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EDITORIAL

This publication of DEOSNEWS offers the fourth and final article in a series on the use of computer mediated communications in higher education based on presentations at the "Best Practices in Computer Conferencing in Distance Education" conference held at The Pennsylvania State University in February 1996. The goals of the conference were to identify and highlight exemplary practices of institutions of higher education that use computer conferencing to deliver courses. The first day of the conference showcased the successful use of computer-mediated instruction at four institutions: Thomas A. Edison College, Rochester Institute of Technology, The Open Learning Agency of Canada, and Houston Community College System. The second day of the conference was devoted to intensive discussions among participants and the representatives of each of the institutions on issues of administration, course development, faculty, and student support.

The complete conference report may be purchased from the American Center for the Study of Distance Education. It includes summaries of each of the presentations of the four institutions, overviews of the conference discussion sessions, and highlights of the conference schedule. For more information, or to order, call the telephone numbers listed above or visit our Web site.

The article in this issue of DEOSNEWS summarizes the "Best Practices" presentation by William J. Seaton and Esther Paist of Thomas Edison State College. See DEOSNEWS, Vol. 7 Nos. 6, 9, and 10 for the first three articles of this series.

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THE COMPUTER ASSISTED LIFELONG LEARNING (CALL) NETWORK OF THOMAS EDISON STATE COLLEGE

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THE CALL NETWORK: A BRIEF HISTORY

In 1982, when staff at Thomas Edison State College first recognized the institution's potential for using modern technology to deliver College services to students, an extensive research and planning process was initiated. The purpose of this process was to examine both the feasibility and potential of the concept, as well as its appropriateness for Thomas Edison.

The College discussed its ideas with corporate educators, telecommunications systems experts, software engineers, and the creators of higher education's (then) state-of-the-art interactive computer network -- the Electronic Information Exchange System at New Jersey Institute of Technology. As a result, Thomas Edison became convinced that its services could be delivered through a telecommunications system accessed through computer technology. The system required no development of new technology; rather, it involved the creation of a new application of existing technology.

The Division of Academic Affairs researched learning opportunities available through, or adaptable to, technology and began developing programs to make them available to Thomas Edison students. From the start, this research produced ample evidence that contemporary technology was producing educational products at ever increasing rates. Computer assisted instruction, telecourses, telelearning, teleconferencing, audio courses, satellite delivered instruction, and other learning opportunities were becoming broadly available. College staff recognized that its students -- adult distance learners -- needed access to these learning opportunities, advice on how to select among them, and support in using them.

Thomas Edison became a New Jersey leader in the development of telecourse broadcasting over public television and cable networks. The College participated in the Eastern Educational Consortium (now CODE - Council on Distance Education) and the International Consortium for Learning through Telecommunications (IUC) and made courseware from both available to its students. The Guided Study Program at Thomas Edison was an outgrowth of its IUC membership and funding from the Fund for the Improvement of Postsecondary Education (FIPSE).

Thomas Edison's Division of Public Affairs also worked to lay the groundwork for the electronic delivery of services. The Center for Corporate Partnerships, working with training officers and executives, developed special workshops, brochures, billing processes, and service applications for its employer clients. Through the Center, the College went TO the student and provided services that were specially tailored for the workplace environment. The Center selected three of its clients for the initial implementation of the CALL Network's Simulated Classroom (now OnLine Computer Classroom).

The College found that high-quality learning opportunities were available in a variety of formats, that employers were often enthusiastic about the possibility of technology-delivered courses and academic advising, and that there was a growing national market for education delivered via technology. Additionally, the College pioneered the use of video cassette distribution of telecourse programs. Today, it is a national leader in this mode of distribution, with over 100 available courses and an inventory of approximately

9,000 tapes.

One area of concern was the market potential for computer-delivered services with Thomas Edison's students. The College surveyed its students in 1986, and the results clearly indicated that the College's students were positioned to take advantage of a computer-based delivery mode and were supportive of the College's expanding into this new arena. Today approximately 80% of the students own or have access to a PC.

OBJECTIVES

Two primary objectives guided the development of the CALL Network: 1) expanding the availability of Thomas Edison's academic services in the growing adult learner market, and 2) enhancing the efficiency of academic services and associated processes within the College. These objectives were achieved through the purchase of (at the time) state-of-the-art hardware, the development of software, and the creation of a telecommunications network which would provide Thomas Edison students with computer-delivered academic services, interactive distance learning opportunities, and diagnostic examinations. When implemented, the CALL Network allowed a student who had dial-up access, regardless of location, to complete many elements of their college degree using a computer. Conceptually, the CALL Network consisted of three major areas: 1) an infrastructure, 2) the academic curriculum, and 3) computer diagnostic examinations.

