Teaching at an Internet Distance: the Pedagogy of Online Teaching and Learning

The Report
Of a 1998-1999
University of Illinois Faculty Seminar

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Summary

In response to faculty concern about the implementation of technology for teaching, a year-long faculty seminar was convened during the 1998-99 academic year at the University of Illinois. The seminar consisted of 16 members from all three University of Illinois campuses (Chicago, Springfield, and Urbana-Champaign) and was evenly split, for the sake of scholarly integrity, between "skeptical" and "converted" faculty. The seminar focussed almost entirely on pedagogy. It did not evaluate hardware or software, nor did it discuss how to provide access to online courses or how to keep them secure. Rather, the seminar sought to identify what made teaching to be good teaching, whether in the classroom or online. External speakers at the leading edge of this discussion also provided pro and con views.

The seminar concluded that online teaching and learning can be done with high quality if new approaches are employed which compensate for the limitations of technology, and if professors make the effort to create and maintain the human touch of attentiveness to their students. Online courses may be appropriate for both traditional and non-traditional students; they can be used in undergraduate education, continuing education, and in advanced degree programs. The seminar participants thought, however, that it would be inappropriate to provide an entire undergraduate degree program online. Participants concluded that the ongoing face-to-face interaction between teacher and students, and among students themselves, was an integral part of a university education.

Because high quality online teaching is time and labor intensive, it is not likely to be the income source envisioned by some administrators. Teaching the same number of students online at the same level of quality as in the classroom requires more time and money.

From our fundamental considerations of pedagogy we have prepared a list of practice-oriented considerations for professors who might be interested in teaching online, and another list for administrators considering expanding online course offerings.

Practical Considerations for Faculty:

i) Whom do I teach? (Sections 2,3)

The fraction of “nontraditional” students is not as high as some make it out to be, but is still significant. Stemming from the baby boomlet, the number of young, “traditional” students will be as high or higher than ever through the next decade. Many contexts of online course delivery, for professional training/continuing education, undergraduate education, and graduate education for both traditional and nontraditional students, are viable. There are several exceptions: first, certain types of advanced graduate work cannot be performed online, and second, traditional students benefit from the maturing, socializing component of an undergraduate college education and this requires an on-campus presence.

ii) How do I teach? (Sections 4,5)

Attempts are being made to use instructional technology such as real-time two-way videoconferencing in efforts to simulate the traditional classroom. With improvements in technology this mode may yet succeed, but from what we have seen, the leaders in this area recommend shifts from “traditional” teaching paradigms. Two new

online paradigms that appear to work well are text-based computer mediated communication (CMC) for courses that are traditionally taught in the discussion or seminar mode, and interactive, graphically based material for courses that are traditionally taught in the lecture mode. Methods are by no means limited to these two.

iii) How many do I teach? (Section 5)

High quality teaching online requires smaller student/faculty ratios. The shift from the classroom to online has been described as a shift from "efficiency to quality". We also believe a motivational human touch must come into play as well in the online environment, as it does in the traditional classroom. Students should feel they are members of a learning community and derive motivation to engage in the material at hand from the attentiveness of the instructor.

iv) How do I ensure high quality of online teaching? (Sections 2, 6, 7)

Quality is best assured when ownership of developed materials remains in the hands of faculty members. The University of Illinois' Intellectual Property Subcommittee Report on Courseware Development and Distribution recommends that written agreement between the courseware creator and the administration be made in advance of any work performed. Evaluation of learning effectiveness is also a means to ensure high quality. We suggest a broad array of evaluation areas that includes, but is not limited to, a comparison of learning competence with the traditional classroom.

Policy Issues for Administrators:

i) How do I determine the worth of teaching technology? (Sections 1, 2)

On any issue involving pedagogy, faculty members committed to teaching should have the first and last say. On the other hand, faculty must be held responsible for good teaching. Online courses should not be motivated by poor instructor performance in large classes.

ii) How do I encourage faculty to implement technology in their teaching? (Section 7)

Teaching innovation should be expected, respected, and rewarded as an important scholarly activity. At the same time, not all classes are amenable to online delivery.

To ensure the quality of a course, it is essential that knowledgeable, committed faculty members continue to have responsibility for course content and delivery. Therefore, intellectual property policies should allow for faculty ownership of online courseware. The commissioning of courses from temporary instructors should be avoided, and the university should be wary of partnerships with education providers in which faculty member have commercial interests.

iii) Will I make money with online teaching? (Sections 3, 5)

The scenario of hundreds or thousands of students enrolling in a well developed, essentially instructor-free online course does not appear realistic, and efforts to do so will result in wasted time, effort, and expense. With rare exceptions, the successful online courses we have seen feature low student to faculty ratios. Quality usually doesn't come cheaply: sound online instruction is likely to cost more than traditional instruction. Some students may be willing to pay more for the flexibility and perhaps better instruction of

high quality online courses. This appears to be the case for a number of graduate level business-related schools. However, it is likely that a high number of "traditional" students, will continue to want to pay for a directly attentive professor and the on-campus social experience.

iv) How do I determine if online teaching is successful? (Sections 5, 6)

We think that a rigorous comparison of learning competence with traditional classrooms can and should be done. High quality online teaching is not just a matter of transferring class notes or a videotaped lecture to the Internet; new paradigms of content delivery are needed. Particular features to look for in new courses are the strength of professor-student and student-student interactions, the depth at which students engage in the material, and the professor's and students' access to technical support. Evidence of academic maturity, such as critical thinking and synthesis of different areas of knowledge should be present in more extensive online programs.

1) Origin and Objectives of Seminar

At the University of Illinois, as at many others, the call has arisen to teach with timely technology. In October 1997, President James J. Stukel promulgated this vision statement (Stukel 1997):

> "Towards full realization of our enduring core values, the University of Illinois will lead nationally in creating, assessing, transferring, and integrating advanced technologies, in our research, teaching, outreach and operations."

This direct reference to online teaching was made:

> "…Indeed, the Internet, and the technology which supports it, may well constitute the third modern revolution in higher education. The land-grant movement in the Nineteenth Century brought access to higher education to the middle class. The community college movement of the Twentieth Century brought universal access to higher education. The technology revolution of the Twenty-first Century can bring access to all beyond the bounds of time and place."

On the crest of the computer revolution, and especially with the advent of the Internet, the academy is asking how technology might be utilized to improve the teaching and learning of university students. How can high quality "teaching at an Internet distance" or "online teaching" be assured? Just where does the traditional "face to face" classroom sit in the sea of information technology? Taken to the extreme, will bricks and mortar be wholly replaced by fiber optic cable and PCs? In the last chapter of "Learning Networks," co-authored by four of the pioneers of computer-mediated communication (Harasim et al., 1995), the authors imagine such startling possibilities as statewide closure of community college systems.

Following President Stukel's statement, a number of the faculty voiced concern about this "vision." For example, in response to what he believed was too much top-down implementation of technology in U of I classrooms without due consideration to pedagogy, John Regalbuto of UIC's Chemical Engineering Department wrote (Regalbuto 1998a):

> "My concern is this: the essence of teaching is the relationship established between a professor and his or her students. Great teachers may well be able to establish great rapport over a distance… But…great teachers have not been approached as a body to help plan the implementation of distance learning. …I believe a sanctioned study by…(a) committee of great teachers will provide assurance for the faculty as a whole and will yield valuable insight and meaningful direction for the implementation of distance learning."

In response to the concern represented by this letter, then Vice President of Academic Affairs Sylvia Manning proposed a scholarly study of "Teaching at an Internet Distance (TID)," or the pedagogy of online learning, in the form of a faculty seminar.

The seminar mode, as opposed to a committee, was adopted to emphasize the learning to be experienced by its members. The seminar was not to focus on practical matters like security or software. The "seminar should avoid matters of governance, personnel policy and technical issues such as registration. It should focus exclusively on pedagogy and the quality of the educational experience, including both student and faculty satisfaction." (Manning 1998) From the beginning, hardware, software, and technical support were assumed to be free of any shortcoming, so that the discussion would remain entirely on pedagogy. And yet, from this fundamental consideration of pedagogy there should arise some practical guidelines for those faculty wishing to implement online teaching (Manning 1998, Regalbuto 1998b).

A group representing 16 different colleges on the three U of I campuses (Chicago, Springfield, and Urbana-Champaign) was assembled, with the one common criterion that members be "outstanding and highly committed teachers" (Manning 1998). [A complete list of the TID faculty members is found in the appended seminar syllabus.] To ensure academic balance, a roughly even split was made between the "converted" or online-using or advocating faculty, and "skeptical" or online-doubting professors. (The point was made early on that this distinction was not so accurate; skepticism in some had arisen not out of a distrust of technology, but because the pedagogy of online teaching had not yet been considered. From that standpoint, the "skeptics" simply felt they were "sitting on the fence" (JR 1998b)). Over the course of the 1998-99 academic year, the faculty seminar met in face-to-face retreats and via videoconference, and with invited speakers chosen to represent both "converted" and "skeptical" bents. The list of seminar speakers and links that provide additional information about them are given below in Table 1.

Table 1. Seminars Presented to the TID Faculty Seminar

Date	Speaker	Affiliation	Title
Sept. 23, 1998	Prof. Linda Smith (http://www.vpaa.uillinois.edu/tid/meetings/092298/)	Library and Information Science, UIUC	Teaching in LEEP 3
Nov. 3, 1998	Prof. Curtis Bonk (http://www.vpaa.uillinois.edu/tid/meetings/110398/)	Counseling and Educational Psychology, Indiana U.	Electronic Collaboration Theory, Research, and Pedagogy: Stories from Indiana University
Nov. 17, 1998	Prof. John Etchemendy (http://www.vpaa.uillinois.edu/tid/meetings/111798/)	Dept. of Philosophy and Symbolic Systems, Stanford	Technology to Enhance the Classroom, Not Replace It

Dec. 1, 1998	Prof. Janice Newson (http://www.vpaa.uillinois.edu/tid/meetings/120198/)	Sociology, York U.	Distinguishing the Hype from Practice: Inquiring into the Pedagogical Claims of Computer-Mediated Instruction
Jan. 15, 1999	Prof. Mark Gelula (http://www.vpaa.uillinois.edu/tid/meetings/011599/)	Medical Education, UIC	In Teaching, Enthusiasm is Perception, Not Personality
Feb. 2, 1999	Profs. David Hansen and Nick Burbules (http://www.vpaa.uillinois.edu/tid/meetings/020299/)	Education, UIC, Educational Policy Studies, UIUC	Good Teaching
Feb. 19, 1999	Prof. Linda Harasim (http://www.vpaa.uillinois.edu/tid/meetings/021999/)	Communication, Simon Fraser U., Vancouver	What We are Learning about Online Learning: Lessons from the Virtual-U Field Trials
Mar. 12, 1999	Prof. Andrew Feenberg (http://www.vpaa.uillinois.edu/tid/meetings/031299/)	Philosophy, San Diego State U.	Distance Learning: Promise or Threat
Apr. 2, 1999	Prof. David Noble (http://www.vpaa.uillinois.edu/tid/meetings/040299/)	History, York U.	The History of Correspondence Schools
Apr. 13, 1999	Prof. Pat Shapley (http://www.vpaa.uillinois.edu/tid/meetings/041399/)	Chemistry, UIUC	Online Instruction of Chemistry 331

At the opening retreat, the fundamental pedagogical nature of the seminar was once again confirmed in lieu of a more "nuts and bolts" discussion of immediately practical issues. As one member, an associate dean, put it, "I deal with practical issues every day. I want to do the fun stuff!" Discussions of the elements of good teaching indeed did invigorate this group. Reviewing the literature it appears that few other groups have done the "fun stuff". The widely circulated "Seven Principles of Good Practice in Undergraduate Education" paper by Chickering and Gamson (1987) of the American Association for Higher Education has been updated with technology in mind (Chickering and Ehrman, 1997) in a brief document titled "Implementing the Seven Principles: Technology as Lever." Both of these documents will be reviewed in detail later. The

American Distance Education Consortium (ADEC)has similarly derived a set of Guiding Principles for Distance Teaching and Learning (http://www.adec.edu/admin/papers/distance-learning_principles.html). In April of 1999 the American Federation of Teachers and the National Education Association commissioned a comprehensive review of distance learning research from the Institute for Higher Education Policy (IHEP).Published under the title "What's the Difference: A Review of Contemporary Research on the Effectiveness of Distance Learning in Higher Education" (Phipps and Merisotis, 1999), the IHEP report incorporates the comprehensive evaluation of Russell (1999). The ADEC and IHEP works focus on evaluation and not the formulation of pedagogy.

Perhaps the closest work to our own is another set of guiding principles developed by Lawrence Ragan of the Innovations in Distance Education Project at Penn State (Ragan, 1998). Part of this project involved a faculty initiative of which the culminating work was the "Emerging Set of Guiding Principles and Practices," which "provide a philosophical foundation for the design and development of educational programming at a distance."

Three stages in the study of online pedagogy were initially suggested (Regalbuto, 1998b): 1) a kick-off retreat and ensuing webboard discussion on the elements of good teaching, to consider if any "essence" could and should be translated to online teaching, 2) presentations from within the group and from external speakers on the educational theory and practice of good online teaching, and 3) presentations from those who have evaluated online teaching with respect to the traditional classroom. The idea was to try to understand good practices of online pedagogy through steps 1 and 2, so as to be able to anticipate the successes and failures of online programs seen in step 3. As will be described in subsequent sections, online evaluation is inherently difficult and published results are ambiguous and scant. Thus, our seminar's understanding of online pedagogy could not be "tested" to any great extent, although we do offer some thoughts on evaluation in section 6.

