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News from Academic Information Services and Research

Creating New Learning Environments

The *Need for a National Learning Infrastructure*, a 1994 report issued by Educom, asks about today's changing definition of learning. "What now constitutes the learning we are seeking? Is it:

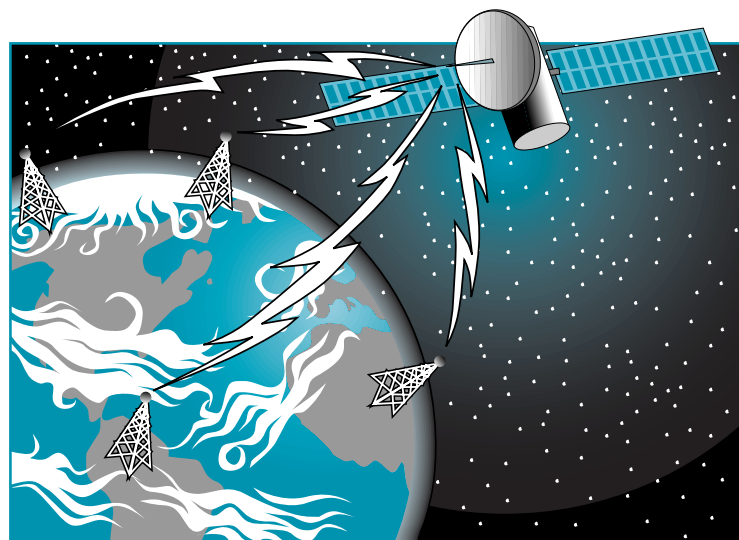
- mastery of a body of knowledge,
- critical thinking ability,
- communications skill,
- preparation for a career or useful life,
- the ability to find needed information,
- the ability to interact with others?"

The report also questions whether "our current teaching infrastructure, with its emphasis on the traditional classroom, provides an effective mechanism to serve a newly defined view of learning."

Professional associations, governments, school districts, and institutions of higher learning are now examining definitions of learning and exploring new methods to improve the delivery of instruction. Thomas Jefferson University, although continually ranked among the best teaching institutions, is no exception.

The Learning Infrastructure Project

Taking account of new trends in teaching and technology, Jefferson's newly formed Learning Infrastructure Project is charged with



undertaking a study to "define new learning environments that harness the power of information technologies and instructional design principles to improve the quality of teaching and learning, control rising costs and provide greater access to the resources of TJU for collaborative research."

Ed Tawyea, Director of AISR and Chairman of the Learning Infrastructure Project Steering Committee, thinks that the current concept of the university as a physical place will change in the future. According to Tawyea, "The concept of university is shifting from one of a physical place to one of a unified suite of services and talents which can be delivered anywhere in the world. Universities will continue to be evaluated by the quality of their

resources, services, and philosophy, but how they make these available will change. Understanding the implications of this shift, as well as the increasing emphasis on independent learning, are an important beginning for the Learning Infrastructure Project."

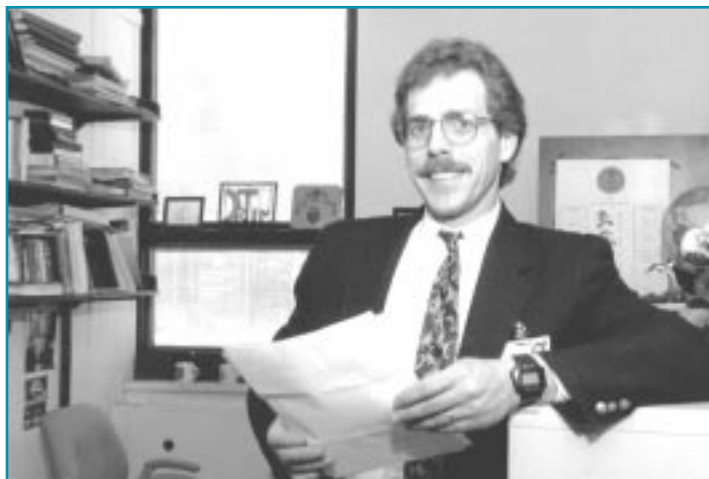
The project will focus on the utilization of technology to:

- reach distant learners,
- open new educational markets,
- improve connectivity to TJU for alumni and others, and
- improve collaborative activities for TJU researchers.

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New Infrastructure to Help Address Residents' & CME Needs



by Timothy P. Brigham, Ph.D.
Assistant Dean for Graduate and Continuing Medical Education
Jefferson Medical College, Thomas Jefferson University

I have been involved in education for a number of years but it is only recently that I have become a convert to educational technology. Although I once saw educational technology as mildly interesting and a nice teaching tool, I now consider it an essential tool in graduate and continuing medical education. The reasons for my conversion are many and they range from the practical, to changes in my thinking about teaching.