Creating the Infrastructure

The creation of the CALL Network required that the College increase its computer resources, develop software packages that would both manage the system and provide access to information, and develop a telecommunications-mediated delivery system.

The CALL Network would reside on two computer systems: a mainframe IBM 4331 system at the New Jersey Educational Computing Network (NJECN) and a mini-computer at Thomas Edison State College. The mainframe system would manage communications by receiving incoming calls to the network and routing the caller into the appropriate software package. Informational software packages would reside on the mainframe, while the academic data base software would be stored on Thomas Edison's mini-computer.

Communications between computers and communications between students and the College were managed by three telecommunications systems selected for ease of use and economy. For student/mainframe connections, a national computer network was employed which allowed students to place a local call to access the CALL Network. Mainframe/mini-computer connections were achieved through a leased line arrangement in which the two computers were connected at all times. Communications between students and the College used electronic mail software already available on NJECN's mainframe.

Software systems that were developed to complete the infrastructure were the heart of the

CALL Network. Most resided on the mainframe at NJECN because they did not require specific information from the College's data base. Student-specific information was stored by software on the mini-computer at Thomas Edison. Specifically, CALL Network software included:

* Thomas Edison Orientation Program

This system allowed an individual to access a file containing general information about the College and its degree offerings and allowed students to review services of the College and gain in-depth information about selected services. Students requiring additional information had the opportunity to leave their name and phone number for later personal contact by a College staff member. The Orientation Program was further developed into an interactive package that allowed students to analyze their college credits and experiences against any Thomas Edison degree program.

* Interactive Registration

This system allowed any prospective student to sign-on and interactively register with the College. Students were prompted to fill out a college enrollment form. The individual could use either VISA or MasterCard to pay the registration fee.

* Interactive Payment of Fees

This system allowed any enrolled student to dial in and request the payment of fees with their VISA or MasterCard. Both the registration and fee payment programs were expanded to allow employers to register groups of students for workshops and other services.

* Examination Program Inquiries

This system allowed any enrolled student to search a data base of available examination programs by academic subject. This software was later enhanced to allow students to register in any of the 100 examinations Thomas Edison administers as part of its Thomas Edison College Examination Program (TECEP) and by arrangement with other examination programs (such as CLEP and DANTES).

* Request for TECEP Study Guides

This option allowed any enrolled student to request a printout of a TECEP study guide.

* Correspondence Course Inquiries

This system allowed an enrolled student to request, by subject, a database of correspondence course programs offered for college credit. Students could select a course and access information about how to enroll in their course of interest.

* Student Records Inquiries

Students had access to their academic records through a special software package which allowed the mainframe to copy a student record from the mini-computer for the student's review. This allowed the student inquiry software to operate on the mainframe and prevented student access to actual records.

* Electronic Mail

This system allowed students to electronically interact with academic advisors, to communicate with other staff members connected to this system, and to participate in the Simulated Classroom (see next section).

* Diagnostic Exams

This software allowed both dial up access and access from Thomas Edison's offices, permitting students to "pre-test" their knowledge in specific course areas and receive a diagnostic statement outlining their subject knowledge strengths and weaknesses.

CALL's "layers" were designed to be transparent so that a student using the CALL Network would be unaware of the systems and computers he or she had activated to receive services. Typically, the student dialed a local number through his or her computer modem and entered a special access number provided by the College. The student would then see a screen welcoming him or her to the CALL Network, followed by a menu of possible activities. The student could choose to pay a Thomas Edison fee (mainframe/mini-computer), review available correspondence courses in management (mainframe), leave a question for an advisor (mainframe), and print a copy of his or her current transcript (mainframe/mini-computer). All four activities were made available instantaneously, and the student was finished in less than ten minutes. Later, the student could access the system again to see if questions were answered and to conduct additional activities. The CALL Network eliminated waiting for mail, busy signals, and call backs; it was time and location independent.

NJECN was accessible 24 hours a day, every day. System downtime was only about 2% of available time per month. By using NJECN's services for the CALL Network, Thomas Edison saved the significant expense of purchasing a mainframe computer system and gained access to TELENET and to CONTACT (NJECN's electronic software package). System maintenance and personnel costs were only charged to Thomas Edison as used, allowing the College to operate a low-overhead system.