On the other hand, the first and second stages were accomplished with sufficient thoroughness that we believe we can suggest to the University of Illinois community and beyond, in section 8, a number of online teaching and learning recommendations that uphold sound pedagogy.

Bonk and Cunningham (1998) state "The lack of pedagogical guidance about integrating tools for collaboration and communication into one's classroom or training setting leaves instructors across educational settings with mounting dilemmas and confusion." We hope that our efforts to study online pedagogy will provide part of the "pragmatism" needed to rectify "dilemmas" occurring in the implementation and evaluation of instructional technology. In particular, we seek to provide guidance for high quality online instruction; this will increase what students can effectively learn online and, we hope, will provide direction to universities on how to spend their funds wisely in this area.

2) The Present Status of Online Instruction

In this report, "online instruction" refers to teaching and learning mediated by a computer. Online instruction implies a connection to a computer system at a venue distinct from the learner's personal computer; this venue can be across the world or across campus. Computer-mediated communication (CMC) is the term preferred by Linda Harasim and co-authors (1995) to connote the interactive textual exchange in learning networks. A related term is computer-mediated instruction, or CMI. Learning networks are comprised of professors and students communicating with each other in real time (synchronously) or off-line and sequentially (asynchronously). Computer-assisted instruction (CAI) is normally applied to the "drill and practice" type of computerized instruction (Harasim et al., 1995, Kowalski, 1998) as used for military training or elementary education, in which little if any two way exchange of ideas occurs. While the term "distance education" can also be used for CMC, CMI, or CAI, in the last few years it has most generally been used to connote "correspondence coursework" utilizing textual, videotape, or CD materials exchanged by mail, or courses presented over the television or via videoconference.

Online teaching and learning occurs in a range of modes. Briefly, these modes, in order of an increasing computer component, are 1) supplemental or adjunct, 2) mixed, and 3) wholly online. (For a not-so-brief, ten-part gradation, see Bonk and Cummings et al., 1999) A good example of the adjunct mode is the approach of John Etchemendy of Stanford. In his presentation to us he demonstrated how new paradigms of teaching, in particular for geometry (Geometer's Sketchpad, http://www.keypress.com/product_info/sketch30.html), logic (Tarski's World, http://hypatia.stanford.edu/hp/Logic-software.html#Tarski) and computability (Turing's World, http://hypatia.stanford.edu/hp/Logic-software.html#Turing), were possible only with the interactive graphics of a computer. This is a very significant point, which should be mentioned early and often – computers beget novel and powerful teaching tools. In his demonstration of Geometer's Sketchpad, which is used in junior high education, his point was that not only can geometry students learn to prove geometric theorems, but also by manipulating geometric figures with great facility and clarity, the student can see how new theorems are thought of in the first place.

The deeper consideration is of course how the computer tool is utilized for class teaching. The title of Etchemendy's seminar was "Technology to Enhance the Classroom, Not Replace It." He used his software packages as supplements to his face-to-face classroom teaching, noting that the material explored by each package was only one part of a larger body of course content.

Success with the adjunct mode may lead to a transition to mixed mode. For example, Jerry Uhl of UIUC's math department became so convinced that the interactive experience provided by Mathematica-based courseware was superior, that he no longer teaches calculus with lectures (Uhl, 1997). His students are all on-campus, and meet in the classroom only infrequently for follow up discussion of the computer courseware. In like manner, Pat Shapley of the UIUC Chemistry department developed visualizations of organic chemistry to the extent that she now offers a junior level course in organic chemistry in mixed mode. Again, the majority of the teaching and learning occurs

though the Internet, and the class meets once weekly to cover problematic areas. The pedagogy of both of these courses will be discussed later in section 5.

Courses and even whole degree programs can be delivered essentially wholly online. Such is the mode of the site-independent M. S. in library and information science (LEEP3) program of the Graduate School of Library and Information Science (GSLIS) at UIUC, a distance alternative to on-campus programs for the same degree. Participants in LEEP3 are mainly place-bound individuals working in libraries. Different instructors, all with apparently good success, devote different amounts of time to synchronous sessions (employing real-time audio, web site viewing, and text chat) and asynchronous conferencing. Again, the pedagogy behind this program will be discussed in the later section.

A Survey of Online Programs and Resources

Due to the rapid growth of online courses and whole degree programs, it is impossible to list precisely the current number of these courses and programs. In April of 1999 the New York Times estimated that online courses number in the thousands (Koeppel, 1999) and listed a sampling of 11 accredited institutions making significant online inroads. These are given below in Table 2.

Table 2. A Sampling of Universities Offering Online Programs

School and URL	Description
American Military University www.amunet.edu	Founded in 1993, this correspondence school in Virginia offers master's and bachelor's degree programs in military studies, management and history and intelligence studies to its 1500 students. The school now offers bachelor's degrees in military subjects online.
Berean University www.berean.edu	The Springfield, Mo., college has trained students to become Assemblies of God ministers since 1948. It now has a technologically advanced online option, including two-way live audio conferencing and audio summaries of every lesson, for several hundred of its 14,000 students.
Duke University www.fuqua.duke.edu	Duke's Global Executive MBA, a 19-month program combining online and classroom instruction, accepts 90 students, usually with international management responsibilities and 10 year's experience. Employers often pick up the entire tuition of $85,000. In addition to online work, students meet professors, business leaders and one another at two-week residencies at Duke's campus in Durham, N. C., and in Europe, Asia, and South America.

International School of Information Management www.isim.com	This Denver School has offered graduate degrees in business and information management by mail since 1987, and now offers master's of science and MBA's over the Internet. Students must develop a Capstone Project, which is similar to a thesis but done at work.
Jones International University www.jonesinternational.edu	This newly accredited institution, which exists only online and draws faculty from colleges across the country, offers a master's in business communication and credits toward a B.A. degree.
Oxford University www.conted.ox.ac.uk	In January [1999], the university began a two-year certificate program in computer science as part of its new Technology Assisted Lifelong Learning Department. Sixty students, chosen from about 300 applicants, are enrolled. They are required to report to campus in England one week each year to meet instructors and take final exams. A second course on researching local history, one of Oxford's most popular programs, was to begin later in the spring.
Pennsylvania State University www.worldcampus.psu.edu	Penn State was one of the first universities to offer distance education, delivering agricultural education materials to isolated farmers. Just a year old, its online World Campus has non-degree programs in mostly vocational and technical subjects, from turf grass to hotel management. Two-year associate degree programs are being introduced in late spring 1999, with master's and bachelor's over the next few years.
Stanford University scpd.stanford.edu	Stanford began Internet courses for working professionals in 1995. Now students can take online graduate-level courses in all engineering specialties and earn a master's solely online in electrical engineering, which takes three to four years for most part-time students.
University of Illinois www.online.uillinois.edu	When UI-Online, one of the fastest growing programs, started in 1997-98, it had 68 courses and 1200 students. By the end of this year [1999], UI-Online expects to have 160 courses and 4500 students. The school offers five master's degree programs and is developing other master's and certificate programs in subjects that include library science, education and computer science, as well as a doctor of pharmacy.
University of Phoenix www.uophx.edu	With "campuses" in rented buildings in 13 states and Puerto Rico, the school provided no-nonsense education to 56,000 students, 8500 of them online. Online offerings include B.A.'s and M.A.'s in subjects like business, nursing, and education. Students must be at least 23 years old and employed to attend.
Western Governors University www.wgu.edu	Sponsored by 17 states and Guam, the school opened its virtual doors in September [1999]. It offers four associate degrees in technical fields and one in the arts. The school works on a "competency-based" system; courses are not for credit, and students

	take proficiency tests to determine if a degree will be awarded. Some 300 courses are offered by 31 learning institutions. The university is awaiting accreditation, but most courses come from accredited schools.

There have also appeared a number of journals and professional communities devoted to online or distance education. These are given in Tables 3 and 4 respectively along with some descriptive remarks.

Table 3. A Survey of Online and Distance Learning Journals

Journal	Description
The Journal of Asynchronous Learning Networks (published online by Vanderbilt University) www.aln.org/alnweb/journal/jaln.htm	The aim of the Journal of Asynchronous Learning Networks is to describe original work in asynchronous learning networks (ALN), including experimental results. The Journal adheres to traditional standards of review and authors are encouraged to provide quantitative data. In addition, major reviews and articles that outline current thinking will be accepted. The initial objective of the Journal is to establish ALN as a field by publishing articles from authoritative and reliable sources. Ultimately, the objective of the Journal is to be the central resource for knowledge about ALN.
ALN Magazine (published online by Vanderbilt University) www.aln.org/alnweb/magazine/alnMaga.htm	The ALN Magazine is devoted to topics in ALN that do not fall in the traditional journal format. These topics include reports of uses of technology, experiences with ALN courses, reports of activities on various campuses or in industry and summaries of ALN activities.
Cause/Effect (published by Educause) www.educause.edu/pub/ce/cause-effect.html	CAUSE/EFFECT is a practitioner's journal for college and university managers and users of information resources--information, technology, and services--published quarterly by EDUCAUSE. Written by campus practitioners, articles are peer-reviewed prior to publication. Articles related to planning for, developing, managing, evaluating, and using information resources on college and university campuses are welcomed.
Educom Review (published by Educause) www.educause.edu/pub/er/erm.html	Educom Review explores the changing ways we will work, learn, and communicate in the digital world of the 21st century. The accelerating pace of development in computer and communications technology is transforming education. Educom

	Review monitors those developments along with related issues in management, planning, law, and policy
The Technology Source (published online by the University of North Carolina at Chapel Hill) horizon.unc.edu/TS/	The purpose of The Technology Source is to provide thoughtful, illuminating articles that will assist educators as they face the challenge of integrating information technology tools in teaching and in managing educational organizations.
The Journal of Distance Education (a Canadian journal published by the University of New Brunswick) www.hil.unb.ca./Texts/JDE/homepgENG.html	The Journal of Distance Education is an international publication of the Canadian Association for Distance Education (CADE). Its aim is to promote and encourage scholarly work of an empirical and theoretical nature that relates to distance education in Canada and throughout the world. The mandate of CADE is to meet the needs of Canadian professionals and scholars in distance education, and this end will best be served by providing a forum for the dissemination of international scholarship. Providing such a forum enables Canada to play an important role in helping to establish and maintain a body of knowledge that will be recognized as the foundation for our profession in coming decades.
The Journal of Educational Multimedia and Hypermedia (published by Penn State University) www.cde.psu.edu/ACSDE/Jour.html	The Journal of Educational Multimedia and Hypermedia is designed to provide a multi-disciplinary forum to present and discuss research, development and applications of multimedia and hypermedia in education. The main goal of the Journal is to contribute to the advancement of the theory and practice of learning and teaching using these powerful and promising technological tools that allow the integration of images, sound, text, and data.
The Journal of Interactive Learning Research (published by the Association for Advancement of Computing in Education) http://www.aace.org/pubs/jilr/	The Journal of Interactive Learning Research publishes papers related to the underlying theory, design, implementation, effectiveness, and impact of interactive learning environments in education and training.

Table 4. A Survey of Professional Communities for Online and Distance Learning

Community	Description
The Web of Asynchronous Learning Networks www.aln.org	The Web of Asynchronous Learning Networks (ALN-WEB) is maintained by the ALN Center at Vanderbilt University. In addition to serving as the home of the *Journal of ALN* and *ALN magazine*, ALN-WEB serves as an online forum for the community of ALN researchers and practitioners. Many of the participants are involved with programs funded by the Alfred P. Sloan Foundation.
Educause www.educause.edu	EDUCAUSE focuses on the management and use of computational, network, and information resources in support of higher education's missions of scholarship, instruction, service, and administration. Through a variety of policy initiatives and demonstration projects, EDUCAUSE conceives and organizes the necessary technical and policy infrastructure to support higher education's continued renewal.
The Western Cooperative for Educational Telecommunications www.wiche.edu/telecom/	The Western Cooperative for Educational Telecommunications is a membership-based organization open to providers and users of educational telecommunications. Established in 1989, the Western Cooperative facilitates resource sharing, information sharing, and policy advocacy in the use of educational technologies and telecommunications. Members come from higher education, non-profit organizations, K-12 schools, and corporations located in 33 states, Canada, Malaysia, and Norway..
Association for the Advancement of Computers in Education www.aace.org	The Association (founded in 1981) is an international, educational, and professional organization dedicated to the advancement of the knowledge, theory, and quality of learning and teaching at all levels with information technology. This is accomplished through the encouragement of scholarly inquiry related to information technology in education and the dissemination of research results and their applications.
United States Distance Learning Association www.usdla.org	The United States Distance Learning Association is a non-profit association formed in 1987. The association's purpose is to promote the development and application of distance learning for education and training. Constituents include K through 12 education, higher education, continuing education, corporate training, and military and government training.
The NODE Learning Technologies Network node.on.ca	The NODE Learning Technologies Network is a not-for-profit electronic network facilitating information and resource sharing, collaboration and research in the field of

	learning technologies for post-secondary education and training. The functions of the NODE are to gather and disseminate information in areas of need; to offer professional development activities; to facilitate collaboration among universities and colleges; and to research issues and practices in technologically mediated teaching and learning.
Telelearning Network Centres of Excellence www.telelearn.ca	The Telelearning Network of Centres of Excellence actively stimulates and tracks leading telelearning research advances in collaboration with university and industry partners throughout the world. Over 120 researchers from across Canada are evaluating the effectiveness of new learning models, analyzing the cost-benefits and social impacts of implementing telelearning, and creating telelearning software prototypes, based on innovative learning models.
Distance Education Online Symposium www.ed.psu.edu/ACSDE/DEOS.html	The Distance Education Online Symposium was established in 1991 by The American Center for the Study of Distance Education at Penn State, with support from the Annenberg/CPB Project. The symposium comprises DEOSNEWS, an electronic journal for distance educators, and DEOS-L, an electronic forum. The purpose of DEOS is to disseminate information and to support international computer conferencing through systems accessible to professionals and students in the field of distance education.

