-find but much-coveted interaction with faculty research and also exposure to our integrative discussions. At the team level, each team's work alternated between design and testing, with the test results providing input for the next phase of design. At the level of the seminar, the design and testing were highly coordinated affairs, as both design and testing were driven by the developing heuristics and metrics.

Illustration: The Connected Kids Galleries

The Connected Kids Information System and Gallery offer special design challenges and opportunities due to the varying abilities and interests of children, teens, and adults with a range of different backgrounds and experience. The Information System and Gallery (<http://www.connectedkids.info/>, retrieved July 25, 2008) were initially funded by the National Science Foundation as an experiment in digital government for the purpose of delivering information about youth programs, services, and activities to youth-services organizations, parents, teens, and children in Troy and Rensselaer County, New York.⁶ The system has an easy-to-use interface for data entry and retrieval, accessible via the World Wide Web. The Gallery offers artwork and photos depicting some of the programs and activities represented in the system. For the TMC project, we developed a model for information-design theory and practice that incorporates both traditional measures of user performance, measured by functionality and efficiency in the execution of user tasks, and user engagement, guided and motivated by the new concept of experience design and the capabilities of the new Web 2.0 technologies described above.

Designing Information Resources for Children and Teens

In our Connected Kids project, we envisioned our design challenge from the outset as a need to design information resources for a diversity of users. We did not fully anticipate the emergence of experience-design concepts and the Web 2.0 technologies and their implications for practice. We believe that our original Gallery, as illustrated in Figure 1, nonetheless incorporates some of the elements of experience design described in the literature and certainly intends for users to look at rather than through it. In the early stages of our TMC project, we developed colorful photo collages and slideshow photo displays with two of our partner organizations, the Knickerbacker Park and Ice Arena and the Troy Family YMCA, in an attempt to create a sense of engagement and immediacy for our users, especially children in the lower



Figure 1. Original Connected Kids Gallery designed for children

and middle grades. We then conducted user tests, initially with college students, and received less-than-enthusiastic responses, due largely to the Gallery's limited functionality and efficiency. At this point, given limited testing, we cannot be certain whether these less-than-enthusiastic responses reflect dissatisfaction with the Gallery itself or merely differences among users, but intuitively we suspect that children, teens, college students, and older adults very likely have different backgrounds and levels of experience and therefore different perceptions of what an online gallery can and ought to be. We will require further testing to sort out these issues—the appropriate balance between functionality and efficiency, on the one hand, and total user satisfaction, on the other, for each of several different groups of users—but we suspect that one possible outcome might be that we need different galleries with different functionalities and offering different experiences for users of different ages—not be a surprising conclusion, if this is

indeed the outcome, given our initial premise about designing information resources for a diversity of users.

The issue of functionality and efficiency versus total user satisfaction is relevant to adults as well as children and teens. Tapscott and Williams (2006) observe the explosive growth of social-networking applications such as Facebook and MySpace, for example, and the relatively young age of their users (now thirteen for Facebook and fourteen for MySpace). These users—the so-called “Net Generation”—“are increasingly free to manage their interactions, form networks, and shape their own identities” (48-49), and they are slowly transforming every aspect of social and organizational life, from education to commerce to work and employment practices. As students, they are responding enthusiastically to new tools and curricular initiatives that permit “real participatory, active learning” (51). As consumers, they are not passive purchasers but “prosumers” who “satisfy their desire for choice, convenience, customization, and control by designing, producing, and distributing products themselves” (52). As workers, they will introduce new norms of workplace practice, including “speed, freedom, openness, innovation, mobility, authenticity, and playfulness” (54). If Tapscott and Williams (2006) are even partially correct, then the information-design challenges of today will only increase as this generation enters into and in the process transforms social and organizational life as we now know it.

