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ABSTRACT

Despite enormous growth of the Internet and its proliferation of tools, resources, and on-line communities, the connection between local learning environments and virtual learning environments remains tenuous. This paper examines this relationship, based upon a case study of an academic unit at the University of Colorado at Denver. Drawing on interviews, written surveys, and exchanges with students, the paper offers an analysis of factors that are critical to a user's choice to participate in the Internet and electronic mail. Factors include: (1) a clear payoff for learning the new technology; (2) overcoming technophobia; (3) cultural/personal compatibility; (4) proper support structure, from access to the Internet to technical support for trying more technologically complex activities; and (5) finding a voice and having something to share via the Internet. The paper concludes with recommended strategies for introducing students and faculty to networked learning environments. (Contains 19 references.) (Author/SWC)

Title:

Cultural Assimilation Of The Internet: A Case Study

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ABSTRACT

Despite enormous growth of the Internet and its proliferation of tools, resources, and on-line communities, the connection between local learning environments and virtual learning environments remains tenuous. This paper examines this relationship, based upon a case study of an academic unit at the University of Colorado at Denver. Drawing on interviews, written surveys, and exchanges with students, we offer an analysis of factors that are critical to a user's choice to participate in the Internet. The paper concludes with recommended strategies for introducing students and faculty to networked learning environments.

The Internet has sustained phenomenal growth since the beginning of the decade. Doubling in size each year for the past several years, the Internet now connects 35 million users across the globe. Three million new accounts are added each month. Higher education accounted for most of the growth in the early nineties, but today, commercial usage accounts for 65% of network traffic. The public schools are also wired. The U. S. Department of Education estimates that over 50 percent of American Schools will be attached to the Internet by the end of 1996. Despite this astounding growth, the majority of Americans at this moment remain unwired, anticipating nothing extraordinary about the age of information.

In spite of the Net's growth, most people remain on the sidelines, hearing media reports but staying a cautious distance away from time-consuming forays into the medium. A college campus is a microcosm of the larger community. Some students spend hours in exploration of virtual worlds, some engage in public forums on specific issues, some utilize the Net for its research capabilities, while many adopt the convenience of electronic mail. A substantial body of faculty and students remains largely unaware of the full array of resources available to them.

INTERNET AS A TECHNICAL INNOVATION

One way to look at the growth of the Internet is as a new technology being adopted. Rogers (1995) has developed an influential model for the adoption and diffusion of innovations within organizations; theorists continue to emphasize that today's organizations must be willing and ready to undergo continual change (e.g., Senge, 1990). Seen in this way, a department head or office manager might develop a plan for implementing the technology, similar to the installation of a new computer or LAN. Consistent with this adoption/diffusion approach, Internet resources can be seen as "mere tools" to be utilized by existing organizations and individuals. Through the Internet, an individual may solve a problem, find an answer to a question, or communicate with another professional on a project.

The Internet differs, however, from many technological innovations in that it seems to be largely driven from the bottom—from the academic community and from individuals and small groups of grass-roots enthusiasts. Organizations find themselves responding to an unplanned cultural shift, rather than implementing a new technology from the top down. Moreover, academic units in higher education often lack the cohesion of a traditional business office. Professors are highly autonomous workers who spend more time interacting with students than with colleagues. Developing a consensus for technological change can be a serious challenge in such settings.

INTERNET AS A SECOND CULTURE.

Another way of viewing the Internet is as a second culture or community (Rheingold, 1993). The Internet exhibits all the key elements of a culture, including language, symbols, rituals, status, and other meaning-conveying forms (December, 1993; North, 1995). Individuals may "enter" this environment, become initiated into various sub-groups, and interact with other community members. At the group level, an entire company or department may introduce its members to the Internet culture.

This broader conception underscores the depth of change that the Internet poses to existing organizations. One cannot expect to simply "tack on" the Internet as a cosmetic addition to an existing structure; as a new and competing culture, the Internet is bound to threaten existing conventions and cultural practices.