Internet-based education is very much in the forecast for the State of Illinois generally and the University of Illinois higher administration in particular. In April 1999 President Stukel declared "online education is part of our future and, like the early concepts that created land-grant universities, it is idealism at its best" (Stukel, 1999); reaffirming the "high bar" set by Burks Oakley, II, the associate vice president for academic affairs, of "achieving 10,000 online enrollments by academic year 2001-02 (Stukel, 1999)."

Stukel's goals reflect the current wave of enthusiasm for technology-mediated education found within the Illinois Board of Higher Education (IBHE) and the Illinois General Assembly. The IBHE recently announced a $405 million plan for cutting-edge Internet technology for Illinois colleges and universities (IBHE 1999a). The plan promises to make Illinois "a national leader in Internet-based education, and to extend high-speed Internet service to communities not yet wired for fiber optic connections."

The plan calls for the creation of the Illinois Century Network, which would link every higher education institution in Illinois to a very high bandwidth network. The proposed network would link these schools to elementary and secondary education institutions, public libraries, hospitals, governments, industry, small business and individual citizens.

The IBHE envisions the Illinois Century Network as a way to (1999a)

> …bring education to students, training to workers, and counsel to people in business, government, agriculture, health care, and a variety of other fields. It will be a telecommunications pipeline sufficiently big, fast, and reliable to transform education – and hence fuel economic success for Illinois and its citizens – in the next century, and will.... position Illinois at the head of the states in competing in a global economy increasingly trafficking in information and technology.

According to the IBHE, a key feature of the Network will be "the nature of its learning environment and the freshness of its information. The Network will stress its high-quality real-time interactive capability, thus engaging the learner as an active participant in the learning. Also, development of the Network will include the technological support needed to continuously update curriculum" (IBHE 1999a).

Funding from the Illinois General Assembly, the state's legislative body, seems to endorse this sentiment. For fiscal years 1997 and 1998, it appropriated $10 million and $15 million, respectively, for technology enhancements in the State's institutes of higher education; and an additional $15 million in each of fiscal years 1997 through 1999 for a statewide telecommunications grant initiative. The University of Illinois faired well in the distribution of technology enhancements funding, receiving $1, 393,400 in FY 1997 and another $2,148,300 in FY 1998.

Overall the Governor recommended an increase of $918 million in new general funds for state activities in FY 2000 - a growth rate of 4.6% - while recommending an increase of 6.2% or $137 million for higher education. This commitment to higher education may be indicative of a national trend among states toward renewed support for higher education. A report prepared for the National Conference of State Legislatures during fiscal year 1997 states (NCSL 1999):

> "After receiving steady cuts since 1990, higher education funding is on the rise. This year (1997) higher education will account for about 12% of state budgets -- a growth of 6.2 percent -- the largest increase since the late 1980s.

The higher percentage of dollars going toward higher education will likely include funding for technology as a way of training and educating the work force to compete within a global economy.

Adverse Faculty Reaction

Not all online ventures are experiencing the degree of success that was originally anticipated. After investments of millions of dollars and years of preparation and planning, the Western Governors University, a completely online operation, had a first semester enrollment of only 10 students (Noble, 1998c). The Chronicle of Higher Education recently reported that the California's Virtual University, a consortium of public and independent colleges, would cease operations as an independent distance education institution (Blumenstyk, 1999b). In the third of a series of articles entitled "Digital Diploma Mills" (Noble, 1998c), David Noble relates how concerned faculty in

the California State University (CSU) system defeated the California Educational Technology Initiative (CETI), which would have created a business deal between CSU and a consortium of computer firms such as Microsoft, GTE, Hughes, and Fujitsu. Noble also reports that at UCLA, the Instructional Enhancement Initiative, which mandated web sites for all arts and sciences courses, has "floundered in the face of faculty recalcitrance and resistance." Less than 30 percent of the faculty had complied by year's end, and several dozen had actively resisted the Initiative (Noble 1998c). At the University of Washington, 900 faculty members last year signed an open letter in opposition to the Governor's "digital education" initiatives (Noble 1998c). Going even further, the faculty at York University in Toronto struck for two months against administrative initiatives in the implementation of instructional technology (Noble, 1998a).

Several of our speakers were able to shed light on the cause of this rising tide of faculty opposition to computer mediated instruction. Andrew Feenberg of San Diego State University summarizes the situation in the opening paragraph of his "Distance Learning: Promise or Threat" (1999) article:

> "Once the stepchild of the academy, distance learning is finally taken seriously. But not in precisely the way early innovators like myself had hoped. It is not faculty who are in the forefront of the movement to network education. Instead politicians, university administrations and computer and telecommunications companies have decided there is money in it. But proposals for a radical "retooling" of the university emanating from these sources are guaranteed to provoke instant faculty hostility."

Feenberg argues that administrators are mainly concerned about the money-making potential of online instruction, and are being directed by vendors to high-priced instruments of the wrong sort. This in turn at least partly explains the ire of committed teachers. The faculty at San Diego State was part of the revolt against CETI, and Prof. Feenberg relates that during a visit to SDSU by Charles Reed, the chancellor of the statewide University of California system, he asked what the pedagogical model that had guided CETI was. The chancellor replied, "We've got the engineering plan. It's up to you faculty to figure out what to do with it." (Feenberg, 1999) We might say that any administration's lead in implementing technology in the classroom runs the risk of "technology driving pedagogy," when true concern for education dictates that "pedagogy drive technology." Indeed, Feenberg's sentiments in this article seem to parallel Regalbuto's in his vision statement response (1998a) and those of our seminar as a whole.

To proceed any further, we must back up more. How is it that commercial concerns figure so prominently, often above those of faculty, in the decisions of university administrators? Janice Newson of York University suggested to us that the introduction of educational technologies by administrators is only a current symptom of a more fundamental transformation occurring in universities. In her article "Technopedagogy: A Critical Sighting of the Post-Industrial University" (Newson, 1996) she describes an inversion of the leadership roles of faculty and administration:

> "Although faculty have continued to participate in academic governance structures such as senates and faculty councils, more and more policy is formulated in and by the expanded and increasingly professional/executive offices of senior administrators, with the faculty bodies acting as ratifiers, rather than originators of these policies."

Driven by the fiscal restraint imposed by government on the higher education sector, economics is now a chief component of administrative decision-making. This policy of "economic rationalism" has the two components of "budget-based rationalization," which includes the expansion and differentiation of a professional management apparatus, and "university-corporate linking," of the sort described earlier.

The net effect is an attempt at what Noble refers to as "the commoditization of education" (Noble 1998a). In his first Digital Diploma Mills article (Noble 1998a) he relates how Wall Street investment firms are presently eyeing the big business of higher education in the same way the health profession was eyed previously. (In a recent paper presented at the Digital Diploma Mills conference, Christopher Oberg (1998) pointed out that education is a huge business with a budget well over $200 billion dollars in 1997.) As the health industry was hammered into the money making mold of health maintenance organizations (HMOs), so is it desired that higher education become the controlled, commodified and moneymaking enterprises of educational maintenance organizations (EMOs). In a recent criticism of distance learning (Farber, 1998) a 1997 Coopers and Lybrand white paper is cited which claims that "a mere 25 courses," packaged as instructional software, "would serve an estimated 80 percent of total undergraduate enrollment in core undergraduate courses… Distributed learning involves only a small number of professors, but has the potential to reach a huge market of students" (Farber, 1998).

Controversy has also arisen over the linking of schools with commercial instructional providers. For example, Columbia University (McGeehan, 1999, Blumenstyk, 1999a) and the University of Chicago (McGeehan, 1999, Blumenstyk, 1999a, Jones and Grossman, 1999) have recently become affiliated with UNext.com, in which the school or individual faculty members hold financial interests. Controversy even extends to one of the pioneers of online teaching, Harasim of Simon Fraser University in Vancouver. Several years ago Harasim became CEO and Network Leader of the Telelearning Network of Centres of Excellence, a research network linking Canadian researchers and members of public and private sector communities. In these cases, a conflict of interest arises between the delivery of sound pedagogy and the sale of educational technology.

The implementation of online education shows both promise and peril. Computer mediated instruction may indeed introduce new and highly effective teaching paradigms, but high-quality teaching is not always assured. Administrative decisions made without due consideration to pedagogy, or worse, with policies or technology that hampers quality, may cause much wasted time, money and effort of both faculty and students.

We professors are partly to blame for the current situation. Feenberg admonishes us in this way (Feenberg, 1999):

> …The failure of faculties to demand the right and privilege of teaching returning [nontraditional] students, to innovate new formats appropriate to their needs, and to exercise control of their education has led to the current situation…. The faculty must accept responsibility now for shaping distance learning, and in the process, it should also attempt to reclaim ground lost in the development of programs for returning students.

Lehigh's president, Gregory Farrington, provides another prod in a recent issue of the *New York Times* (Mendels, 1999a):

> If administrators and faculty members are wise, …they will view the advent of the Internet not as a threat, but as a chance to launch an overdue examination of teaching methods. We've become a bit monopolistic, a bit complacent…. We've put too little of our energy into focusing on the challenge of how we create the most effective learning environment at the undergraduate level. We know how we want to teach. We too seldom discuss how do students best learn.

3) An Overview of Online Teaching and Learning

While there are as many modes of instruction as there are varieties of students, we will attempt to generalize a few categories of each so that a number of options for online instruction can be fashioned and discussed within an orderly framework.

Types of Online Education

First, we might generalize the instructional modes into four types: training, education toward an undergraduate degree, continuing education, and graduate work. In the previous section, computer assisted instruction was associated with "drill and practice" training. The market for this mode appears to be significant. For example, the Illinois Fire Service Institute (IFSI), based at UIUC, has plans to put the cognitive portion of their "Firefighter II" certification online this year through UI Online. Last year, IFSI provided training for 18,000 professional and volunteer firefighters in Illinois.

In training, a particular package of knowledge is imparted to an individual so that he or she can assume work within a system, as the firefighters do for example. According to Prof. Noble, training and education are appropriately distinguished in terms of autonomy (Noble, 1999). In becoming trained, an individual relinquishes autonomy. The purpose of education, as compared to training, is to impart autonomy to the student. In teaching students to think critically, we say in effect "Student, know thyself." Education is not just the transmission of knowledge, important as that is, but also has to do with the transformation of persons and the development of critical thinking skills.

John Dewey's theory of learning and growth fits neatly into place here. In a wide-ranging set of influential books and articles (Dewey 1960, 1980, 1997) Dewey urges educators to think of learning as at once both social and cognitive. Persons do not learn, he argues, in the way that sponges absorb water. Persons are changed, however subtly, by everything they learn. Dewey captures a powerful image of liberal learning when he shows how an adequate learning theory must embody the education of the mind, body, emotions, and spirit.

Classrooms and offices, dorm rooms and pubs are necessary for this most important part of education. In the recent book "Dancing with the Devil: Information Technology and the New Competition in Higher Education" (Farrington, 1999), Lehigh's President Gregory Farrington addresses the social dimension of undergraduate education as follows:

> …undergraduate life at a residential college is as much about learning to live as it is about learning from books…. Eighteen-year-old students nervously tiptoe onto campus at the start of their first year, and four years later they march out – sometimes after a bit of prodding, to be sure, but generally with the motivation, education, and confidence needed to take on the world. The transformation is remarkable and is as much the product of the general intellectual and social experience on campus as the result of what goes on formally in the classroom. For these students, late-night discussions are much of what college is about, and the role of the football team is truly important. It is hard to imagine distance education, however effective, being truly equivalent.

Next, we consider postgraduate education. Continuing education and lifelong learning are imprecise terms that might connote something as simple as a weeklong technical workshop or as extensive as a part-time advanced professional degree program scheduled around a full-time job. The former example might be considered professional training, as in the case of a chemical engineer at an oil company who spends a week learning the practical intricacies of distillation tower design. Professional seminars or workshops can be developed from within the company, but can also be offered to private industry by a team of university faculty members. For example, chemical engineering and chemistry faculty at the University of Delaware offer a yearly workshop in industrial catalysis. The U. S. Centers for Disease Control and Prevention have funded the Schools of Public Health at four universities, Johns Hopkins, Emory, Tulane, and Washington, to offer distance-based certificate programs to meet the unique needs of public health practitioners who require continuing education to meet the demands of a rapidly changing environment.

In these contexts the student is typically a mature professional dealing with complex subject material not suitable for "drill and practice." Certainly, none of the social component is needed here. Likewise for continuing education in the form of advanced degrees; students have already gained a great deal of socialization through their first degree, and less of this is needed unless the student has switched fields and needs socialization in the new field. In lieu of the socializing component, many graduate students must learn to perform research, and this learning component distinguishes graduate school from both undergraduate work and professional training. In many cases it may be argued that the nuances of a field and the performance of research within it must be learned under the personal mentorship of a research advisor. This need, as well as the actual performance of experimental research, greatly constrains the means of delivery of many types of graduate level work.

Research and mentorship considerations notwithstanding, demand appears to be significant for advanced online degrees (see Table 2). Michael Beller and Ehud Or of The Open University of Israel, in the *Journal of Computer Mediated Communication* (JCMC), argue that the need for specialized lifelong learning by individuals scattered across the globe is matched by the distributed accessibility of online instruction (1998). As examples, Stanford maintains a successful master of engineering program taught in the "distance education" mode (but which is converting to online education), with about 5000 students. The University of Phoenix is currently delivering online offerings including BA's and MBA's to 8500 professionals in 13 states and Puerto Rico. The online master's degrees offered by the Graduate School of Library and Information Science (GSLIS) offered by UIUC also fits this category. Students from as far away as Anchorage, Alaska, are enrolled in the online GSLIS program.