The architecture of the system designed by Thomas Edison staff was reshaped and refined as a result of reports received from the New Jersey Institute of Technology (NJIT), New Jersey Educational Computer Network, and Sycomm Systems Corporation. The first study, conducted by NJIT, was a global review of the technological feasibility of the project. In summary, NJIT found that the College's hardware, software, and telecommunications decisions were appropriate and that the CALL Network placed the College on the leading edge in using technology to provide college services. The NJIT study noted that geographic boundaries to higher education were eroding and that out-of-state institutions were already offering courses in New Jersey. In the opinion of

NJIT, if New Jersey did not support the development of the CALL Network, out-of-state institutions, as well as adults, would take advantage of the situation.

The Academic Curriculum

The vast majority of learning options that were accessible to distance (non-classroom) learners had extremely limited interaction or no interaction at all. By simulating the classroom through computer conferencing over the CALL Network, Thomas Edison could provide interaction for distance learners. This new learning option would be created by integrating telecommunications and computer technology with the College's Guided Study program. Guided Study was initiated in 1984 specifically for the distance learner.

All courses in the Guided Study program involved college faculty who assessed students' academic progress through written assignments and proctored examinations. Faculty were also available to students for consultation by mail or telephone. Faculty were hired for specific courses based on their academic expertise, current teaching experience, and commitment to adult education. These were all essential components in the success of the Guided Study program.

The Guided Study program remains an interdisciplinary instructional system designed to examine and present a body of knowledge through the use of sight, sound, color, movement, and print in a manner that will stimulate and increase student involvement. Guided Study integrates high-quality instructional video, texts, and faculty mentoring, resulting in a learning environment which both challenges and stimulates the adult distance learner.

The primary curricular objective of the Simulated Classroom was to make available distance learning opportunities which allowed for interpersonal exchange similar to that which occurred in the traditional classroom. In addition to this primary objective, several secondary objectives included:

1. Demonstrating that the learning environment is enhanced when high-quality courseware designed for the distance learner is combined with interactive computer conferencing.

2. Familiarizing the student with the use of the computer as a learning and communications tool.

3. Demonstrating the effectiveness and efficiency of the Simulated Classroom for human resource development in organizations as disparate as corporations, the military, and state agencies.

Computerized Diagnostic Examinations

The Computerized Diagnostic Examinations (CDE) are short-form TECEPs (Thomas Edison College Examination Program). TECEP is the College's standardized examination program. It is similar to ETS's CLEP and offers fifty-six examinations in a variety of

Liberal Arts and Professional Studies subject areas administered in an adaptive mode, for the purpose of predicting TECEP performance. These exams are essentially guidance instruments. The CDEs are available through the College's CALL Network.

The fundamental purpose of the examinations is to use a CDE score to predict a TECEP score, indicating to a student who scores well on the CDE that he/she will most likely succeed if they take the actual TECEP. A student who scores lower on the CDE may be advised of the likelihood of failure. The project proceeded on the assumption that the best guidance would be provided if the relationship between a CDE test and its TECEP "parent" test was established empirically. To this end, samples of students who had taken both tests were secured.

The CDEs are "adaptive" because they route the more knowledgeable student to more difficult questions and the less knowledgeable student to less difficult questions. This is done by using a computer-based test administration and programming which "adapts" its selections of questions to the demonstrated success level of the student. The CDE questions are structured in five levels of difficulty, a hierarchy of knowledge from the simple to the more complex.

INSTRUCTIONAL DESIGN ISSUES

Instructional design comprises, in part, issues pertaining to content, access, and efficiency, which are all intertwined. By stating general assumptions about good practices in course design and then raising questions about specifics of online course design and use of computer conferencing, I will describe what we are considering at Thomas Edison State College as we move into the next phase of distance learning course development. Because the field is changing so rapidly, I believe this questioning approach may be more useful than a prescriptive approach.

General Assumptions

Content

* There must be an alignment of content such that test questions or other outcomes-assessment items reflect course or unit objectives, which, in turn, drive course content.

* Content must be accurate and complete.

* Course content drives media selection and general delivery methods

Access

* The capabilities, needs, and expectations of the intended audience drive the presentation of instruction.

* Various learning styles must be accommodated.

* There must be consistent organization of information and clarity of expression with

careful attention to the special needs of learners who must function at a distance.

* The choices of delivery methods must take into account the capabilities of students to receive the materials, especially when electronic technologies are involved.

Efficiency

* The chosen medium must be the best possible way to deliver the content.

* The chosen medium must be cost-effective in terms of both time and money.

Online Issues or . . .

"The more things change, the more they stay the same." This applies to the three areas of content, access, and efficiency online.

Content

Although we certainly should not "dump" existing print-based courses into electronic formats and put them online as is, and although we should not attempt to replicate the classroom online, the same issues of alignment of course content with desired outcomes, testing, and/or other outcomes-assessment items mentioned above are still of paramount importance in good course design for online course materials. However, online delivery, with its potential (via multimedia and hypertext links) for nonlinear as well as linear delivery of information, presents some new twists and raises new questions.