Designing for User Performance: Functionality and Efficiency

Based upon our initial round of user testing, we created a new Gallery with enhanced functionality and efficiency consistent with the expectations of our initial test group and consistent also with the portrait of the new generation of teens and adults captured in Tapscott and Williams’ (2006) account. Initial testing of the original Gallery with college students revealed numerous functionality/efficiency problems, possibly reflecting these users’ experience with more sophisticated gallery software. For these users, according to the test report, the original Gallery seemed “very casual and not task oriented,” more like “slide shows rather than

true ‘galleries,’” “very linear” with “no hierarchy of information, no search functions, no category scheme or navigation system to assist users in finding images,” no “library of types of images and thumbnail images,” and “no help functions or contact information.” Based upon this initial testing, we created the new Gallery, shown in Figure 2, using the readily accessible, sophisticated open-source Gallery software (<http://gallery.menalto.com/>, retrieved July 25, 2008). We then tested the new Gallery with a wider range of users, including three under age twelve, three between the ages of twelve and seventeen, and three at or over the age of eighteen.

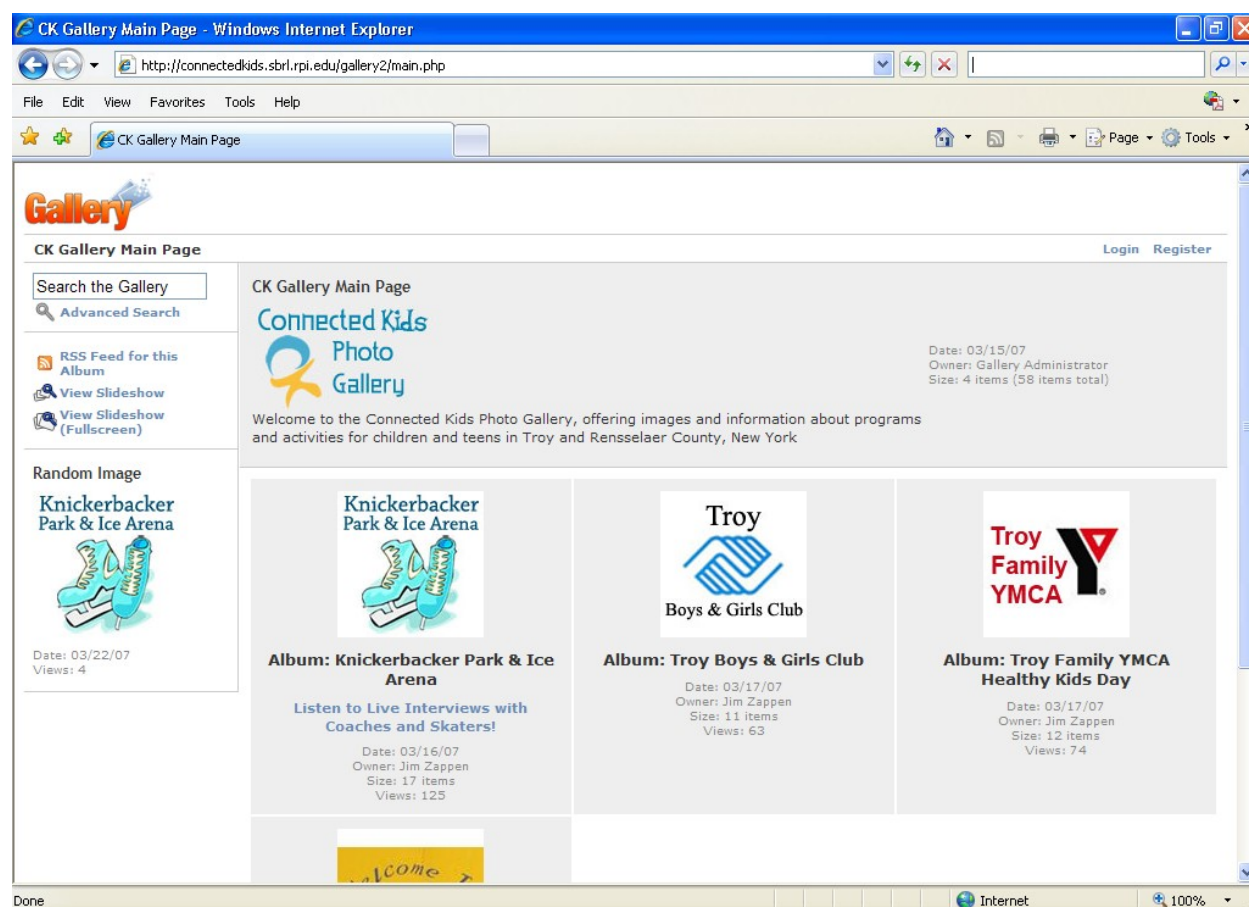


Figure 2. New Connected Kids Gallery designed for teens and adults

Based upon responses from these users, the test team reported that the new Gallery seemed to be “a significant improvement over the original exemplar.” Not surprisingly, however, the test team also observed that the new Gallery seemed to be designed for “adults, not children,” and suggested that it include “more interactive audio and video features,” “more rich contrasting