The four types of online instruction might be summarized as follows: training is the transmission of knowledge, education is the imparting of perspective, professional training, might then be considered the "training of the educated," and graduate education, "training and mentorship of the educated." As the mode of instruction is related to the type of student and university, we now need to take a look at student demographics. From the entire pool of college students, how many might benefit from and might afford the various types of online instruction?

Types of Online Students

There are two main groups of students. The "traditional" student is young (often straight out of high school), full time or significantly part-time, and attends face-to-face classes. This category would include both two- and four-year institutions. It is with the traditional student that we associate the need for socialization in college. A "mature" or "nontraditional" student might be older, working full time, and might already possess one or more degrees. By virtue of their state in life nontraditional students are more place-bound than traditional students, whether to a home in which children are cared for, or by a job location. This category also includes the "young" nontraditional student who is also place-bound, as for example, an advanced student at a small and understaffed rural high school who seeks an advanced course in college math or physics. In either case, though for different reasons, socialization is not a requisite of the college level education that each of these students might receive at a distance. With the mature student, it has already occurred, and with the young student, it will occur at a later stage.

The varieties of students, modes of instruction, and corresponding options for online delivery can be generalized as in Table 5. Of course the categories in this table are by no means definitive; they have been formulated only to help with ensuing discussion. Seven areas have been delineated - four instructional modes and two types of students for each, excepting "traditional" continuing education which by definition does not occur. Online teaching is not just for the nontraditional, place-bound student.

Universities and education providers have began to realize that significant numbers of students subscribing to totally online courses are in fact to be found on-campus; this includes UIC's own School of Public Health. Adjunct and mixed modes are possible and these by definition are available only in traditional settings.

Table 5. Seven Contexts for Online Instruction

Type of student	"Training"	"Education"	"Continuing Education"	"Graduate Education"
Traditional: - young - full time - in-class	Vocational school, employee training Online Modes: - adjunct - mixed	Associate, Bachelor degrees Online Modes: - adjunct - mixed	(not applicable)	Masters, doctorate degrees with heavy research component Online Modes: - adjunct - mixed
Nontraditional: - place-bound - part-time - mature (or young and place-bound)	Vocational school, employee training Online Mode: - wholly online	Associate, Bachelor degrees, individual courses of interest Online Mode: - wholly online	Professional workshops, certifications Online Mode: - wholly online	Advanced degrees with lesser research component Online Mode: - wholly online

Our next consideration is the distribution of traditional and nontraditional students. Contradictory interpretations exist in the literature. A ratio being cited in the online learning literature is that only 1/6 of all college students are in the 18-22 year old range

and live on campus (for example, see Applebome, 1999). Taken at face value this figure implies high demand from non-traditional students, and supports the anytime-anywhere feature of asynchronous online instruction. However, this interpretation does not appear to be supported by statistics of the National Center for Education Statistics (NCES), a division of the U. S. Department of Education (NCES 1997). A close look at these figures suggests that "nontraditional" students, while significant in number, are in a minority[1]. The 1/6th fraction does not in fact refer to the number of "traditional" students, neglecting for example young students at 2-year institutions, and students attending 4-year institutions, but living off campus. These students are hardly "nontraditional" and are no more or less in need of distance learning than residential students.

Projected enrollments in the NCES report are also at odds with the thinking of many online implementers. The enrollment of students 30 years old and over is predicted to level off after 1996, through 2007, and the enrollment of the 22-24 and 25-29 year old segments is predicted to increase slightly in this time. It is only the enrollment of students under 22 that show a dramatic increase in this nine year span, from about 5.8 million to over 7 million (NCES 1997). From 1995 to 2007, NCES projects a rise of 20 percent in enrollments of persons under 25 and an increase of 4 percent in the number 25 and over.

In light of the NCES data it does not appear that the "traditional student" is a minority at all. The number of "nontraditional" students, on the other hand, is indeed significant. Twenty-five percent of all undergraduate students are over thirty, and 23 percent of all graduate students are over 40 (NCES 1997, Table 175). Almost 60 percent of graduate students are part time.

That the ratio of nontraditional to traditional students does not appear to be as exaggerated as some suggest does not imply that the demand for online learning is low. In the following sections we look at pedagogy, both traditional and online, to see what sorts of high quality online instruction are possible and to get a rough idea about costs. In our recommendations (section 8) we will consider these contexts in light of sound pedagogy and the mission of the University of Illinois. Some types of instruction would work better for each type of student. For example, non-traditional student might benefit from wholly online instruction while traditional students might typically do best with the adjunct or mixed mode.

4) Elements of Good Teaching

Does good teaching in the classroom translate to good teaching online? If so, what elements can be translated and which ones can't or shouldn't? At first it might seem that the essence of good teaching in the classroom is impossible to distill, as there are many different styles of teaching and many different styles of learning. While a professor of English literature might be at her or his best in a seminar, a nursing or medicine professor might best lead his or her class in a clinical setting. Science and engineering professors might give rousing lectures or lead students through illuminating laboratory experiments. In addition to different teaching styles, students have different strengths in the ways they learn. Many taxonomies of learning styles exist, including Kolb's Learning Style Inventory, the Myers-Briggs Inventory, and Soloman's Inventory of Learning Styles (Montgomery 1998). Soloman's Inventory, for example, classifies learning styles along four dimensions: processing, where learners are either active or reflective, perception (sensing or intuitive), input (visual or verbal) and understanding (sequential or global). But, in fact, many authors have suggested that there are indeed ways to distill the essence of good teaching. For example, a set of online teaching guidelines that resulted from Penn State's Innovations in Distance Education Project, "Good Teaching is Good Teaching: an Emerging Set of Guiding Principles and Practices for the Design and Development of Distance Education" (Ragan 1998), reads:

> The shared mantra of the faculty and staff during the development of this document was that "good teaching is good teaching!" An Emerging Set of Guiding Principles… is less about distance education and more about what makes for an effective educational experience, regardless of where or when it is delivered."

Similarly, the first basic assumption of the American Distance Education Consortium's "ADEC Guiding Principles for Distance Teaching and Learning" is that "The principles that lend themselves to quality face-to-face learning environments are often similar to those found in web-based environments" (ADEC 1999). Finally, the hallmark document "The Seven Principles of Good Practice in Undergraduate Education" (Chickering and Gamson, 1987) published by the American Association for Higher Education, was revised for online teaching by taking each of the original seven principles, and applying them to computer mediated instruction. The seven principles retain their centrality in "Implementing the Seven Principles: Technology as Lever" (Chickering and Ehrman, 1998).

Traditional Classroom Teaching

Good teaching can take many forms, although not just any form. If there were an essence of good teaching it would have to be found independent of and beyond teaching and learning styles. Such are the seven principles of good practice of Chickering and Gamson (1987). They are given below:

1. Good practice encourages student-faculty contact.
2. Good practice encourages cooperation among students.

3. Good practice encourages active learning.
4. Good practice gives prompt feedback.
5. Good practice emphasizes time on task.
6. Good practice communicates high expectations.
7. Good practice respects diverse talents and ways of learning.

As it happens, one of our seminar members, David Hansen of UIC's education department, has distilled the practice of teaching to an even greater extent (Hansen, 1998 & Hansen, 1999). Hansen characterizes the practice of good teaching by a two-fold "attentiveness;" attentiveness to the intellectual and to the moral formation of the student. Of the former sort he writes "…being intellectually attentive means focusing as closely as the teacher can on what students know, feel, and think about the subject at hand" (Hansen, 1999). And of the latter, "teacher's moral attentiveness has two components: alertness to the development of their students' character, and awareness of their own regard for and treatment of students" (Hansen, 1999). These statements align with Jerry Farber's "three circle" model (1998); intellectual attentiveness builds total competence, while moral attentiveness provides the spark for the process of socialization.

The essence of good teaching might be summed up as the teacher's concern that his or her students become educated. On one hand this implies that the teacher will put much thought into the presentation of the material and its human impact. This is where research expertise of professors at research-oriented universities comes into play. Good teachers promote cognition by organizing content and by assigning activities (homework, labs, projects, papers, and so on) that reach students with various learning styles. On the other hand, good teachers pay attention to how well the students are learning the material and developing a broad perspective of it. In short, we can say that a good university professor takes an interest in both teaching and learning.

Why is attentiveness so necessary? From the complementary side of things, how are students affected by the attentiveness of a good teacher? The answer may have to do with student motivation. In the "Seven Principles" document (Chickering and Gamson, 1987), the discussion after the first point (Good practice encourages student-faculty contact) reads:

> Frequent student-faculty contact in and out of class is the most important factor in student motivation and involvement. Faculty concern helps students get through rough times and keep on working. Knowing a few faculty members well enhances students' intellectual commitment and encourages them to think about their own values and future plans.

Again, there is a connection to Farber's role of episodic memory here; a student's close contact with a faculty member can go a long way. Hansen has also described how attentiveness induces motivation. In doing so, he quotes Michael Oakeshott (1989):

> Being taken seriously by a teacher in a natural, unforced way can promote a student's own seriousness of mind and purpose. Michael Oakeshott suggests that a quality like seriousness of mind "is never explicitly learned and it is known only in practice; but it may be learned in everything that is learned,

> in the carpentry shop as well as in the Latin or chemistry lesson." Such a quality cannot be taught directly, either. Here is Oakeshott again: "[A quality like seriousness of mind] cannot be taught overtly, by precept, because it comprises what is required to animate precept; but it may be taught in everything that is taught. It is implanted unobtrusively in the manner in which information is conveyed, in a tone of voice, in the gesture which accompanies instruction, in asides and oblique utterances, and by example."

So in general, attentiveness on the part of the instructor motivates students to engage in the material at hand, and beyond. It must be noted, however, that the need for motivation is a function of the student's age and background, intellectual capacity, and psychological makeup. This ties back in with student types; the mature nontraditional student is inherently more self-motivated than the young, traditional student, and so perhaps less in need of the instructor's attentiveness. One of our seminar members recounted a deep, vivid two-hour discussion among his graduate students, during which he simply sat back the entire period and listened with great satisfaction.

Apart from the professor, students also derive much motivation from each other. The following comment on the second of the Seven Principles (Good practice encourages cooperation among students, Chickering and Gamson, 1987) directly pertains to the effect of peers:

> Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's own ideas and responding to others' reactions improves thinking and deepens understanding.

While this statement mainly addresses the cognitive advantages of collaborative learning (improved thinking and deepened understanding) it also touches on motivation (increased involvement in learning). For their part, professors may be thought to "catalyze" motivation among groups of students. And motivation can of course come from many sources apart from the school, such as professional goals, friends and family members.

Finally, motivation can be imparted to the student in a variety of ways. Highly motivating professors are not necessarily the most exuberant or gregarious or witty. The behind-the-scenes efforts of a quiet but dedicated professor, in assembling supplementary material or following up students' questions will also demonstrate to the students the professor's concern. In small classes it is possible to come to know and motivate each student individually. Yet in large classes where this is impossible, an "intimate bond" with the class is still achieved if the students in the back row come to know, through the indirect manner Oakeshott describes, that the professor is concerned that they learn.

If a finger can be placed on the "human touch" of teaching, the role of attentiveness in motivating the student could well be it. As we now consider the pedagogy of online instruction, this is a key element that must be kept in the translation, at least for the great many students who need motivation from the instructor. Not only must professors provide teaching over the Internet; they must also be in contact with students to assess learning.

Online Pedagogy

At first glance, teaching a class without the ability to see and hear the students in person appears daunting. The enlightened, quizzical, or stony facial expressions, the sighs of distress or gasps of wonder, and even the less-than-subtle raised hands or interjected queries that constitute immediate feedback to a lecture, discussion, or clinical situation are absent. Yet the proponents of online instruction will argue that these obstacles can be overcome, and that the online format has its own advantages. In the online experiences documented in the "Net.Learning" (http://www.pbs.org/netlearning/home.html) videotape, which our seminar viewed early in the year, Peggy Lant of the California Polytechnic State University, San Luis Obispo presented a striking example that occurred in her class' online discussion of civil war. One student's comments were especially gripping as she had just survived a civil war in her home country. Shy students who have trouble participating in a classroom discussion are said to feel more comfortable in an online setting. The ability to sit and think as one composes a question or comment also can raise the quality of the discussion. Susan Montgomery at the University of Michigan has developed an interactive website that addresses diverse learning styles through the use of multimedia (Montgomery, 1998).

Harasim and Feenberg argue enthusiastically that in the hands of professors who know what they are doing, online instruction is superior to face-to-face instruction. Says Feenberg of outright faculty rejection of online teaching (Feenberg 1998)

> …this unqualified rejection of online education contradicts our experience at the Western Behavioral Sciences Institute. There the virtual classroom was a place of intense intellectual and human interaction. Literally hundreds of highly intelligent comments were contributed to our computer conferences each month by both students and teachers. The quality of these online discussions surpasses anything I have been able to stimulate in my face-to-face classroom.

During her visit with us, Harasim described the change from traditional classroom lectures to online CMC instruction as "a change from a model of efficiency to a model of quality." In Learning Networks (Harasim et al., 1995), she states

> Teachers, trainers, and professors with years of experience in classrooms report that computer networking encourages the high-quality interaction and sharing that is at the heart of education. …(The) characteristics of online classes… generally result in students' contributing material that is much better than something they would say off the top of their heads in a face-to-face class.

There is a converse side, however. Just after the passage above, Harasim cautions (Harasim et al. 1995)

> On the other hand, unless the teacher facilitates the networking activities skillfully, serious problems may develop. A conference may turn into a monologue of lecture-type material to which very few responses are made. It

> may become a disorganized mountain of information that is confusing and overwhelming for the participants. It may even break down socially into name calling rather than building a sense of community.