* How can we foster the critical thinking skills that both faculty and students must bring to bear on the complexity of nonlinear presentation of content?

* Testing should still drive objectives and course content, but how will nonlinear as well as linear presentation of information affect how and for what we test?

* How can we best take advantage of the increased opportunity for improved feedback and interactivity inherent in computer-delivered content? What is it about the content that makes feedback and/or interactivity essential in some areas but not necessarily in all? How can we determine which is which?

* How can we help faculty make the best media choices as based on CONTENT, and not on the "glitz" of technology? For example, animated graphing can be used to present principles of economics, straight text to present concepts and examples in a literature course, still or full-motion video in science or art courses, and sound and graphic notation in music theory offerings.

Access

Here, again, we must challenge ourselves to ask the "right" questions, questions that address the needs and capabilities of the intended audience.

* Online courseware clearly offers the potential of providing for a wider variety of learning styles than do strictly print-based materials. But how do we decide what OUR audience needs? And how do we decide how much of each sort of learning style we will address in any given course? For example, should we always include both linear and nonlinear branching?

* Is the course content presented in a sufficient variety of ways that all students, even those with disabilities, have appropriate access?

* If careful and consistent organization was needed in the largely linear, strictly print-based materials, we need this sort of organization even more in online materials, with their potential for variety in presentation and format. How can we achieve this without diminishing the effectiveness of that variety? And how can we achieve this such that our students do not become lost in a maze of choices or overwhelmed by technology?

* Do our faculty and/or designers have access to the appropriate training, hardware, software, and technical support to create, maintain/revise, and teach online courses?

* Do our students have access to the appropriate user-friendly hardware, software, and technical support to take online courses?

Efficiency

As we plan for the use of high-tech (and potentially high-cost) methods of course delivery, we need more than ever to focus attention on making wise, cost-conscious decisions.

* How shall we determine optimal "class size," given constraints of faculty time, financial support, and such technology-related costs as "run-time royalties," line charges, and access to equipment?

* How shall we compensate faculty and developers, since almost by definition these courses (especially if they involve nonlinear elements, interactive test banks, or intensive graphical elements) take longer to create? And how do we resist the pressure to bring courses online, "ready or not"?

* How can we determine that with the inclusion of good choices of media, appropriate interaction, feedback loops, and attention to learning styles, these courses will be worth the effort and will be, in the long run, MORE efficient in terms of learning outcomes ?

Computer Conferencing Issues

Computer conferencing has proven to be an important subset to course delivery online. For many courses, it provides an essential interactive element. But here, too, we need to ask searching questions related to content, access, and efficiency

Content

The first and most important step is to determine the best role of computer conferencing in the delivery of content and what types of content are best delivered via this method. Having taken that step, we need to ask the following questions.

* What is the role of the online conference moderator? How can the moderator best direct interaction? Should he/she respond immediately to student postings; or should he/she purposely avoid response until after other students have joined in the group discussion?

* How does content affect the design of the conference? Are there some subjects that do not lend themselves to conferencing?

* Is synchronous or asynchronous conferencing better for the delivery of content?

* How can we measure the success or failure to deliver course content of the conferencing component of the course? By length of time online for students? By number of responses? By testing outcomes?

Access

As important an element as computer conferencing may be, we cannot ensure its success unless we address issues of access.

* Do all students and faculty have equal access to the conference? Are times of day (or night) for postings and responses constraining? Must people go to special locations to participate?

* Do students understand what the expectations are for them in the conference? Do faculty?

* Is the format of the conference accessible, with "rules" and guidelines clearly explained and enforced?

Efficiency

As with online courses in general, making wise, cost-effective decisions regarding the computer-conferencing element of the instruction can have important implications for success.

* What is the optimal student-to-instructor ratio for computer conferencing for this course?

* How many conferences do we need to run to gain maximum benefit from the interactivity they provide?

* How can we best design and otherwise plan each conference for the greatest possible benefit (in terms of learning and in terms of student satisfaction) from this medium.

* Have we considered all of the types of conferencing available to us (e.g., student-

to-student; student-to-instructor; chat; BBS) and chosen the most appropriate ones?

CONCLUSION

A careful consideration of the issues of content, access, and efficiency is paramount to good instructional design, design that results in distance-delivered courses that truly serve the needs of the course content and the students who must interact with that content. Only at our own peril can we ignore the questions raised above, especially in the current climate of cost-containment, burgeoning technologies, and student/consumer demand. If we are to use the technologies available to us in the best service of teaching and learning, we must continue to challenge ourselves with questions like these.

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