The gap between the preexisting local community (typically an academic or business unit) and the virtual Internet community is worthy of study. How and why do individuals move toward the Internet culture? How does an entire group of people make the move? What factors are at play, and what can be done to facilitate the change?

This paper draws on our own efforts to bring our local academic culture in line with the Internet culture. Over the last couple of years, we have been using the Internet within our academic unit, the program in Information and Learning

Technologies (ILT) at the University of Colorado at Denver (UCD).[16] We have been intrigued to observe the response of faculty and students as they gravitate toward the Net. An expected normal distribution occurs, ranging from anxiety, frustration, and resistance to utilitarian accommodation to excitement and immersion. In some, these differing responses reflect personal stages of growth over time. We hope the local academic community can overcome initial fears and frustrations and move toward mature utilization of Internet resources much as they might acquire a second language through a semester abroad program. Our hopes, however, have not yet become reality.

Our purpose in this paper is:

1. to reflect on the general problem of the local and Internet cultures;
2. to report on our efforts to support the integration of the two cultures; and
3. to point to areas of needed research and to offer recommendations to designers of learning environments for the successful integration of the Internet into existing learning cultures.

BEGINNING EFFORTS

Martin Ryder wrote a paper in 1994 which articulated his vision of the Internet as a learning tool (Ryder, 1994). To test out his developing ideas, he concurrently developed a homepage to represent the local department's interests and self-concept. Instructional Technology (IT) Connections[17] is an all-purpose hypertext-based help page for beginning and experienced users of UCD computers. Located outside the UCD network's firewall, on a gopher server named Oasis, IT Connections links students with a variety of Internet databases and tools relating to instructional technology and cognitive science. IT Connections has been accessible on the World-Wide Web since the spring of 1994, when it appeared in the Educational Technology section of CERN's virtual library, Stanford's Connections to Cognitive and Psychological Sciences, the Curriculum and Instruction section of EINet Galaxy, and the Education section of John December's list.

The Online Helpdesk is a key component of IT Connections designed to provide documentation, tools and other supports for new users. It includes direct access to gopher resources, usenet and world-wide web utilities, allowing the user to access them in a seamless environment. While the Helpdesk was specifically designed for new users, experienced users maintain active links to the resource for its exhaustive FAQ lists, interest group databases, and practical search tools. For more complete descriptions of IT Connections, the Online Helpdesk, and other performance supports, see Sherry et al. (1995).

HIDING THE COMPLEXITY

Powerful resources have been available to users within our local department from the start, including usenet, gopher, ftp, and telnet. But these tools required the burden of rudimentary Unix skills which effectively kept the resources out of reach of most new users. Not surprisingly, they were minimally used.

Our tactical approach was to eliminate any direct reference to such tools whenever possible. Martin, who works as a software engineer in his daytime job, designed command scripts which enable users to perform complex Unix operations with simple commands. The command, "connect", for example, invokes a script that brings up IT Connections with the Lynx browser, a tool designed at the University of Kansas specifically with new users in mind. For local users, IT Connections serves as their window to Internet services in education. The single command "connect" allows the user direct access to IT Connections without requiring technical knowledge of the underlying details. A similar command, "aid", invokes Lynx to bring up the Online Helpdesk.

Another tool, "makepage", was developed to allow new users to immerse themselves in online authoring without passing through the initiation rites of Unix. The single command "makepage" creates for the user a public directory with an index template. It sets all the appropriate security permissions to allow public browsing of the new directory. The new user is not encumbered with these distracting cognitive tasks. After invoking the command, users can immediately begin editing an html template, customizing it to their own specifications as they begin to mold a personal homepage from a generic model.

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[16]ILT programs are housed within the Division of Technology and Special Services, which is within the Graduate School of Education.

[17]The URL to IT Connections is: gopher://www.cudenver.edu/~mryder/itcon.html

Such conveniences do not come without a price. Users who wish to understand the technical details of Unix and html are not directly rewarded with this approach. But the templates and shells provided by the tools have opened the door for many users whose interests are focused beyond the technology.