There are two related parts to this caution. First, the teaching paradigm must change for online instruction, away from the traditional lecture format. Second, the instructor has an important role in moderating the interaction. Feenberg emphasized that the different paradigm of CMC is due to the fact that CMC is a text-based medium. In "Promise or Threat" (Feenberg 1998) he explains:

> Just as a concert hall is a space appropriate for different activities than a living room, so the electronically mediated spaces of computer networks are also suited to specific activities. It would of course be possible to conduct a class in a restaurant, or dine on a basketball court, but the results would likely be disappointing. Similar abuse of the online environment will also yield disappointing outcomes. But this is precisely what happens when we try to reproduce a face-to-face classroom online or on CD ROM. …On the other hand, we have a well established method for communicating in a narrow bandwidth. It's called writing… Writing is thus not a poor substitute for physical presence and speech, but another fundamental medium of expression with its own properties and powers… These considerations on writing hold the key to online education. The online environment is essentially a space for written interaction. This is its limitation and potential. Electronic networks should be appropriated with this in mind, and not turned into poor copies of the face-to-face classroom that they can never adequately reproduce.

(From this standpoint, he argues that the latest, most expensive high-tech equipment for videoconferencing or automated learning frequently hyped by vendors to eager administrators is not the best for the task.) While the Learning Networks text (Harasim et al., 1995) presents a host of media options for online content delivery, including video and audio conferencing, CD ROM and videotapes, the CMC mode appears to occupy the central place in this group's thinking, and certainly did in Prof. Harasim's presentation to us.

It was Feenberg and his colleagues who first worked out the role of the instructor for the novel paradigm of CMC. He played a central part in the pioneering efforts at the Western Behavioral Sciences Institute in one of the earliest educational experiments (1982) in international networking (Feenberg, 1993). The role of teacher as online "moderator" can be summarized in three parts, contextualizing functions, monitoring functions, and meta-functions (Feenberg 1989). The role of the first two functions is to compensate for the absence of physical cues found in a traditional classroom. Students must be explicitly told, for example, that the conference in which they are about to proceed is a "class" or a "meeting" or a support group. After a topic is introduced, students' comments must be monitored to assure that all are participating and that they understand the meeting mode. If CMC has both limitations and potential, these first two functions compensate for the limitations of this medium, while the third, meta functions, give rise to its potential.

Meta-communication, or communication about communication, has two parts. First, it is needed to resolve problems in communication that would be addressed in the classroom by body language or a request to speak up on the part of the students. Second, comments are needed which summarize the state of a discussion and provide a sense of accomplishment and direction. These are called "weaving" comments, and it is particularly with these that the class gets more deeply into themes than students in a face-to-face classroom. These three functions are summarized in Table 6, which is adapted from Feenberg (1989). These functions are alluded to with approximately the same terms in the book of Harasim et al. (1995).

Table 6. Moderating Functions of Computer Mediated Communication

Name	Function
Contextualizing Functions	Opening Discussion: announce theme Setting Norms: give type of conference Setting Agenda: control flow of discussion
Monitoring Functions	Recognition: welcome students, correct context Prompting: solicit comments, assign work
Meta Functions	Meta-Commenting: remedy problems in context Weaving: summarize state of discussion

In his visit with us, Curtis Bonk called to our attention the theory supporting the text-based, collaborative learning paradigm of CMC. That theory is constructivism, which evolved earlier than and independently of CMC, but which has extensive applications in the use of computer supported collaborative learning tools. While there is no canonical form of constructivism (Bonk and Cunningham, 1998), the theory involves the belief that better learning occurs when knowledge is the result of a situated construction of knowledge. Bonk and Cunningham (1998) cite Cobb's (1994) two variations: "cognitive constructivists tend to draw insight from Piaget and focus on individual constructions of knowledge discovered in interaction with the environment, [and] social constructivists rely more on Vygotsky… and view learning as connection with and appropriation from the sociocultural context…"

Bonk favors the latter position, perhaps because this position best fits the social, collaborative milieu of the online courses he teaches in education. The assumptions of this form are that "the mind is located in the social interaction setting… (knowledge is built) not just on individual student prior knowledge, but on common interests and experiences …(and there is) team as well as individual reflection and group processing on experiences" (Bonk and Cunningham, 1998). Likewise, the CMC forms utilized by Feenberg for courses in management and strategic studies and Harasim's for communication also appear to match the social model. Feenberg and Harasim appear to have developed their methods less from constructivist theory than by practice.

Several points drawn out by Bonk suggest that online communication may enhance the goals and tactics of constructivist educational theory. One of the most significant is the development of flexible "scaffolding" for student work where the instructional design

and teaching tactics surround, but do not fill in, the learning by students (Bonk et al., 1998). This is seen in his work on apprenticeship, for example, in some cases extending far beyond a normal classroom environment to draw far-flung experts into a discussion (Bonk and Reynolds, 1997). A second factor concerns the importance of a distributed, or even global audience for student work which, connected with the student's ability to adapt to alternative roles, may fundamentally alter a student's view of their work (Bonk, Appelman, and Hay, 1996). Finally, the archiving function of online technology may form the basis for new methods of student portfolio construction. Through all these points, he asserts that online environments offer interesting opportunities for learning to take place through social interactions in areas where the individual's prior and emerging knowledge meet. Educators often refer to this area as Vygotsky's Zone of Proximal Development (Vygotsky 19xx).

But what of Uhl's online course using graphical mathematics software for calculus, and Shapley's online course using molecular visualizations? These courses are not text-based, but rather are graphically driven and are immediately interactive with computer software as opposed to other students. It is tempting to ascribe the social form of constructivism to classes that are normally taught in the seminar or discussion mode. Likewise, the cognitive form of constructivism, which places more emphasis on individual constructions of knowledge and experience via physical manipulation, can be ascribed to courses such as math and chemistry that would normally be taught in a didactic way. An example of a cognitive constructivist approach to traditional education is the new approach at the University of Maryland to teach physics not with lectures, but with hands-on experimental demonstrations (Redish and Steinberg, 1999).

The material we have seen suggests that sound online pedagogy involve a shift in paradigm in one of at least two ways, which are of course not mutually exclusive. For discussion type courses the text-based, collaborative learning approach seems very suitable, while for didactic courses, the graphics-based, more individualized form of constructivism works well. And by no means are new paradigms limited to these two.

Before we leave the issue of online paradigms, it must be noted that many educators do believe that the best approach to online teaching is to simulate the traditional face-to-face mode. At Georgia Tech, for example, the distance education program is being renovated in this fashion (Goettling, 1999): "What distinguishes Georgia Tech's [new] offering is its use of streaming video and audio, essentially to transmit an image of the professor delivering the lectures, something like movies on demand." More locally, a UIUC study conducted in the Department of Human Resource Education (Johnson et al., 1999) concludes that "Until the technologies for online instruction better simulate real time interaction, program developers need to avoid courses that require frequent socialization between students and the instructor." In his criticism of distance learning Prof. Farber also displays this thinking: "…let us note that teleconferencing, sadly inadequate as it is as a replacement for the classroom, is the very top of the line when it comes to distance learning" (1998). In a later section (6, Teaching Evaluation) we will explain why we disagree.

What of online interactions and the human touch? One comment Harasim made to us brings this matter to the forefront. In comparing how well one gets to know their class by the respective modes she said "Online you get to know your students' minds, not just their faces." (Upon hearing this the tendency of a good classroom teacher is to argue that

he or she has relationships with students that are a bit beyond skin-deep.) Taken with her other statement that "online teaching represents a shift from a model of efficiency to a model of quality," the point here is that an online course taught well creates a great deal of interaction between the professor and her or his students. There must also be a great deal of interaction between the students themselves, especially in wholly online courses for groups of placebound students. Harasim, Smith, Bonk, and Feenberg all state the need to form "a community of learners." Says Harasim (1995):

> The instructor must make a computer conference feel and function like a classroom, turning the computer screen into a window on the world [not by imitation but by a new paradigm], so that students exchanging asynchronous messages feel and behave as if they are working together with a group of peers. …The instructor's challenge is to create appropriate conditions for a group learning environment… A sense of group and community among electronically assembled individuals can be created by a combination of facilitation skills [e.g. Feenberg's moderating functions], team-building activities, and conferences for specific groups and tasks.

A recent paper has stated that student frustration is much more prevalent than is currently believed (Hara and Kling, 1999, Mendels, 1999b). Two levels of frustration were cited; the first related to technical problems, stemming from inadequate technical support and computer skills, and the second due to a lack of immediate feedback from the instructor and from ambiguous instructions.

Smith, who has had over 2 years experience with teaching wholly online in the Library Education Experimental Program, contributed this comment to our webboard discussion on motivation, which underscores the need for student-professor interactions even with mature graduate students:

> …I think I am in a good position to address these issues as they relate to graduate professional students who range in age from early 20's to late 50's. These students are already working in libraries or seek to prepare themselves to work in libraries or related settings, so they already have a high degree of self-motivation. In addition their program of study has only two required courses, so they are choosing courses in which they expect to have an interest. Nevertheless the instructor still has a responsibility to motivate interest in the material through the design of the course and assignments. Factors that contribute to peer motivation include starting them as a group in "boot camp" so they have a shared face-to-face experience at the beginning of the program. In addition many courses include group assignments where there is a shared responsibility for completing the work. Does this mean that the faculty member plays a minor motivational role for most students? Not in my experience, though the type and amount of motivation provided by the instructor varies with the student. Students still seek recognition of their work by the instructor – they want feedback on assignments, a certain number of live sessions in which they can interact "in real time" with the instructor, and expect the instructor to have a presence in the dialogs that

> unfold on the webboards. While students are generally interested in the content of the course, they can become overwhelmed with all the other responsibilities in their lives. It is important for them to be able to connect with an understanding instructor who can help them put things in perspective and sustain their commitment to continuing in the course and in the program when it is tempting to give up. I know that they also receive this type of support from peers and LEEP alumni…

At what cost is this high degree of interaction, the need for which we suspect is student motivation and the professor's (online) attentiveness, achieved? In the previous section it was noted that charismatic professors of large (several hundred student) classes might indeed reach and motivate the students in the back row by intangible displays of attentiveness. Online, attentiveness must be tangible, and may involve more effort than in a face-to-face setting. These considerations imply an inherent limitation of online class size; size is determined by the amount of effort required to form a "community of learners."

The implication that successful online class sizes are relatively small appears to be borne out in the online literature. There are frequent references in Learning Networks to class sizes on the order of twenty (Harasim et al., 1995). The mid-twenties was the limit for Bonk's online classes at Indiana, and was preferred by UIUC's Smith for the LEEP program, although she most recently taught 37. An article entitled "How Many Students are 'Just Right' in a Web Course," appearing in Syllabus Magazine (Boettcher, 1998), cites Murray Turoff, one of Learning Networks' coauthors and another of the online pioneers, as noting that "the workload of faculty is linearly dependent on the number of students." The Syllabus article states that "experiential data is suggesting that the maximum number of students for online courses is really very low – in the range of 12 to 20 students, depending on the level of instruction. Some experience seems to suggest that Web courses can support larger numbers – in the range of 25-65 for courses that are focused more on training, certification, or professional degrees." However, the student/faculty ratios for the executive programs at the WBSI and for the University of Phoenix to date, are even fewer at about 8:1 (Feenberg, 1989).

There are a few exceptions, and the most notable we encountered is Shapley's mixed mode organic chemistry class at UIUC. We were amazed to hear that the most recent enrollment in Chem 331 was 162! This is especially astounding since Shapley made it a point to communicate with each student at least once a week, and would specifically follow up with those students who hadn't been in communication. Another of Shapley's human touches, by the way, is to embed a photograph of the corresponding student with each communication, so that she could associate words with a face. During her videoconferenced presentation to us, the comment was made to her that 3 or 5 minutes per student, times 162 students per week, is a significant chunk of time. She replied, with a knowing pause easily discernable even via the video monitor, "Yes, it's a significant chunk of time." She then proceeded to describe a new format being developed that would require less contact on the part of the professor, and more on the part of teaching assistants.

Small class sizes and the linear dependence of effort on student numbers are indicative of the high level of interaction needed for high quality online teaching. And is

it just the instructor's time, or does their expertise in the subject area also come into play? Often in the online literature one encounters the phrase that the role of the instructor changes from being " sage on the stage" in traditional settings to "a guide by the side" online (Harasim et al, 1995). According to constructivism, students "create knowledge for themselves," and the instructor's role is to facilitate this process. Such descriptions lend themselves to the notion that the instructor can be nothing more than something like a non-expert but motivational cheerleader.

Harasim was actually reluctant to use the "guide by the side" description, and instead showed us a manuscript in preparation in which she and her co-author emphasize the need for "master teachers" (Campos and Harasim, 1999). Professor Feenberg summarizes the need for expert professors in the "Promise or Threat" article (1998) by concluding:

> The best way to maintain the connection [between online education and the values of traditional education] is through ensuring that distance learning is 'delivered' not just by CD ROMs, but by living teachers, fully qualified and interested in doing so online …[P]repackaged material will be seen to replace not the teacher as a mentor and guide but the lecture and the textbook. Interaction with the professor will continue to be the centerpiece of education, no matter what the medium.

The need for "master educators" and small class sizes for high-quality online teaching implies high cost. Etchemendy's presentation contained a very interesting introductory slide, in which initially three questions were presented, to the effect 1) "Can online delivery improve the quality of teaching?" 2) "Can online delivery improve the access to teaching?" and 3) "Can online delivery decrease the cost of teaching?" The answer to each question asked individually was "yes." However, when each individual question was considered in relation to the other two factors, the answers became different. "Can online delivery improve the quality of teaching?" "Yes, but not without increasing the cost." "Can online teaching increase access at the same cost?" "Yes, but not without a degradation of quality," and so forth.