colors,” and “more visual draw” to hold the attention of children. In addition, the test team also identified a number of functionality/efficiency issues, including a need for larger text and images, less white space, elimination of extraneous information such as photo properties, a search button and elimination of the text within the search box, more prominent links and breadcrumbs, and adjustment of some of the default settings. Consistent with Tapscott and Williams’ (2006) description of the new generation of users, the test team also made recommendations for more dynamic content and more opportunities for collaboration in the form of user-generated content, including audio and video content, interactive components such as games, links to more information, mechanisms for sharing Gallery content and other information resources, and opportunities for users to upload their own content.

Designing the Total User Experience: Experiments in User Engagement and Collaboration

Given these findings, and motivated also by the literature on experience design and the new Web 2.0 technology, we are working on a revised Gallery, which we now call an Information Gallery (<http://connectedkids.sbirl.rpi.edu/gallery2/main.php>, retrieved July 25, 2008), to emphasize our effort to develop an information resource rich with visual, textual, and audio content, including content generated by our users. In this effort, we are targeting teens and adults, not children, and we are retaining the original Gallery, for the moment, for use by children. We are constrained, of course, both as co-creators of the Gallery and as stakeholders in our own community, from opening this resource to teens with nothing more than an email account and a willingness to assent to a terms-of-service agreement. Legally, and ethically, we are obligated to make every effort to protect our young people. Nonetheless, we are working to address the functionality/efficiency issues and to introduce richer and more varied content. To address the functionality issues, the revised Gallery, shown in Figure 3, eliminates white space and thereby includes more albums per screen, eliminates extraneous textual information from the main page, adds a Go button and eliminates the text in the search box, removes broken links, adds a large audio image for each of the audio files, and resets defaults, among other fixes.