THE INTERNET TASK FORCE

In the process of developing these support tools, Martin learned something interesting: He could barely get the attention of anyone around, student or faculty. This was especially ironic, since the department was ostensibly committed to educational technologies as its professional focus. Professors in the program had been teaching telecommunications classes and using e-mail for years. Why didn't anybody share Martin's excitement? Why did faculty members take weeks to even take a look at the Web resource, IT Connections? Martin expressed a sense of disequilibrium and confusion as he contrasted the supportive responses of remote patrons with the general disinterest shown locally.

Undeterred by the resistance shown to the new tools, Martin joined faculty member Brent Wilson and a team of students to study the issue. The Internet Task Force was created in the fall of 1994, with the following broad objectives:

- to support the department in its move toward the Internet culture through a variety of online and offline tools, support, training, and policy initiatives;
- to develop ways that e-mail and the Internet could be used as knowledge-building tools within graduate classes and seminars;
- to reflect on and conduct research on users' needs, support tools, adoption processes, cultural change, and collaborative learning communities.

Our overall goals for student (and faculty) online access involve the ability to engage actively within local and virtual communities toward the social construction of public knowledge. Specifically, we want students and faculty in Information and Learning Technologies to utilize online resources in order to:

- Engage in public dialog over issues of scholarly and professional import.
- Exploit the various resources that comprise a public knowledge base.
- Contribute information of value to the public knowledge base.
- Provide consulting and collaborative services to communities of learners, scholars and practitioners.

The group has met regularly since August 1994, and has created a number of performance supports and research products related to educational uses of the Internet. Sherry et al. (1995) provides a more complete report of the Task Force activities and accomplishments.

USER SURVEY

In spite of our enthusiasm for the potential of Internet resources, we were sensitive to the very real obstacles facing students and faculty alike. In particular, we were wary of mandating policy and enforcing changes in the culture without careful assessment of people's perceptions and needs (Sarason, 1988). We designed a written questionnaire based on Rossett's (1991) needs assessment model, which was intended to survey the level of Internet training and support needed by our students, faculty, and staff. Our primary research questions were:

- What is your current level of use of e-mail and the Internet?
- Do you have access to the appropriate technology?
- What are your objectives in using e-mail and the Internet?
- What obstacles do you face in using them?
- What performance and training supports do you feel would be helpful?

Seven teachers and 66 students (73 in all) responded to the questionnaire. Some of the information guided us in the next phase of our work, i.e.: developing home pages for the School of Education, our doctoral program, and our division, and developing additional job aids and other types of learner support. We have enumerated our key findings below.

We are online. Fifty-nine respondents already had e-mail accounts on one of the university computers. About half learned to use e-mail in classes; the rest learned on their own or from friends.

We are mobile. Those who use e-mail nearly every day connect from home, whereas those who use it weekly connect from home or from the university computer labs. 60 of the 73 respondents have modems and computers.

We have good e-mail access. Most felt their e-mail service was reliable and accessible, and that their system permitted them to download and save files.

We have different reasons for using e-mail. When asked to rate the usefulness of a variety of reasons for using e-mail, the responses tended to cluster into four groups: local access and communication, scholarly research, collaboration, and information dissemination.

- Very useful: use e-mail, locate instructional materials, transfer files from remote locations, consult with classmates, instructors, and advisor;
- Moderately useful: do literature searches, access electronic publications, articles, and scholarly journals, transfer information between home computer and university account, and organize, store, and print information in student account;
- Somewhat useful: observe other Internet sites, participate in electronic discussion groups, collaborate with scholars from other universities worldwide;
- Less useful: author and publish electronic documents with hypertext links to remote sources.

Responses were fairly evenly divided into these four groups, indicating a wide range of utilization of Internet resources.

We have a mix of challenged and experienced users with different needs. Respondents were asked to identify the challenges they encountered using e-mail. From those responses, we separated the early adopters from a group of respondents who seemed to have more difficulties with the technology. The two groups were then compared as they expressed preferences for the eight training and performance support aids which we were considering developing. The rankings, reported in Table 2 below, were very different for each group.