To university administrators, we appear to have a good-news/bad-news scenario to present. The good news is that high quality online instruction can occur, if new paradigms are employed which compensate for limited bandwidth, and if professors take the time and effort to maintain the human touch of attentiveness needed in many cases by their students. The bad news is that the limit of college level online class size is inherently below that of the traditional classroom. Any transition of "efficiency to quality" comes with a high quality price tag.

5) Teaching Evaluation

A number of factors would seem to call for the evaluation of online learning effectiveness in comparison to traditional classes and programs. One is certainly economic: the high cost for the technology and staff to support it. How justified are these expenses? A second is pedagogic: implementers of novel teaching methods, and their administrators for that matter, are in need of feedback so that the quality of teaching can be maximized. Harasim and her co-authors refer to these two directions in the Learning Networks text (1995):

> The introduction of new educational technologies, including computer networking, benefits from educational evaluation and assessment. Assessment includes both top-down accountability approaches (reporting of results for accountability purposes) and bottom-up instructional improvement (helping individual students gain most from instruction). Both perspectives share a common goal of improving education and are important at all stages of adopting technological innovations.

However, the evaluation of online learning is not straightforward. In this section we present a picture of what has been done or attempted, what has been suggested, and what we feel an evaluation of online learning should include.

A Survey of Online Evaluation Literature

The online evaluations we encountered over the course of the year were mainly anecdotal. A good number of such examples are found in chapters 1 and 3 of Harasim's text (1995). In her presentation to us she related a particular experience with a sophomore level class in communication that she taught in mixed mode. Midway through the semester, she informed the class that the online component would be removed, but the class would not permit it. This class was obviously satisfied with the online component. Shapley's message concerning evaluation was that by using a self-paced, asynchronous online approach with plenty of opportunity for the review of difficult material, retention of remedial students was much higher than in a traditional classroom. Additionally, overall online class performance on a graduate level chemistry entrance exam was much higher than the traditional class.

Turning to the literature, two of the most recent, comprehensive reviews of online teaching effectiveness are Russell's "No Significant Difference Phenomenon" compendium (1999), and the AFT- and NEA-commissioned review of distance learning research in higher education by Phipps and Merisotis (1999).

The former work, posted as the "No Significant Differences" Web site (Russel, 1999) and also to be published as a book, is a listing of well over 300 studies dating from 1928 that have found no significant difference in the effectiveness of distance versus traditional learning. (A revised version is to contain studies that do cite a difference, but at the time of this report's writing that section had not been added.) In these works "distance learning" is used in its most general form; included are studies of mail, radio, one-way television, audio and videotape and even telephone delivery. About one-third of the material pertains to recent developments in CMC. Unfortunately, the manner in

which outcomes were assessed is not given in detail if at all, in the brief descriptions of each study.

Nevertheless the information in this compendium raises questions when digested slowly. Each study concluded that the performance of students at a distance was not significantly different than that of traditional students. This applies not just to CMC, but to transmission by, say, radio or television. Commenting on this report in his "Third Circle" article (Farber, 1998), Farber states "if one wanted to lower the boom on the new distance learning technologies as a cost-effective means of delivering measurable competence, it would be hard to find a better argument for doing it than this list..." That is, why pay for computers and tech support when radio broadcasts or mail correspondence will do?

We might make of this an historical observation. Claims have been made in every age that distance learning is as effective as the classroom. Indeed, the theme of Noble's seminar to us ("The History of Correspondence Schools") was how hauntingly familiar the promises of cost efficiency and learning efficacy made for mail correspondence courses in the first half of this century are to current claims for distance learning. We might also comment that there will always be some students who are sufficiently mature and motivated that they can learn by almost any distance mode. We'd love to see a compendium of detailed assessments reporting a difference.

The report of Phipps and Merisotis (1999) titled "What's the Difference? A Review of Contemporary Research on the Effectiveness of Distance Learning in Higher Education" cites Russell's work frequently but focuses much more on computer based learning studies published in the 1990s. The purpose of their analysis is "to examine the research on distance learning more closely so that public policy may be better informed." Their report confirms what we heard from all of our external speakers, that "there is a relative paucity of true, original research dedicated to explaining or predicting phenomena related to distance learning." They suggest that "the overall quality of the original research is questionable and thereby renders many of the findings inconclusive," and go on to list the key shortcomings and gaps in the research. Listed shortcomings include non-random subject selection, questionable validity of the instruments used to measure student outcomes, and lack of controls for "reactive effects" of students and faculty such as increased motivation and interest stemming from a project's novelty. Gaps in the research are cited to include emphasis on outcomes for individual courses and technologies rather than whole programs and multiple technologies, no account for differences in students and learning styles, no explanation for higher drop-out rates of distance learners, and no inclusion of a theoretical or conceptual framework. Three implications are drawn from the findings: 1) the issue of nondiscriminatory access remains unclear, 2) technology cannot replace the human factor in higher education, and 3) the technology employed is secondary to pedagogical factors such as learning tasks, student motivation, and the instructor.

Phipps and Merisotis' criticisms of online education research have themselves been sharply criticized. In an article by Brown and Mack (1999), their evaluation is described as convoluted, naïve, and contradictory, and their expectations of the research as unrealistic:

> Their convoluted expectations illustrate precisely why comprehensive, clear evidence is rarely attainable in the complex, messy world of teaching and learning, even after decades of educational research. Quite simply, Phipps and Merisotis call for a fantasy research paradigm in their critique. They want 'randomized experiments' embedded in 'theoretical construct to test multiple variables' in which 'extraneous variables are controlled' to produce results that do not yield population data, but rather are 'predictive of outcomes for individual learners." This would be roughly equivalent to a randomized, double blind study of the effects of multiple drugs interacting with each other and with caregivers' styles, resulting in predictions of how various drug combinations work with different individuals in order to make a uniform policy for a universal health care program.

At issue here is the extent to which it is even possible to evaluate the effectiveness of online teaching and learning.

In a First Monday article, which rebuts Noble's Digital Diploma Mills series, Frank White (1999) argues that the question of pedagogical effectiveness of information technology is the wrong question. He cites both Steven Ehrman, who observes (1997)

> The first group of useless questions seeks universal answers to questions about the comparative teaching effectiveness and costs of technology… That question assumes that education operates something like a machine…"

and Ronald Owston, who points out (Owston, 1997)

> …we cannot simply ask "Do students learn better with the Web as compared to traditional classroom instruction?' We have to realize that no medium, in and of itself, will likely improve learning in a significant way when it is used to deliver instruction. Nor is it realistic to expect the Web, when used as a tool, to develop in students any unique skills.

White, again citing Owston, suggests that the right question is "What distinct advantages does an instructional technology offer that instructors can exploit to promote improved learning?"

White seems to be saying that instructional technology should be implemented based on its pedagogical potential, which is well and fine. However, the earlier evaluation philosophies only seek to confirm a technology's pedagogical potential. We disagree that comparisons of learning effectiveness can't or shouldn't be done, with at least some of the rigor called for by Phipps and Merisotis. On the other hand, we do agree that the evaluation of online learning is multifaceted and subtle, and learning competence is only part of the evaluation need.

Our external speaker with the most perspective in this area was Harasim. The "top-down" and "bottom-up" approaches given by Harasim et al. (1995) have also been termed "summative" and "formative" evaluation. Regarding the former type, the text states, "Summative evaluation is generally conducted for the benefit of outsiders, perhaps

funding agencies that want to know if their investment paid off or the research community, which wants to know what generalizable conclusions result from a project. Cost benefit analysis is one possible component of summative evaluation." In her presentation to us, she mentioned that rigorous evaluation of learning effectiveness is sorrowfully lacking, but that it could and should be performed. She mentioned random selection of students, and thorough pre- and post-testing of comparison groups among the requirements for a rigorous evaluation.

A good example of such an evaluation program is found at Stanford University's Distance Education Web site, in a funded grant proposal that is posted online (Harris, DiPaolo, and Goodman, 1994). The grant authors designed a comparison between three control groups of graduate level engineering students, one taught in the traditional classroom, one taught at a distance by videotape and one taught at a distance online. The proposal also included cost-benefit calculations as part of their evaluation.

Evaluation gets fuzzier for more open-ended, CMC based courses. In these settings the argument of Ehrman (1997) is that "different students learn different things and their learning cannot be tested on discreet skill tests and quantified." Another difficulty in evaluation arises when the computer-based technology represents a unique learning paradigm, as in Etchemendy's logic and computability programs. In this case, there may be no immediately tangible basis on which to compare the unique learning experience imparted by the computer tool.

Critical Questions for Evaluation

The new paradigms of online instruction call for new paradigms of evaluation. Harasim (Harasim et al, 1995) suggests that formative feedback as well as summative evaluations should consider a multiplicity of evidence beyond written exercises and tests, for example "participation by students in class discussions, project work, and individual and group interviews." The entire second section of Learning Networks (entitled The Guide), cited extensively throughout this report, is devoted to teaching and learning guidelines, with chapters on Designs for Learning Networks, Getting Started, Teaching Online, Learning Online, and Problems to Expect. Perhaps the best way to summarize the guidelines put forth in this text, which hint at the focal points for evaluation, is to cite the checklists for action at the end of the Teaching Online and Learning Online chapters. Both of these lists were formulated mainly in reference to CMC. This checklist, written for the instructor, comes from Chapter 6 of "Teaching Online" (Harasim et al., 1995):

> Facilitating Online Courses: A Checklist for Action
>
> The key concept in network teaching is to facilitate collaborative learning, not to deliver a course in a fixed and rigid, one-way format.
>
> - Do not lecture.
> - Be clear about expectations of the participants.
> - Be flexible and patient.
> - Be responsive.
> - Do not overload.
> - Monitor and prompt for participation.
> - For assignments, set up small groups and assign tasks to them.

- Be a process facilitator.
- Write weaving comments every week or two…
- Organize the interaction.
- Set rules and standards for good netiquette [network etiquette]…
- Establish clear norms for participation and procedures for grading…
- Assign individuals or small groups to play the role of teacher and of moderator for portions of the course.
- Close and purge moribund conferences in stages…
- Adopt a flexible approach toward curriculum integration on global networks.

The checklist in chapter 7 (Learning Online) is written for the student:

Checklist for Action

- If you have not used CMC before, the learning curve can be steep.
- Make sure that you have convenient access to the PC or terminal you will use…
- Learning networks emphasize collaborative learning. Respond to the ideas and questions of other students, not just to the instructor.
- Be polite, considerate, and friendly online. Make your entries short and to the point… Take the time to socialize with others…
- Devise a systematic method for saving and organizing the material for later review.
- Make sure you understand the instructor's expectations for online tasks.

The American Distance Education Consortium (ADEC 1999) has set forth a more concise set of guiding principles for distance teaching and learning, which again can be viewed in light of determining key elements for evaluation. One assumption of the ADEC principles has already been cited in section 4 on "Good Teaching" ("The principles that lend themselves to quality face-to-face learning environments are often similar to those found in web-based learning environments"). Another is that distance learning media is converging to a digital platform. Their distance learning guidelines therefore apply wholly to online learning:

- The learning experience must have a clear purpose with tightly focused outcomes and objectives.
- The learner is actively engaged.
- The learning environment makes appropriate use of a variety of media.
- Learning environments must include problem-based as well as knowledge-based learning.
- Learning experiences should support interaction and the development of communities of interest.
- The practice of distance learning contributes to the larger social mission of education and training in a democratic society.

Teaching Evaluation

While the "tight focus" of the first point above sounds a bit more like "training" than "education," this set of broad guidelines, and the former set more focused on CMC, appear in general to be well grounded in experience and reasonable.

For our part, we wish to propose a set of questions that we regard as critical in evaluating online education. Our questions take their point of departure from the guiding principles outlined above.

1) Is the teaching style innovative? As Bonk called to our attention, teaching innovation is expected in universities, especially in education departments. Are the shortcomings of online teaching (principally communication bandwidth) compensated by either the circumstances (e.g. teaching only in an adjunct mode) or by novel paradigms that work with limited bandwidth such as collaborative learning via CMC?
2) Is learning competence equal or superior to that of a traditional classroom? Again, we feel that such comparisons are justified. We suspect an affirmative answer in a great many cases.
3) Are students engaged in the material? Does each student participate in the communication? Is there real depth to the students' responses? As Harasim and co-authors (1995) state, "Formulating and articulating a statement is a cognitive act, a process that is particularly valuable if comments such as 'I don't agree' or 'I do agree' are followed by 'because…'" This question presumes that the presentation of material has been thoughtfully prepared, objectives clearly specified, and students taught appropriate protocol.
4) Is there interaction between professors and their students, and between the students themselves? Has a "community of learners" been established from which students derive motivation, or do the students feel isolated?
5) Is access to technical support readily available?
6) For online programs that are more extensive, such as entire degree programs, are the signs of academic maturity present? These include the ability to synthesize knowledge in different fields, as would be demonstrated for example in a traditional senior-level engineering class in process design. Do the students think critically, and has a desire for life-long learning been fostered in them?

The ability to archive peer discussions and student-faculty interactions offers a unique and rich source of data for evaluation. As Harasim points out, the medium permits faculty to reflect back upon the educational growth of their students. Similarly, archived material can be "mined" to assess the critical elements identified above.