From a practical perspective, although the Office of Graduate and Continuing Medical Education is responsible for a wide range of programs, we have limited resources and staff and must be as efficient as possible. Instructional programs for residents, for instance, are very difficult to schedule. Each residency has numerous existing time commitments and clinical emergencies. Schedules vary from one residency program to another. And, residents who are away on rotation at one of our affiliates face even more difficulties once you add in travel time. We can't afford to put on these programs over and over! So, it is clear from a practical perspective, that we need a different delivery mode for our instruction.

From an educational perspective, I believe we need to shift from a

teacher-centered to a learner-centered environment. Teacher-centered programs focus on delivering the same content to a group of people at a set time. A learner-centered approach addresses the fact that learners may have:

- Unique learning needs,
- Unique learning styles, and perhaps,
- Different locations.

To be learner-centered, programs must be flexible and be deliverable in multiple formats. This is where I think educational technology can come in. Technology can help to deliver courses to different locations and can adjust for differences in individual learning needs. If a resident or practicing physician can't attend a class at the time it is offered, they should be able to log in over a network and get access to the teaching program. The program should be flexible, and be capable of changing from text to a sound or graphical format. The program should assess the learner's starting skills and change the presentation accordingly depending on their initial level of knowledge. When our educational programs include these features, I believe we will have made the transition to a learner-centered environment.

Of course the use of educational

technology gives us more than just improved teaching methods. It will also allow us to improve:

- Evaluation, because we can track what people are learning and how well, which can help us assess readiness for practice
- Needs assessment, because we would have records of the kinds of educational and informational programs physicians access for continuing education
- Research, for instance, assessing the impact of teaching on practice patterns.

Educational technology and distance learning will also allow us to maintain contact with our alumni. After they receive their initial training at Jefferson Medical College, physicians should be able to continue to learn from Jefferson faculty and resources. I look forward to the day when alumni keep their Jefferson connections quite literally, by online access to a full range of Jefferson informational and educational resources anytime they need it right in their offices.

Of course, the transition will not be easy. The Learning Infrastructure Project will help by answering questions related to cost and actual delivery methods, as well as by defining some of the issues we face with new technology and new teaching methods. I look forward to the new learner-centered environments we will create for all of our students.▲

The project will investigate and report to the academic officers of the university about:

1. the state of the art of technology for the purposes mentioned above
2. an economic model related to distance learning and research collaboration for distant partners
3. a course of action for the university.

The project will also initiate a demonstration project with the new M.S. program in Pharmacology to show how new learning environments can impact teaching and learning.

Although the project report will come as a result of many meetings and much research, the final recommendations will surely incorporate a number of emerging trends in health care, teaching and technology. For instance, Dr. Jonathan Gottlieb, Associate Dean for Academic Affairs, Jefferson Medical College has listed a number of forces that are changing the practice of medicine including:

- migration of the locus of care from the inpatient to the ambulatory setting,
- an ever-expanding body of knowledge, and
- rapid development and deployment of technology in the health care setting.

In response to some of these changes, the Medical College Curriculum Committee has already recommended a number of needed changes in the undergraduate medical curriculum including:

- enhancement in patient care experiences in the first and second year,
- encouragement of independent and computer-based learning,
- integration of topics and enhancement of case-based/ problem-based learning activities.

Other Jefferson programs such as Graduate and Continuing Medical Education (see editorial on page 2) are examining the use of technolo-

gies to improve access to education and outcomes of teaching. Raymond W. Campbell, Ph.D., Chairman, Department of General Studies, College of Allied Health Sciences has stated, "Time and customization are fast becoming competitive advantages in higher education and technology is allowing institutions to deliver education that is responsive to all students' time constraints and designed with each student's specific learning goals in mind."

Jefferson's Nursing faculty has revised their curriculum in response to new trends in nursing practice and theory, to focus on, among other things, the development of thinking skills in clinical decision-making. The curriculum includes courses focusing on clinical problem-solving, nursing informatics and the development of nursing knowledge. Sharon Renshaw, MSN teaches an Informatics course that features a simulated bedside computing system with full nursing documentation capabilities. Six bedside terminals connected to a file server provide access to nursing unit information. According to Renshaw, the TJU Nursing Program has been a curriculum innovator for some time. The college began its move to Nursing Informatics in 1983 and was the first program in the country to require computer-related courses.

The Learning Infrastructure Project will need to weave together the needs of the University with trends in healthcare, technology, and education to propose new learning environments that will serve Jefferson into the next century. ▲

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"Managing the Information Mosaic" Computers In Healthcare Education Symposium-April 26-28, '95

The Jefferson Learning Infrastructure Project will receive a jump-start when the Computers In Healthcare Education Symposium meets April 26-28, 1995 in Jefferson Alumni Hall. The Symposium is jointly sponsored by Jefferson, the Health Sciences Libraries Consortium, and Apple Computer Inc. "This is our tenth symposium, but the first to offer A.M.A. Category 1 CME credit," says Rodney B. Murray, Ph.D., chair of the program committee and director of academic computing at Jefferson.