Early Adopters	**Reluctant Users of the Technology**
1. online tutorials, 2. workshops, 3. paper tutorials, 4. interactive demonstrations, 5. booklets, 6. classes, 7. brochures, 8. help from graduate assistants.	1. help from graduate assistants, 2. workshops, 3. classes, 4. paper tutorials, 5. interactive demonstrations, 6. brochures, 7. booklets, 8. online tutorials.

Table 1. Preference rankings for different kinds of performance support, across two user profiles.

It is evident that new users seek face-to-face instruction: either individual attention by graduate assistants in the laboratory, or one- to two-hour workshops and formal classes.

The early adopters included experienced and frequent users. This group seems comfortable with tutorials, both online and paper, whereas one-on-one assistance from graduate assistants was at the bottom of the list—possibly because graduate assistants working in the lab are not formally trained or certified in the use of the Internet!
Interestingly, both groups ranked one- to two-hour workshops very highly (rank=2), whereas formal classes were ranked third from the top by the challenged group, and third from the bottom by the frequent users.

In an effort to uncover users' perceptions, we asked survey respondents a number of Likert-style attitude questions. Responses of ten identified "reluctant users" are reported in Table 2 below.

3.5	I feel intimidated by the techno-gurus in the program.
3.3	I feel I can accomplish the same thing with mail and phone calls.
3.3	I'm the type that needs a lot of hand-holding.
3.1	I'm concerned that I'd have to learn too much technical jargon and commands to make it worthwhile.
3.0	I don't have the time to learn e-mail.
3.0	I would like to see more use of E-mail in my classes.
2.6	I think E-mail is worth the time and trouble.
3.6	Getting access from home is too expensive.
2.4	Learning to use E-mail will pay off for me professionally.
2.3	I think E-mail can help me stay in touch with people better.
4.0	I have a hard time expressing my thoughts in writing.

Table 2. Attitude responses of ten survey respondents who showed a reluctance to use e-mail and Internet resources, with 5 converting to "strongly agree", 3 to "undecided", and 1 to "strongly disagree."

These responses from reluctant users reflect a number of underlying factors—self-concept, social, and practical—that contribute to a person's choice to use e-mail and the Internet in their day-to-day work. In spite of users' reluctance to make use of the technology, their responses indicate a complex relationship with that technology. Discussion of these issues is continued in the section below.

Further Insights into User Perceptions

Since the summer of 1993, Brent has been using e-mail as a mode of communication within his classes (Lowry, Koneman, Osman-Jouchoux, & Wilson, 1994; Wilson, Lowry, Koneman, & Osman-Jouchoux, 1994). Students receive e-mail accounts and are encouraged to communicate with each other and with the instructor. Reactions to readings, discussions of the text, class announcements, and questions to the instructors are all commonly communicated electronically.

In the spring of 1995, Brent's doctoral seminar went the next step and began using the Internet seriously as a research tool and as an object of study. The thirteen class members were about evenly divided between students with an interest in technology and other students who took the course as a program requirement. The class spent nearly half the classtime exploring the Internet, developing homepages, conducting searches, downloading files, and participating (electively) in listserv discussion groups.

A group interview with the 13 students was conducted nine weeks into the semester. This group interview served as an important source of information concerning students' motives, attitudes, and perceptions of the Internet as a learning tool. The following questions were sent out on e-mail in anticipation of the interview, and guided our discussion (see Table 3).

Questions to New Users of the Internet

—Did I embrace or resist the technology? Why?

—How did my thinking change as I learned to use the Internet? Were there changes in my mental models? Changes in attitudes? Were there any breakthroughs or "aha" experiences?

—What kinds of supports or experiences were most helpful to me in learning to take full advantage of e-mail and the Internet? Why?

—In what ways can the Internet be used for learning purposes? What is the potential versus the reality? How can the potential be realized?

—Has my experience with the Internet influenced the way I think about technology and education? What do I know now that I did not even think about three weeks ago in terms of how I might use technology for education?