To conclude this section, we will illustrate the application of our suggested evaluation survey for the online "contexts" given in Table 5. First, we consider adjunct applications for any of the training, education, or graduate education contexts. Suppose a professor has gone beyond posting a syllabus and homework assignments on the Internet, and has developed online exercises by utilizing available software. For example, students could be asked to perform a series of calculations related to a physics or an engineering lecture with the use of a spreadsheet or math package, or students in a history course might be asked to perform a literature search through the web. There is innovation in that

modern computer tools are being utilized. Interactivity issues are of lesser concern here, since the students still meet in class on a frequent basis. Similarly, the maturity issues are of lesser importance in these contexts. The scope of the calculations and the comprehensiveness of the literature search would serve to indicate the student's breadth of understanding. This appears to be a favorable situation, and we would expect learning competence to be improved relative to students in the same circumstances but without the computer work.

Even more innovative are adjunct modes in which the professor has invented a new learning paradigm with the computer. Etchemendy's Turing's World and Tarski's World are prime examples of leading-edge innovation. During our discussions, Etchemendy opined that such novel teaching paradigms could be developed in most any field, if one sat down and really thought about it.

The mixed mode class of Shapley, featuring interactive graphics, self-paced learning with ample opportunity for review, and weekly gatherings to tie up loose ends, would also be evaluated highly in innovation and student engagement. The one caution in this case, on the issue of interaction and "connectedness," would be due to the very large class size. This appears to be addressed by the extraordinary efforts expended by Shapley to contact each student on at least a weekly basis. The classroom meetings also serve to foster interactions. The high retention rates and higher test achievement of this mode are also evidence of the success of this course. We would impart similarly high evaluations to and expect similar results from Uhl's calculus classes, as well as Harasim's mixed mode communication classes. Mixed mode classes can be comprised of the best of both worlds; the human interactions of the classroom with the powerful learning tools of the computer.

The direction of some undergraduate online proposals away from low student to faculty ratios is disturbing. Recently, for example, the Pew Learning and Technology Program has been created in conjunction with the Center for Academic Transformation at Rensselaer Polytechnic Institute (http://www.center.rpi.edu/). The main portion of the $8.8 million, four-year effort is allotted to the Pew Grant Program in Course Redesign, which specifically targets the online redesign of “large-enrollment, introductory courses, which have the potential of impacting significant numbers of students and generating substantial cost savings.” The presence of “significant numbers of students” and “cost savings” in the same sentence raises concerns with “interactions.” Applying Etchymendian logic here, increased access at decreased cost amounts to lower quality.

The mode of delivery and degree of professor-student and student-student interactions, on which depend the student's engagement in the material, are especially crucial in wholly online courses. Among the more successful wholly online programs appear to be graduate level business degrees. We would venture to guess that the most successful programs such as those at the U. of Phoenix feature leading edge CMC and collaborative learning exercises (high on the innovation scale), and small class sizes and student to faculty ratios (high on the interaction scale). The high tuition these students pay would also seem to indicate that technical support is correspondingly high. The academic maturity of these students, who would already have experienced an undergraduate education, mitigates the need for emphasis on socialization. Ideal online graduate students already possess a mature outlook and will employ it readily in their work. Similarly, for a professional workshop in which the participants may be extremely

mature (for example, a class of Ph. D. engineers taking a short course in industrial catalysis), the need for interaction might be relaxed. The term "professional training" fits this case well and connotes that the object of the communication is primarily to impart information.

For most work at the masters level, though, the key aspects of wholly online contexts for the "nontraditional' student would appear to be the mode of delivery and the degree of interaction. A number of graduate distance education programs appear to be entering the online arena using delivery modes that strive to simulate the traditional classroom. For example, a description of Georgia Tech's online masters engineering programs (Goettling, 1999) reads "What distinguishes Georgia Tech's offering is its use of streaming video and audio, essentially to transmit an image of the professor delivering the lectures, something like movies on demand. The lecture notes being used by the instructor also appear on the screen." This format will undoubtedly be more convenient (although if a computer must be purchased, more expensive) than videotape or satellite transmission. We suggest, however, that the maintenance of the lecture format doesn't exploit the full potential of online learning, which involves a paradigm shift away from the lecture format. In addition, online courses in which professors are insulated from students by teaching assistants, in attempts to make the course offering less onerous for the professor, are also less desirable. We might say that a lecture-style, low-interaction online format represents only an incremental improvement of "distance" courses, and keeps them in the category of individualistic "correspondence courses." On the other hand, more innovative, interactive offerings might cross the threshold in becoming truly "online" courses in which "communities of learners" are established.

Perhaps the most risky wholly online context is the offering of whole degrees in undergraduate education. While this mode might be justified for some place-bound students, online interconnectivity, as good as it can be, still cannot replace the human interactions of in-class, in-the-hallways, and in-the-pub situations. Harasim admitted as much in her seminar to us, stating that "online programs are not in competition with traditional education" for precisely this reason. It is interesting to note that at UIC's School of Public Health as well as at some other schools, courses designed for "distance" students are actually subscribed to by a majority of on-campus students. This is not necessarily a bad thing: wholly online course taken by on-campus students might be part of the "best of both worlds" scenario mentioned earlier.

In sum, of the seven contexts of online education presented in Table 5, high quality online courses and programs might be developed, with due attention to the paradigm of content delivery and to the establishment of professor-student and student-student interactions, in all contexts except that of whole undergraduate degrees offered online. In this case the needed process of socialization occurs apart from, and indeed is a complement to, the content-delivery experience. We have yet to see how this might be accomplished online. Young, traditional students in these programs might be well served, however, with online courseware on campus.

A final consideration here pertains to the degree to which traditional teaching should be replaced by online teaching. As mentioned earlier, Etchemendy suggested that novel online tools could be developed very widely. We do believe that teaching innovation should be expected of faculty and weighted and rewarded to perhaps a greater degree than presently occurs at many research-oriented universities. There is no way of

knowing or predicting, however, to what extent traditional teaching can be replaced by online material. That is, lectures have their place. While this document pertains principally to high quality online instruction, we must also insist on high quality face-to-face instruction by lecture, discussion, or clinical setting. Online courses are not the solution to poor classroom teaching; policies that encourage and reward good classroom teaching are.

6) Ancillary Concerns

Three ancillary issues affect online pedagogy to such an extent that we wish to include them in this report: course ownership, the conflict of interest between business and scholarship, and academic deprofessionalization. In this section, we will discuss how these related issues impact the quality of online offerings.

Earlier, we argued that in-depth involvement of an expert professor is needed in order to ensure high quality of online teaching. The issue of course ownership is directly related to this principle: the highest quality of online materials is usually assured when faculty members are in control of the material. There may be legitimate circumstances under which the quality of academic work and the maintenance of creative vitality is best assured when the University has some share in copyright. We now examine the conditions under which faculty retain the copyrights of material they have developed, and when the University claims such rights.

At the University of Illinois two documents relate directly to courseware ownership and copyright policy; these are Article III of The General Rules Concerning University Organization and Procedure (Board of Trustees, 1998), and The Intellectual Property Subcommittee's Report on Courseware Development and Distribution (VPAA 1998) that is based on the third article of The General Rules. The latter document's executive summary states that "The Intellectual Property Policy in The General Rules (Article III) is sufficient to cover the ownership, license rights and income distribution policies that are applicable to the development and distribution of web tools and course materials." Its purpose is to apply the General Rules concerning ownership to the specific issue of online courseware development.

In the General Rules, Traditional Academic Copyrightable Works are defined in Section 2, statement (b) of Article III:

> (b) *Traditional Academic Copyrightable Works.* "Traditional academic copyrightable works" are a subset of copyrightable works created independently and at the creator's initiative for traditional academic purposes. Examples include class notes, books, theses and dissertations, educational software (also known as courseware or lessonware), articles, non-fiction, fiction, poems, musical works, dramatic works including any accompanying music, pantomimes and choreographic works, pictorial, graphic and sculptural works, or other works or artistic imagination that are not created as an institutional initiative (as specified in Section 4(a)(2) below).

The section of Article III which pertains to ownership is the 4th, (Copyrights) and is reproduced below:

> SECTION 4. COPYRIGHTS
>
> (a) Ownership. Unless subject to any of the exceptions specified below or in Section 4(c), creators retain all rights to traditional academic copyrightable works as defined in Section 2(b) above. (See, however, Sections 4(b)(2) below.)

The University shall own copyrightable works as follows:

(1) Works created pursuant to the terms of a university agreement with an external party, or

(2) Works created as a specific requirement of employment or as an assigned university duty that may be specified, for example, in a written job description or an employment agreement. Such specification may define the full scope or content of the employee's university employment duties comprehensively or may be limited to terms applicable to a single copyrightable work. Absent such prior written specification, ownership will vest with the University in those cases where the University provides the motivation for the preparation of the work, the topic or content of which is determined by the creator's employment duties and/or when the work is prepared at the university's expense. (See end note 2)

(3) Works specifically commissioned by the University. The term "commissioned work" is hereafter used to describe a copyrightable work prepared under a written agreement between the University and the creator when (1) the creator is not a university employee or (2) the creator is a university employee but the work to be performed falls outside the normal scope of the creator's university employment. Contracts covering commissioned works shall specify that the author convey by assignment, if necessary, such rights as are required by the University.

(4) Works that are also patentable. The University reserves the right to pursue multiple forms of legal protection concomitantly if available. Computer software, for example, can be protected by copyright, patent, trade secret and trademark.

(b) University Rights in Creator-Owned Works

(1) Traditional academic copyrightable works created using university resources usually and customarily provided are owned by the creators. Such works need not be licensed to the University.

(2) Traditional academic copyrightable works created with use of university resources over and above those usually and customarily provided shall be owned by the creators but licensed to the University. The minimum terms of such license shall grant the University the right to use the original work in its internally administered programs of teaching, research, and public service on a perpetual, royalty-free, non-exclusive basis. The University may retain more than the minimum license rights when justified by the circumstances of development.

> (c) Student Works. Unless subject to the provisions of paragraph (a) or provided otherwise by written agreement, copyrightable works prepared by students as part of the requirements for a university degree program are deemed to be the property of the student but are subject to the following provisions:
>
> > (1) The original records (including software) of an investigation for a graduate thesis or dissertation are the property of the University but may be retained by the student at the discretion of the student's major department.
> >
> > (2) The University shall have, as a condition of the degree award, the royalty-free right to retain, use and distribute a limited number of copies of the thesis, together with the right to require its publication for archival use.

In the Intellectual Property (IP) Subcommittee's Report on Courseware Development, the section cited above is reiterated. Additionally, a second type of rights, "moral rights" is covered. The report states:

> In addition to copyright, creators expressed concern that they be able to maintain "quality control" of the content, presentation and use of courseware that they develop, particularly for derivative works. Such concerns generally fall under the "doctrine of moral right," which is covered by several federal and state doctrines that protect authors against reputational affronts arising from the use of their works. Thus for whatever policies are put in place by the University and the Units regarding course materials, it is important in general to respect the wishes of the original creators in the University's use of their work (particularly when the University has no ownership in the work). The "moral rights" issues are also very important when considering the University's right to make derivative works without the original author's participation.

According to the General Rules, the conditions for ownership of online courseware appear to be analogous to the conditions for ownership of, say, materials for a textbook. The first point of Section 4 (b) states that copyright is retained by the "creator" when the work is developed "using university resources usually and customarily provided." Thus if a professor develops online material during her normal workday, in addition to her usual teaching, research and service duties, then ownership is hers. Section 4 (b) (2) covers the case where university resources are utilized over and above those usually and customarily provided. Examples might include release time, courseload reductions, or technical or secretarial help. In this situation the material is still owned by the creator, but the University retains the "right to use the original work in its internally administered programs of teaching, research, and public service on a perpetual, royalty-free, non-exclusive basis."

Likewise in paragraph 4 (c), the copyright of the work of students is retained by the student, but the University has "the royalty-free right to retain, use and distribute" the thesis or dissertation.

Part (a) of Section 4 indicates those circumstances when the University claims outright ownership of faculty-developed online material: (1) when the development of the

material has been funded by an external agency, (2) when development of the material is a specific requirement of employment, (3) when the work is commissioned by the University from someone not a university employee, or the work is outside of the normal scope of a creator's employment, or (4) when the work is patentable.

The first three of these statements have potentially significant effects on the quality of online teaching. The first has to do with external funding. A consistent theme of the year was the increased workload necessary to change from a traditional to an online course format. Professor Harasim stated to us that the work was far from over after the initial offering of an online course. The second iteration requires just as much time and effort in making improvements, as the first offering required in changing format. It is not until the third iteration that the preparation effort begins to diminish. By its nature, developing an online course involves effort over and above the effort needed for a traditional class. Faced with such an onus, it is natural for faculty members to try to seek external funding which might include, for example, summer funding to allow for a focused period of learning and preparation. But here the faculty member could be caught between a rock and a hard disk – without support, courseware development may be next to impossible, but the support that makes the development of courseware possible may prohibit course ownership. Thus enjoined forfeiture of course materials that are funded externally might be seen as a disincentive both to developing online courseware and to seeking external funding. This was cited to be the case in a Chronicle of Higher Education story about Drexel, where very broad ownership claims were initially made by the administration (Young 1999). Courseware ownership policy is currently being rewritten there.

At the University of Illinois, the situation may not be so contentious. The usual practice here is to agree to joint ownership, with clearly defined responsibilities for the faculty member and for the University.

By the second and third conditions above, the University claims ownership when the courseware is "created as a specific requirement for employment" or is considered "work for hire" either by a current faculty member or an outsider, and this has traditionally been outside the norm of faculty duties. The IP Subcommittee's report clearly points out that "The University's position has been that faculty are hired to do teaching, research and public service – and creating copyrighted works as "work for hire" for the University is not a specific employment obligation for faculty."