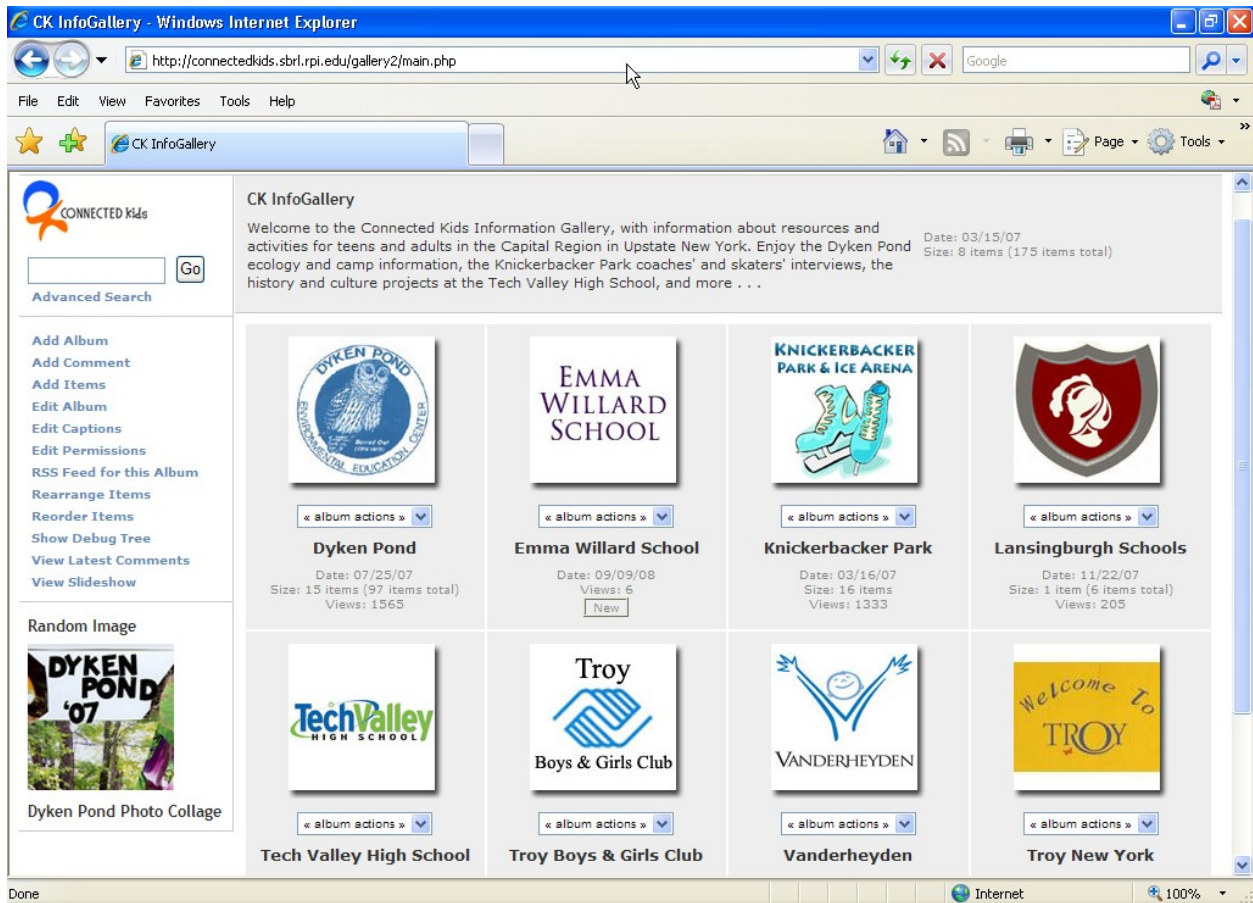


Figure 3. Revised Connected Kids Information Gallery

In addition, to address the content issue, the revised Gallery includes a variety of ongoing experiments designed both to enrich the quality of the user's experience and to build a sense of ownership and community. One such experiment is the new Dyken Pond ecology resource, which offers images from a local summer camp, including photos of natural settings and campers' learning activities; captions by a former camper and camp counselor; plus additional information such as a camper's photo collage, visitor's guide, and trail map. This experiment also offers direct access to the camp director for the purpose of adding or editing captions to ensure the thoroughness and accuracy of the information and to ensure as well actual ownership of the resource. Another such experiment, in early stages of development, is an opportunity for students at our area's new Tech Valley High School to develop and post their own content, including their explorations of serious issues such as conflicts in Africa and more

personal and expressive materials such as graphic narratives, artwork, and poetry. In addition, we are developing a new moderator function to permit users to post comments directly with the oversight that we require for teens. We anticipate that these developments are merely the beginning of a long but exciting process, in which our area's young people will likely teach us as much as we teach them about the rapidly changing communication technologies of the present and future. We believe that that these developments also offer countless challenges and opportunities for research and program development in technical communication—opportunities not only to respond to rapidly changing communication practices but to lead and to shape the mediating technologies of the future.