—Can tools like the Internet help us create collaborative, knowledge- building learning communities? Has my experience with the Internet influenced how I think about education and learning in general?

—Are there concerns about potential abuses of technology and education? How can we use the Internet in ways that affirm people's individuality and humanity?

Table 3. Questions put to members of the doctoral seminar.

We have organized student comments around several key factors that affect students' choices to use or avoid e-mail and the Internet. Names have been changed to protect the anonymity of responses. (For a further analysis of features of the Internet which inhibit of encourage interaction, see Ryder, Wilson, & Myers, 1996).

1. *Clear payoff.* There needs to be some compelling need for students to engage in the discomfort attending the learning of new technologies. Says one student: "How is this gonna help me down the road?" Jon used the example of his wife pressuring him to use Quicken for their personal finances. "I have always known exactly what I have in the bank within $5. What do I need Quicken for?"

A goal to use the technology can come from a class assignment or expectation, but also from students themselves. Carl described a personal learning goal he created: To create an electronic portfolio showcasing his work. A portfolio is a major requirement of the doctoral program; Carl decided to do his electronically. With this goal in mind, Carl's heavy participation on the Internet had a focus and purpose.

2. *Overcoming technophobia and technophatigue.* Technophobia is common because it seems there is always some new technology demanding to be learned. Technophobia typically is triggered when two things are coupled:

- a belief in the value or necessity of learning and using a new technology;
- feelings of incompetence or inability to learn the new technology.

Ironically, the higher someone values the technology, the more extreme the phobia can become.

Many people have deeply ingrained feelings of incompetence regarding technology. These feelings of inadequacy, when reinforced by past experiences of failure, can lead to a condition of "learned helplessness" where the person quits trying and becomes entrenched in the avoidance of technology. Persisting avoidance behavior only widens the knowledge gap, leading to a vicious cycle of avoidance, growing incompetence, and feelings of inadequacy.

Several students in our interview reported a need for unpressed time to dabble, observe others, and become comfortable with the technology. Deb said, "It takes me awhile to process, then when I get it—[snaps finger]—I go for it." Kate's strategy is similar: "I soak myself in it for a long time, then I'll use it after I'm comfortable." Kate reported that, because her learning style is conceptual and highly visual, she is developing her own job aids to support her performance. Alta has a friend who lives close by, just across town. But she enjoys communicating back and forth with this friend via e-mail. It's a safe way to practice her new skill. "My daughter and son are both in college. I found out they were communicating over e-mail and it made me curious. If it had been an assignment, though, I would have thought differently about it."

3. *Cultural/personal compatibility.* Technology occasionally conflicts with people's learning styles, self-concepts, and lifestyles. Some people actively resist technology on grounds of principle, believing the technology influences their lives in negative ways. To address this concern, students need skills and tools to manage the complexity and retain a sense of control over the technology (and not vice versa).

Frank, for example, commented on the problem of information overload on the net. He sees the Internet as an open-ended tool, but "the World-Wide Web is a garage sale—There's so much junk out there! I have to be selective in how I spend my time and what resources I use."

Deb described some of the interpersonal dynamics involved in e-mail communications. She found it amazing that the co-worker in the next cubicle would send e-mail to send simple messages rather than just saying "Hey!" across the partition. She also described times when people would post messages laced with an emotional undercurrent, concerning job conditions or personal items. Deb gets a message like this and replies, "We need to talk." At that point, the communication returns to face-to-face.

4. *Proper scaffolding.* People need a "scaffold" or support structure in place as they engage in complex performances outside their normal repertoire of skills. In the case of the Internet, a complete scaffolding system seems to include:

- *Supportive, non-judgmental, social support system.* Scott noted a problem with adult learners. We tend to assume that everyone knows how to do basic things. "I shouldn't have to ask for help—I'm a graduate student!" Then we're embarrassed when don't know what we're doing, and we're afraid to ask. "You don't wanna look stupid, so you're not going to venture out..."
- *Lots of hand-holding.* New users of technology can easily get overwhelmed by the complexity and newness of it all. Greg complained, "We don't know what we don't know." Carl suggested that technology be mastered in small groups of 2-3 learners, maximum. People need personal attention and hand-holding that is not possible in a full class. Five minutes into a full-class demo, some students get lost but won't say anything, because they feel there is nothing that can be done in such a large group.
- *Freedom from technical hurdles.* Richard described his attitude towards obstacles in using technology. "You hit a barrier once—jump over it. You hit it a second time, remove the barrier." Richard described how having a clear

application—a decision to begin implementing e-mail in his own classes—prompted him to make steady progress toward using the technology. "It's like the movie, 'What About Bob'—I'm taking baby steps but I'm getting there."

- *Access*. One student had serious problems initially because he did not own a computer and modem, and had difficulty getting on campus. This lack of access initially affected his attitudes and learning of Internet skills.

Finding a good time to get online is a problem for Alta. "If you look at my times, you'll see that I'm on at 5:00 am. I can't get on during the day—the modem pool is overloaded. Sunday night is impossible." So she logs on before work, which leaves her little time to reflect and respond to mail, even when she is inclined to do so.

Jack had similar access problems. He lives outside the local dialing area, but eventually learned how to telnet from one computer to another. This made communication from home to the university economically feasible.

5. *Finding a voice and having something to say*. Lynn described some of the concerns that are keeping her from finishing her homepage. "The issue of progress isn't with the technology. There's lots of supports—We know how to get help. My problem is the CONTENT, not the technology. I still don't know what I want to put into my homepage, and how I want it to look."

Frank agreed with Lynn. "I used the 'private' command to lock up my homepage until I'm ready to show it off. I'm spending time developing the text document. I want to make sure my stuff is substantive and cogent. I don't want the whole world thinking I'm a fool!"

Followup with Students and Faculty

To examine possible shifts in students' perceptions and Internet use since the Spring term, a follow-up interview via e-mail was conducted during the fall of 1995. A short questionnaire was sent to the thirteen students who had been enrolled in the spring doctoral seminar.

The students were asked to re-assess their attitudes, perceptions, and use of e-mail and the Internet in relation to their academic work. Seven of the thirteen students replied. Their comments reveal two clusters of students: Some students have remained static or resistant toward technology use, while others dynamically appropriate the technology into their research and communications. Students in the second group have entered into a dynamic relationship with the technology, with their personal and professional growth stimulated by new resources and tools available on the Internet.

This dynamic growth is reflected by an extended use of the Internet as a research tool. Kate experienced a major shift in how she thought about and used the Internet: "What I wasn't tuned into at first was my potential role on the Net...that I could be a resource for others...that I could have a site and offer my wares to the world." Kate uses the Internet almost daily to communicate within the virtual community. She gives credit to a professor who provided support as she underwent this change process.

Another equally enthusiastic adopter is Scott. His use of the Internet has been stimulated by his experiences outside the department. He commented, "...I conferred with an acquaintance in Britain more frequently on e-mail this semester than I did with my classmates at UCD." Scott questions the department's support of the Internet as a resource for students. He is concerned that some students perceive the Internet as not a valued resource or a place to participate in the larger academic community. For technical support, another student, Oprah has also reached out to the broader Internet community, seeking technical help from her daughter, a computer engineer at a university in another state.

In contrast, we noted the work done by the Task Force extends beyond our university walls. One student who sees values in the Internet but uses these resources irregularly, reported that he would use locally developed resources to develop a homepage at a neighboring university.

Janell, an active e-mail user, explains why she doesn't take advantage of Internet resources:

> My thinking has not changed re: the Internet since May. I still think that it is a very time consuming effort to search and/or monitor the Internet for my learning needs. I realize that the vast amount of information available could be invaluable, but I do not currently have the time or the inclination to 'fight' the technology as well as the effort needed to 'find' what I need.

We can only conclude that the six students who chose not to respond to the followup questions may hold similar views. Person-to-person followup may shed further light on these students' use of e-mail and the priority of the Internet in their graduate studies.