It would appear that a shift in this tradition is being attempted in some instances as universities contract with for-profit organizations using the "work for hire" provision as the lever to claim university ownership of developed courseware. David Noble addresses this shift of tradition in the second of his "Digital Diploma Mills" articles (Noble 1998b). He maintains that "University control over copyright is the sine qua non of the Digital Diploma Mills." He cites cases involving UCLA Extension (UNext, the largest continuing higher education program in the country) and The Home Education Network (THEN, now Onlinelearning.net), UC Berkeley and America On Line, and the University of Colorado and Real Education (now ecollege.com), all of which hinge on university control of courseware rights. As part of the planned UNext-THEN contract, "UNext formally agreed that it would undertake to compel its instructors, on THEN's behalf, to assign their copyrights to UNext" (Noble 1998b). Furthermore, the instructor must "forever waive any right to assert any rule, law, decree, judicial decision or

administrative order of any kind throughout the world, which allows Instructor any right in the moral rights (droit moral) in the Recordings." Thus, even the "moral rights" of courseware developers would be denied.

In Professor Noble's third article (1998c), an example is presented in which the lines between extraordinary and normal duties and support from the university again appear to be blurred entirely. At Florida Gulf Coast University, a draft policy on intellectual property, formulated without faculty involvement, is cited to read as follows: "IP developed by FGCU employees (faculty, staff, and students) under university sponsorship or with university support shall belong to the university. University sponsorship or support means the work is conceived or reduced to practice: as a result of the employee's duties; through the use of University resources, such as facilities or equipment; or with university funds, or funds under the control of or administered by the university." The faculty at FGCU as at many other institutions have opposed what they perceive to be an overreaching ownership policy.

Professor Noble has called the current trend of university-commercial ties through teaching technology "the commoditization of higher education." In *Digital Diploma Mills I* he states (Noble 1998a):

> With the commoditization of instruction, teachers as labor are drawn into a production process designed for the efficient creation of instructional commodities, and hence become subject to all the pressures that have befallen production workers in other industries undergoing rapid technological transformation from above. Like these others, their activity is being restructured, via the technology, in order to reduce their autonomy, independence, and control over their work and to place knowledge and control as much as possible into the hands of the administration.

Apart from issues of higher education management, the passage above underscores the gravest danger to sound pedagogy. If commercial interests prevail in the distribution of educational material, the focus might cease to be "How are students best able to learn?" and might be instead "How are students, through learning, best able to maximize the profits of education providers?" This risk is especially critical when faculty members or whole departments have a financial interest in the educational media company, as reportedly is the case in the liaison between UNext and the University of Chicago and UNext and Columbia (McGeehan, 1999, Blumenstyk, 1999). The situation is even more acute at the University of Chicago, where UNext's head is a U. of Chicago trustee.

A final related part of ownership risks to sound pedagogy is the issue of "deprofessionalization." In a worst-case scenario of education commoditization, the replacement of full-time by part-time faculty is just one step in the eventual progression of the deskilling and then the elimination of faculty. Professor Noble cites the case of the New School in New York, which "now routinely hires outside contractors from around the country, mostly unemployed PhDs, to design online courses. The designers are required to surrender to the university all rights to their course. The New School then offers the course without having to employ anyone." In the same article he quotes Educom President Robert Heterich as follows: "Today you're looking at a highly personal human-mediated environment… The potential to remove the human mediation

in some areas and replace it with automation – smart, computer-based, network-based systems – is tremendous. It's gotta happen." While the elimination of all but perhaps "superstar" faculty members seems farfetched, Feenberg provided us some surprising statistics. According to his *Promise or Threat* article (Feenberg 1999), "Between 1970 and 1995, the number of full-time faculty increased by about half, while over the same period part-time faculty grew by two and one half times… At community colleges, they are already in the majority." In southern California, relates Feenberg, part-time instructors who must commute hastily between several campuses have become so prevalent that as a group they have acquired a nickname: "freeway flyers." The deprofessionalism of faculty appears to be a reality, as part of the business-oriented transformation of higher education, and it would also appear that teaching technology could be used to abet this transformation.

7) Conclusions and Recommendations

We conclude with a summary of tentative recommendations, which are the called-for "practical considerations" arising from our fundamental considerations of pedagogy. We have formulated two sets of guidelines, one for faculty members interested in developing online coursework, and one for administrators interested in formulating policy.

Practical Considerations for Faculty:

i) Whom do I teach? (Sections 2,3)

The fraction of "nontraditional" students is not as high as some make it out to be, but is still significant. Stemming from the baby boomlet, the number of young, "traditional" students will be as high as or higher than ever through the next decade. The seven contexts of online course delivery given in Table 5, for professional training/continuing education, undergraduate education, and graduate education for both traditional and nontraditional students, are all viable contexts in which to implement online teaching, with several exceptions. First, certain types of advanced graduate work, due to the experimental or clinical nature of the work or the type of mentoring, which must occur, cannot be performed online. Second, it appears that traditional students benefit from the maturing, socializing component of an undergraduate college education and this requires an on-campus presence (which includes students both living in dorms and off campus). This is not to say that degrees can't be awarded to place-bound students for whom there is no alternative. This is also not to say that traditional students shouldn't be taught online. The scenario seems quite plausible that good learning can come from courses taught in adjunct, mixed or even wholly online modes to on-campus students, who would also have ample opportunity to interact with each other and with professors out of class, and to attend social and cultural events.

ii) How do I teach? (Sections 4,5)

Attempts are being made to use instructional technology such as real-time two-way videoconferencing in order to simulate the traditional classroom. With improvements in technology this mode may yet succeed, but from what we have seen, the leaders in this area recommend shifts from "traditional" teaching paradigms. The learning theories of constructivism and collaborative learning are incorporated into these shifts. Two new online paradigms that appear to work well are text-based computer mediated communication (CMC) for courses that are traditionally taught in the discussion or seminar mode, and interactive, graphically based material for courses that are traditionally taught in the lecture mode. Methods are by no means limited to these two.

iii) How many do I teach? (Section 5)

From what we have seen, teaching the same number of students online at the same level of quality as in the classroom requires more time, or equivalently, in the same amount of time fewer students can be taught online than in the classroom if high quality teaching is to occur. The shift from the classroom to online has been described as a shift from "efficiency to quality;" lower student-to-faculty ratios are needed in the first place because there is so much information to be monitored. We also believe a motivational

human touch comes into play as well, at least with the young "traditional" student but also to a certain extent in older students. Students should feel they are members of a learning community and derive motivation to engage in the material at hand from the attentiveness of the instructor.

iv) How do I ensure high quality of online teaching? (Sections 2, 6, 7)

Quality is best assured when ownership of developed materials remains in the hands of faculty members. As in other sources, the U. of Illinois' Intellectual Property Subcommittee Report on Courseware Development and Distribution (Vice President, 1998) recommends that written agreement between the courseware creator and the administration be made in advance of any work performed. Evaluation of learning effectiveness is also a means to ensure high quality. We suggest a broad array of evaluation areas that includes but is not limited to a comparison of learning competence with the traditional classroom.

Policy Issues for Administrators:

i) How do I determine the worth of teaching technology? (Sections 1, 2)

The analogy presented at the University of Illinois was that of the President, from the crow's nest of his sailing ship, sighting an imminent tidal wave of teaching technology. The alarm must be sounded, and the ship must be turned to meet the approaching wave! To this image we reply: the ocean is enormous, and a lookout's perspective might not be accurate. How grave is the potential danger? How precisely sweeping is the wave? Might sections of it dissipate entirely? The most logical solution is to call in and rely upon the expertise of oceanographers, those experts of ocean appreciation, wave mechanics and naval engineering. On any issue involving pedagogy, seaworthy faculty (that is, good teachers) should have the first and last say.

The reverse of this argument is, of course, that faculty must be held responsible for good teaching. For example, online courses should not be motivated by poor instructor performance in large classes.

ii) How do I encourage faculty to implement technology in their teaching? (Section 7)

Teaching innovation should be expected, respected, and rewarded as an important scholarly activity. At the same time, not all classes are amenable to online delivery.

Circumstances that remove the responsibility of course content and delivery from the hands of a committed professor place the course's quality at risk. Forcing faculty members to forfeit ownership of a course, commissioning courses from temporary instructors, and allowing professors to have commercial interests in education providers are all circumstances that appear to permit this risk. If online courseware development is the trend of the future, IP policy should be consistent with the inherently greater effort needed to formulate courseware. Disincentives such as withdrawing copyright for externally funded work might be eliminated unless circumstances are extraordinary.

iii) Will I make money with online teaching? (Sections 3, 5)

The scenario of hundreds or thousands of students enrolling in a well developed, essentially instructor-free online course does not appear realistic, and efforts to do so will result in wasted time, effort, and expense. With rare exceptions, the successful online

courses we have seen feature low student to faculty ratios. Those rare exceptions involve extraordinary amounts of the professor's time. And besides the initial investment in the technology, technical support for professors and students and maintenance of hardware and software are quite expensive.

Online teaching has been said to be a shift from "efficiency" to "quality," and quality usually doesn't come cheaply. Sound online instruction is not likely to cost less than traditional instruction. On the other hand, some students may be willing to pay more for the flexibility and perhaps better instruction of high quality online courses. This is the case for a growing number of graduate level business-related schools. However, it is likely that a high number of "traditional" students, including the baby boomlet, will continue to want to pay for a directly attentive professor and the on-campus social experience.

iv) How do I determine if online teaching is successful? (Sections 5, 6)

In the short term, before history answers this question, we think that a rigorous comparison of learning competence with traditional classrooms can and should be done. High quality online teaching is not just a matter of transferring class notes or a videotaped lecture to the Internet; new paradigms of content delivery are needed. Particular features to look for in new courses are the strength of professor-student and student-student interactions, the depth at which students engage in the material, and the professor's and student's access to technical support. Evidence of academic maturity, such as critical thinking and synthesis of different areas of knowledge should be present in more extensive online programs.

Footnote

1. In 1995, the latest data available, there were 14.3 million college students in the U. S. (NCES 1997, Table 175), of which 12.2 million were undergraduate students. Of these, 47 percent are 21 and under, 63 percent are 24 and under, and 75 percent are 29 and under. The NCES tables are broken into 18-19, 20-21 and 22-24 age groups, so the 18-22 segment cannot be compared head-to-head. From the trend in the NCES data, though, it appears that the percentage of undergraduate students at or under 22 years of age is perhaps 50 to 55 percent.

The number of students at 2-year institutions account for about 1/3 of all students (at 2-year and 4-year institutions), independent of the age range for ages below 24 years (NCES 1997, Table 176). A significant portion of "nonresident students" is then the young and "traditional" community college student, many of whom aspire to enter 4-year institutions. The remaining 2/3rds of the 22 and under students are in 4-year colleges. That is, about 33 percent of all undergraduate college students are under 22 and attend 4-year institutions. About 90 percent of these are full time. If the 1/6th ratio mentioned above is correct, over half of "young" students attending 4-year institutions are nonresident. Since commuter schools such as UIC are a minority among 4-year schools, the 1/6th figure could mean that "nonresident" students are enrolled in 4 year residential universities, but live off campus. This may indeed be accurate. An article that recently appeared in the Chicago Tribune (June 1, 1999, section 1, p. 1) described the building trend occurring in many American universities, for the purpose of moving off-campus students back onto campus so that they might enjoy more benefits and feel more a part of the academic community.

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University of Illinois 1998-99 Faculty Seminar Syllabus

Teaching at an Internet Distance: The Pedagogy of Online Learning

Chairman: John Regalbuto, Assoc. Prof., Chemical Engineering, UIC

Participants:
Rachell Anderson, Assoc. Prof., Human Services, UIS
Hassan Aref, Head, Prof., Theoretical and Applied Mechanics, UIUC (fall semester only)
Nicholas Burbules, Prof., Educational Policy Studies, UIUC
Allan Cook, Assoc. Prof., Teacher Preparation, UIS
Cleora D'Arcy, Prof., Crop Sciences, UIUC
Mark Gelula, Assoc. Prof., Medical Education, UIC (spring semester only)
David Hansen, Assoc. Prof., College of Education, UIC
Michael Loui, Assoc. Dean, Graduate College, Prof., Electrical and Computer Engineering, UIUC
Babette Neuberger, Assoc. Dean, Academic Affairs, Asst. Prof., School of Public Health, UIC
Linda C. Smith, Assoc. Dean, Prof., Library and Information Science, UIUC
Ronald D. Smith, Director of Instructional Computing, Prof., Veterinary Pathobiology, UIUC
James Sosnoski, Prof., Dept. of English, UIC (fall semester only)
Saundra Theis, Assoc. Dean for Academic Programs, Assoc. Prof., College of Nursing, UIC
Robert Wengert, Chair, Prof., Philosophy, UIUC
Donald Wink, Coord., General Chemistry, Assoc. Prof., Chemistry, UIC
Charles Woodbury, Assoc. Prof., Medicinal Chemistry and Pharmacognosy, UIC

Support:
Jeff Stuit, Office of the Vice President for Academic Affairs

Objective:
The implementation of computers for distance or online teaching and learning should be governed by sound pedagogy. To date, no in-depth study of online pedagogy for university level instruction has been conducted, even while a good many courses and degree programs are now offered over the Internet. The objective of this seminar is to define the essential elements of online pedagogy, from which practical guidelines can be established for the future implementation of online teaching.

Approach:
Components of a three-pronged approach are as follows:
1) Preliminary intuition of the faculty participants on what constitutes good teaching, to be established at the opening retreat and with subsequent webboard discussion.

2) Input from scholars of pedagogy, computer pedagogy, and human-computer interactions, including those both "pro" and "con" online teaching.
3) Input from websites, articles, and other speakers which empirically evaluates, illustrates, or testifies to the effectiveness of a particular method of online teaching.

Differences among the types of university students (e.g., resident vs. place-bound, gifted vs. average, high esteem vs. low esteem) will be kept in mind.