Implications for Research and Program Development

We see the TMC project—including the Connected Kids Gallery as just one of many possible illustrations—as emblematic of the next wave of research and program development in technical communication. Technical communicators have always been advocates for the human, with strong commitments to the social. In a technical-communication world focused upon functionality and efficiency, our role was to make the user experience as transparent as possible. But in a tech-mediated world, advocating for the human requires a broader scope. It requires changes in how our research projects are organized and how our programs work. It requires an interdisciplinary collaborative design orientation embedded in new program commitments and structures.

Interdisciplinary Mix

Given the increasingly complex mediations of the kinds of communications that we have been describing, we may be sure that no single researcher or academic discipline can bring together all of the knowledge and skills needed to sustain a research project such as ours. In this project, we needed to bring together faculty and students whose disciplinary bases have often been siloed and isolated. We needed to engage rhetoricians, graphic designers, and specialists in

human-computer interaction, all under the TMC umbrella, all committed to the human and the social, but bringing together distinct sets of percepts and concepts. In the process, we came to recognize—and value—that we did not see the same things or think in the same ways about the communication artifacts that are the objects of our inquiries. We did not see the results of this mixing as a blending process; we did not expect a new overarching discipline to emerge. Instead, we expected to see—and we did see—a continuing need to transform our individual disciplines into a complex interdisciplinary mix.

Programmatically, this interdisciplinary mix has required a commitment to recruitment and program development that draws upon the strength of our individual disciplinary bases while we continue to *mix it up* in the hallways and classrooms. For such a process to work, we have had to make two strategic moves. The first has been a focus in our recruitment—of both faculty and students—on those who see the need, and the joy, in crossing disciplinary boundaries. We have found that they need to have this commitment from the beginning. The second has been a decision to focus our individual disciplinary visions through the common lens of technological mediation. It would somewhat misleading to say—though we often do say—that we tend to take a narrow slice out of a variety of disciplines rather than attempt a broad overview. It would be more accurate to say that we pull the whole cloth of those broad disciplinary bases through the ring of technological mediation. The result is a transformation—a remix—that fundamentally changes disciplinary thinking itself. An example of this transformation is the way the concept of rhetorical agency, with which this paper began, gets refigured when brought into contexts mediated by technologies like the personal digital assistant and the (imaginary) automated writing assessments.

Deep Collaboration

The TMC project has taught us that the effectiveness of this interdisciplinary mix depends upon a kind of deep collaboration that was, quite frankly, new to us. Much of the ordinary collaboration in which we engage depends upon an often unspoken

compartmentalization of tasks: You do this; I'll do that; we'll get this done. In deep collaboration, on the other hand, collaborators engage in continual interaction. Each still brings his or her expertise to bear on the tasks at hand, but through continual interaction we become aware of what each brings to and takes from our work. Out of this awareness, over time, emerges the mutual influence that is deep collaboration. In the TMC project, in particular, deep collaboration allowed us to make progress on five different design projects while, at the same time, we reflected, in general, on what makes communication usable in a tech-mediated world.

Programmatically, deep collaboration requires a rethinking of the temporal, social, and spatial structures that ordinary keep us isolated from one another. In the temporal dimension, our program was organized as a series of courses embedded in a repeating curriculum that constituted students' plans of study. The need for an iterative design-and-test cycle that would stretch over the course of several years challenged us to find a way to break out of these curricular time structures. Our solution for the TMC project was to schedule our TMC seminar in three iterations over as many years. Not only did each seminar decline to duplicate the *material* of the previous seminars, but, in some cases, the same students moved from one seminar to the next over multiple years, building on the concepts and work of previous seminars. As a consequence, we encountered new needs, opportunities, and challenges throughout the course of the three seminars: the need to recruit and orient new members, the opportunity to draw upon the developing knowledge and experience of the old-timers, and the challenge of keeping a multi-year project headed in the same direction.