Jefferson faculty and students are invited to explore the 1995 Symposium theme "Managing the Information Mosaic." This symposium is the only computer conference designed for and by medical and allied health educators.

Educational leaders from around the US and Canada will be convening at Jefferson to describe how they are using case-based learning, simulation and distance education technology to create new learning environments.

Besides providing a number of interesting demonstrations and workshops on new educational technology, the Symposium program includes dozens of presentations by health care institutions who use technology to deliver innovative instructional programs.

•Rodger Marion and Bruce R. Niebuhr, University of Texas Medical Branch, have combined simulation and case-based learning in their Health Information System Simulation (HISS) Project which focuses on simulated patient cases presented in a computerized patient record. In this environment students learn to collaborate with colleagues in other disciplines while mastering skills in diagnosis and treatment planning.

With increased use of the internet and other information technologies, access to networked information and

colleagues will produce more opportunities for learning and collaborative research. Several presentations at the Symposium will focus on the Internet as a tool to create new learning environments and the use of telecommunications to deliver information and instruction in tomorrow's learning environments.

•Edwin A. Holtum and Susan Zollo, University of Iowa, will discuss the development of a National Laboratory for the Study of Rural Telemedicine and describe the Laboratory's Resource Center and projects such as the Virtual Hospital, a digital representation of the University of Iowa Hospital that can be accessed over the Internet.

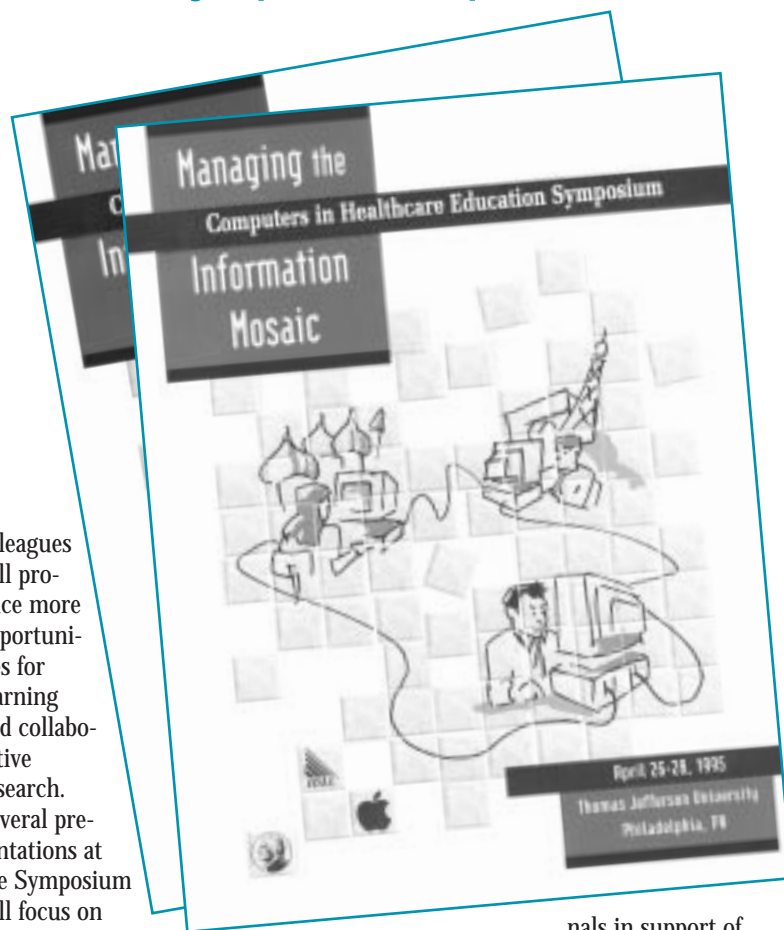
•Jacqueline H. Trolley and Sina Adibi of the Institute for Scientific Information (ISI) will describe The Electronic Library project, an effort now underway to support the delivery of full-text, full-image journal literature in the life sciences. The project, a joint effort by ISI and IBM, will provide networked, full-text jour-

nals in support of education and research.

•Andrew Penn, University of Alberta, will describe "The Synapse Project" which shows how the Internet and hypertext can be used as a medium to deliver Clinical Practice Guidelines, Care Maps, CME, Clinical Trial registries, databases and trial forms.