Recognizing the central role played by faculty members in setting a tone for a department's local culture, we decided to probe into faculty attitudes. In spite of their affiliation with a technology program—or perhaps because of it!—faculty members can be expected to show varying attitudes toward the adoption of new technologies. Four faculty members in

the ILT department were contacted to participate in a telephone interview. Three of the four responded. Two of three interviews were conducted via phone and one via an e-mail interview.

The interviews revealed different levels of use and interest toward the Internet. One faculty member has been using the electronic medium to communicate globally with an entire class, establishing online discussion groups and encouraging individual communication among class members and their professor. Students are encouraged but not required to use online resources for class projects. Another faculty member also encourages students to communicate via e-mail, requiring it for some classes. But non-adopters can be found among faculty members, too. The third faculty member felt the Web is not a credible place to either place a paper or to find published research of fellow academics. Using the Internet is perceived to be a cumbersome, time consuming activity.

Overall, student and faculty comments were consistent with survey responses in showing the diverse responses the Internet can provoke. Some members of the local culture make a conscious, reflected choice to avoid these technologies, while perhaps most make cautious, calculated forays as time and expected payoff allow. For the Task Force, dedicated to continuing the assimilation of the Internet culture into the local culture, these findings provide a clear mandate for respecting diverse points of view and for providing comprehensive support. We are at beginning stages in providing that support, as reported in the section below.

WHERE WE ARE NOW: A PROGRESS REPORT

The response of the Task Force to surveys and interviews have taken a number of forms, including:

—developing information brochures describing local resources;
—creating a student distribution list for job announcements, etc.;
—maintaining and improving departmental homepages and resources;
—a continuing research agenda related to adoption and change.

ILT faculty members, in spite of their diverse views toward the Internet, have responded in turn with a number of supportive gestures, including:

—in many cases, encouraging e-mail use within classes and between advisors and students;
—establishing greater presence of telecommunications, distance learning, and Web authoring in curriculum offerings;
—inserting an e-mail policy statement into the ILT student handbook, mandating regular access.

Overall, the local culture is moving toward the Internet, but we are far from assimilating the two cultures. E-mail us is becoming routinized, but using the Internet varies dramatically, with faculty differences continuing to play a key role. Internet use has not yet transcended individual courses to become a habit among community members in general. A number of concerns remain, including:

—concerns with equity and access from labs, work, and home;
—varying expectations among faculty and courses;
—lack of a graphic interface (SLIP/PPP) from home, resulting in different standards for software and interface;
—continued difficulty getting connected from home;

Increasing forays are being made toward integrating Internet resources into coursework. Most recently, a course is being planned for the spring that will be taught primarily via e-mail and the Web.

A significant factor affecting the adoption of Internet resources within the School of Education is the competition from a School-sponsored e-mail system called Colorado Educators Online or CEO. CEO is based on the First-Class BBS system and allows access to listservs but not the Web. CEO is used as the primary e-mail system by Education faculty members and is promoted heavily to school districts within the Denver metro area. A significant advance has recently been made which allows access to CEO via Netscape on the Web. We are hopeful that once students and faculty invest in SLIP access from home, the Web will be more easily integrated into their regular e-mail activities.

The Internet Task Force continues in its goals to support the integration of Internet resources in the School. We struggle to maintain a dual focus of maintaining Web pages while at the same time promoting and seeking to understand the adoption process. This semester, we have begun splitting these two responsibilities among two sub-groups, one charged with Web maintenance and the other charged with engaging in change research.

CONCLUSIONS AND RECOMMENDATIONS

Theory and practical knowledge about how to use the Internet lags behind the technology itself. This is to be expected. Cuban (1986) surveyed the history of technologies used in education and found a pattern that included initial stages of excitement and hype, followed by predictable backlashes and retrenchment. Initial uses of a new technology tend to mirror existing educational forms and practices—e.g., traditional classrooms, lectures, and control structures. Eventually

we expect to see greater departure from traditional educational forms, with the Internet enabling new paradigms and approaches to learning (Blurton, 1994; Lemke, 1993).