The TMC project also challenged us to break out of the usual social boundaries that center the curricular action in a single classroom. The seminar became the social center, the structure that brought us together, but orbiting around this center were constellations of activity with as much if not greater significance in the work of the five faculty-led teams. The work of these teams differed from the usual student teams that we have used in other courses in two ways. First, they were faculty led, which gave them the direction and credibility that student

teams usually lack. When students reported their work, for example, we listened to learn rather than to evaluate. Second, and most germane to deep collaboration, we quickly recognized that the teams could not work in isolation from one another if we were to achieve our goal of generalizing our findings across projects. To meet this challenge, we developed over time a matrix structure in which members of our *testing team* had joint assignments, serving both as members of an evaluation team and as members of the five separate design teams. The move from project-specific knowledge to generalization—so central to technical-communication programs—thus became literally inscribed in the movements of these matrix members across the social structures of the course.

Finally, and not surprisingly, these changes in social structures led us inevitably to seek new ways of using space. The climax of each TMC seminar was a five-hour design *charette* in which team members had the opportunity to interact with the design projects produced by other teams and also to come together to address larger issues. Because the charettes required at points rotating students through projects, we literally *exploded* beyond the spatial confines of our usual seminar room to encompass faculty offices and labs scattered through our building as *demo* rooms. Because our seminars included both on-campus and distance students, each of these spaces needed to be equipped with suitable technology to mediate both voice and application sharing with distance members. Each of these sets of arrangements, both the physical and the virtual, had to change every fifteen minutes! The level of technological coordination was, for us, unprecedented.

Design Orientation

Implicit in the concept of deep collaboration, but worthy of articulation, is the importance of taking a design orientation in our common work. Too often, interdisciplinary interactions focus on analyzing the *interdiscipline* itself—How are you and I similar? How are we different? What are our histories of convergence or divergence? What are the key issues for adjudication? While we do not doubt the value of such questions, our discussions have largely

been structured quite differently—around the design of something new. Design—the way the imagining of something new structures the creation of something new—has never been totally at home in an academy centered upon analysis. Yet the opportunity afforded by fast-paced technological change invites us to become *prosumers* ourselves as we imagine, construct, and—yes—also analyze new tech-mediated interactions.

Programmatically, the disciplines from which we draw all have design mandates. HCI concerns itself with the design of human-computer interactions. Graphic design concerns itself with the design of two- and three-dimensional visual communications. Rhetoric concerns itself at least in part with the design of effective communication. It is not surprising, then, that this interdisciplinary mix, brought together for the purpose of deep collaboration, can coalesce around common design projects. In the TMC seminar, in particular, the design orientation became salient not because we asked our students to design—we all do this in our classes, don't we?—but because we asked them to design *with us*. Such open-ended and collaborative design projects are not very common in our coursework, but, again, one of the important lessons of the TMC project is that we need to take steps to ensure that interdisciplinary collaborative design lies at the heart of our technical-communication programs and curricula.

Programmatic Impacts of Interdisciplinary Collaborative Design

Not by chance does interdisciplinary collaborative design become important in the context of tech-mediated communication. As we outlined in the first half of this paper, the shift from supporting individual users as consumers to structuring a beehive of coordinated communication among *prosumers* is the essence of recent technological change. Of course, the programmatic impact of this deep interdisciplinary collaborative design has yet to be played out. But as we bring the TMC project a close, we have begun to wonder about its legacy. In three to five years, will it all seem like a dream? Or will we invent new curricular structures that enable deep collaboration to continue? One of the TMC challenges, it seems to us, is to find a way to institutionalize these changes, both at our own institution and elsewhere.