To understand people's use and resistance of the Internet, we have felt a need to go beyond traditional adoption models (e.g., Rogers, 1995). The coming role of e-mail and the World-Wide Web in people's lives may better be understood when seen in systemic, organismic, and chaotic terms (Bateson, 1972; Kelly, 1994). We are presently drawing on theoretical frameworks of biologists, cognitive psychologists, and anthropologists as we seek to understand the learning potential of the Internet.

Our observations have also heightened our awareness of the difficulty in bringing two cultures together. Users must surpass a number of barriers as they become initiates into the Internet culture. We found the technical barriers to be the easiest ones to solve. But there are many more that are rooted in culture, lifestyles, learning styles, paradigms, and comfort zones. These cultural aspects of Internet use provide rich opportunities for further research, theory development, and guidance for practice.

David Perkins (1996) notes an important kind of learning that is not often acknowledged in formal school settings: *Knowing your way around.* Just as we knew our way around our neighborhood as children, Perkins suggests that knowing our way combines a number of kinds of knowing, including:

> ...having a sense of orientation, recognizing problems and opportunities, perceiving how things work together, possessing a feel for the texture and structure of the domain. It encompasses not just explicit but tacit knowledge, not just focal awareness but peripheral awareness, not just a sense of what's there but what's interesting and valuable....*[K]nowing your way around resonates with the notion of a learning environment.* (p. *vi*)

Knowing our way around can be critical in a variety of domains:

> We can speak sensibly of knowing your way around the stock market, playing baseball, and any discipline, for instance physics or English literature. To really know any of these domains requires a kind of flexible orientation to what things and places they contain, what resources they afford, and how to get jobs done.... (Perkins, 1996, p. *vi*)

We agree with Perkins. People who learn their way around the Internet are learning more than facts, rules, and procedures. As Perkins notes, being able to "get around" an information-rich environment is closely related to mastering the complexity of modern disciplines (*cf.* Kelly, 1994). Through the Internet and similar collaborative learning environments, people can become enculterated into new disciplines and knowledge-building communities (Scardamalia & Bereiter, 1994). Students facing limited resources in their local environments (e.g., an under-funded, inner-city school) potentially can reach out to unlimited resources on the Internet. The possibilities are staggering: The Internet has the potential to be an "equalizer" that introduces novice outsiders into a rich community full of resources and expertise.

Of course, something is missing from the picture. Impoverished or dysfunctional local communities will not prepare students with the metacognitive and dispositional qualities needed to take advantage to a rich virtual environment. Students who have never "seen the light" of day cannot be expected to rush outside and begin playing football on the lawn. Even so, the Internet may come to serve as a "Trojan horse" in such limited local environments, subverting the established order, providing a second voice or second perspective that will stimulate change at the local level.

Even within healthy local environments, providing clear guidance for practitioners is a challenge as they try to incorporate the Internet. Understanding the factors affecting use, however, should help educators get a better grasp of methods to bridge the gap between the two cultures. In this light, we offer the following recommendations to educators using the Internet:

1. Provide experiences which guarantee first-time success (e.g., don't require users to install and configure their own software).
2. Provide ample scaffolding from initial direct hand-holding to on-line job aids and help facilities, to on-going human (peer) support. Everyone in our study benefited most significantly from direct, live, person-to-person support.
3. Integrate Internet resources by providing authentic tasks that provide students legitimate reasons to use the technology.
4. Integrate Internet resources into traditional classrooms, but also cultivate informal, student-directed uses. Internet adoption will be most successful in organizations that encourage independent and collaborative inquiry, student-directed learning, and professional responsibility.

5. Encourage adoption of Internet cultural practices through a variety of incentives, policies, and practices, but keep to a minimum explicit mandates and requirements. Seek to create an atmosphere of expected and natural Internet participation without the feeling of coercion.
6. Encourage students to represent themselves to a world-wide community of learners by offering unique contributions to society's knowledge base. This single strategy affords ownership and empowerment—the learner has made her presence known in cyberspace. She is attached to the World-Wide Web!

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