Not all research and program development in technical communication can or should, of course, follow the TMC model. Not every program has the same institutional environment, faculty, resources, or interests. Nonetheless, we believe that the same forces and influences will operate in every case. The basic concept of experience design and the rapid emergence of new collaborative communication technologies are effecting fundamental changes in communication practices and in the culture at large. One way or another, we will need to be responsive to these changes. We will all need to become more technologically sophisticated, more interdisciplinary, and more collaborative. Some of the questions that we should ask ourselves include:

- Can we, as we *mix it up* in terms of disciplinary backgrounds and interests, ensure that our programs bring a variety of disciplines to our programmatic tables? If we have small programs, can we build alliances across our institutions or even collaborate with other institutions in joint projects?
- Can we provide students with opportunities to engage in deep collaboration? Can we find ways to break out of the usual temporal, social, and spatial arrangements of our programs to allow for cross-generational learning? To facilitate faculty-faculty interaction (beyond committee work)? To link team and class work in ways that give authenticity and credibility to both?
- Can we fully embrace a design mandate? Can we see ourselves as part of the effort to design new technologies, not just as users of those technologies or producers of documents to aid those users?

At Rensselaer, it is too early to be certain about our answers to these questions. But it is clear that such project-driven mixes can be more easily implemented in programs designed to invite faculty to experiment and collaborate. Rather than building solely around a set of stable offerings repeated year after year, programs need to offer more open-ended slots. At Rensselaer, for example, during the three years in which they were offered, the TMC seminars filled open slots in core program requirements in both our MS and PhD programs. In the MS in HCI, for

instance, students could take the seminar as one of the two or more required courses in advanced HCI topics. In the PhD in Communication and Rhetoric, students could take it as part of the required sequence of at least three 6000-level seminars. Since neither of these requirements specifies courses by name, the open ended-slots invited faculty to offer—and students to take—timely and pertinent courses tied to specific projects.

But more than a passive invitation is needed to make such initiatives work. Indeed, in emerging areas of strength such as Games Research and New Media, we are looking for ways in which multi-year seminars might be created. We acknowledge that our own institution has rich technological resources, but low-cost technologies such as Skype and Yugma are beginning to duplicate the audio, video, and application-sharing environments that can facilitate deep collaboration (Poe, 2008). These technologies will permit many more of us to devise new curricular and programmatic structures outside of the single instructor/single discipline model—structures that support interdisciplinary collaborative design.

Consistent with our commitment to the human and the social, however, we also remind ourselves that we pursue these interdisciplinary collaborative design activities not only, or even primarily, to advance our own intellectual agendas but to influence and shape the digital communication technologies of the future and, in the process, to help to create more functional technologies and more engaging experiences for our users, both with the mediating technology and with others users—who collectively represent the range of corporate, governmental, and public interests that we profess to serve. This, we think, is the challenge of tech-mediated communication.

Notes

¹We are grateful to the Society for Technical Communication for support for the TMC project; to Bridgette Kenkel for permission to use her designs for the Connected Kids children’s gallery; to Elia Nelson for research assistance with user testing of the teen galleries, especially the new Information Gallery; and to John Britton for technical support for the Information Gallery.

²Orlikowski (2000) offers three basic principles for the study of the mediating role of technology in communication processes. On the one hand, she argues, (1) human agents—designers—build into technologies certain interpretive schemes, facilities, and norms that shape communication processes (405). On the other hand, she observes, (2) human agents can and do redefine and modify the properties and applications of the technology, and (3) they do so only in the process of active use (405-406). Spinuzzi (2003) explains the fallacy behind the second and third of these principles as “the worker-as-victim” trope and argues that information designers need to embrace “the emergent innovations of workers, not by replacing those innovations with centralized solutions, but by helping to design systems that workers can modify” (1, 4-5). Similarly, but more philosophically, McCarthy and Wright (2004) urge us to think of technology as “simultaneously prosaic and aesthetic experience,” as always open and unfinished, in a world that “already half-designed, is always becoming” (196-197).

³In a similar vein, Winsor (2006) sees agency as emergent from a dynamic between organizational structures, textual resources, and, not least, personal disposition or intent.

⁴Babin (2007), Negrino and Smith (2007), and others explain how to build these applications and supply code that can be readily imported into existing or new applications.

⁵These programs include the PhD in Communication and Rhetoric, the MS in Human-Computer Interaction, and the BS in Electronic Media, Arts, and Communication.

⁶This material is based upon research supported by the National Science Foundation under Grant No. 0091505. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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