•James Baggott and Sharon E. Dennis will describe "NetBiochem," an Internet resource for medical biochemistry topics and a collection of animated graphics that may be downloaded and modified to meet local needs. ▲

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Faculty Enhance Instruction with Computer Based Learning

Computer-Based Learning Packages Developed at TJU: available on JEFFLINE

- Antibiotics Guide Curriculum materials from JMC Microbiology Dept.
- Cardiac Auscultation Demonstration suitable for all audiences
- Online Genetics Case studies for JMC'98 students
- Lyme disease tutorial
- Microscopic Anatomy demonstration on CD-ROM
- Pathology Exam Demonstration of the CD-ROM based pathology examination
- Pharmacokinetics Introductory pharmacokinetics for sophomore students

Jefferson faculty don't have to wait until the Computers in Healthcare Education Symposium comes to Jeff Hall to see examples of innovative educational technology. They can drop in now at either of AISR's electronic classrooms (311 Jeff Hall or 307 Scott) or the new Faculty Development Computing Lab in the offices of Academic Computing (114 Scott) to see what is new in educational software. Two Jefferson Medical College faculty members who recently consulted Anthony J. Frisby, Ph.D., AISR's instructional design consultant, are pleased with the results of their visits.

Allen R. Zeiger, Ph.D. and Libby Anderson, M.D. had somewhat different instructional concerns for which computer-based learning (CBL) tools proved the appropriate solution. To help meet the educational demands facing them, both Zeiger and Anderson met with Frisby to determine how CBL could help.

Zeiger faced two conflicting goals: to decrease the amount of lecture time and to increase the amount of information presented to students. His teaching experience with the Biochemistry course spans twenty years, and he sought to address his observation that students enter Jefferson with vastly different scientific backgrounds and therefore, different learning needs. Zeiger's meetings resulted in two new programs which all first year medical

students at Jefferson are now required to take: a pH tutorial, which is an introduction to acid-base balance; and pH Exam, a computer-based examination.

Students find Zeiger's pH tutorial to be a successful learning and review tool in preparing to pass the online examination. Students can take the exam at their convenience in either of the Open Access Labs and the results are immediately available to both the student and to Zeiger. Keeping track of the number of students taking the exam, and how they perform, allows Zeiger to structure his lectures to meet the changing needs of his students.

Dr. Anderson, one of the instructors of the January Plan Genetics course in Jefferson Medical College's first year curriculum, together with AISR staff, developed three different goals:

- provide concrete cases to complement the material presented in genetics lectures
- integrate literature searching and informatics principles into case material
- receive immediate and ongoing feedback from the students during the learning process

Along with Dr. Frisby, Dr. Anderson consulted with Michael D. Hamlin, Ph.D. and Elizabeth R. Warner, MSLS, AHIP of AISR's Education Services to determine how to best integrate principles of informatics with the genetics course content. The resulting program, Genetics Case Studies includes:

- computerized genetics counseling cases
- automatic collection and



Anthony J. Frisby, Ph.D., AISR
Instructional Designer Specialist

storage of student responses

- electronic discussion groups, where students could discuss ethical issues on-line
- access to local MEDLINE and Micromedex databases
- access to the genetics databases at Johns Hopkins University
- online evaluations

As one of the first computer-based learning programs to take advantage of the new graphical and hypertext capabilities available on JEFFLINE and the Internet, Dr. Anderson's Genetics Case Studies provide an exciting model for others who want to create new learning environments.

Since the opening this winter of the Faculty CBL Development Center in 114 Scott, Frisby has already worked with Ronald P. Jensh, Ph.D., and Bruce A. Fenderson, Ph.D., developing learning materials to support their courses. The new center is available exclusively to TJU faculty, and provides a full suite of multimedia development tools. ▲

To schedule a consultation or for more information:
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JEFFLINE—Your Connection to the Internet

AISR Education Services will be offering the following Internet classes starting in May:

- Overview and tour of the Internet via JEFFLINE
- Electronic mail & bulletin boards
- Listservs & discussion groups
- Internet as an information resource
- Designing your own internet information resources with HTML

Reports such as Educom's *The Need for a National Learning Infrastructure* and a number of presentations at the upcoming Computers in Healthcare Education Symposium make it clear that learning environments of the future will include access to networked information and computerized learning tools.

Dr. Libby Anderson's recent collaboration with AISR has produced an example of how computer-based instruction can be tied into networked databases, electronic mail and online discussion groups. The resulting integrated learning environment gives students access to numerous learning tools and online information resources in a single format.

Craig Doermann, a Nursing student at Jefferson is working with faculty member Sharon Renshaw to create a different type of learning resource on JEFFLINE. Doermann and Renshaw have created a Nursing information resource on JEFFLINE with links to Nursing information, discussion groups and organizations located on the Internet.

Previously, instructional applications on JEFFLINE were somewhat limited because the system was capable of text-only displays. Recently, AISR redesigned the interface to take advantage of new Internet capabilities. Graphics, sound and digital

movies open up new options for creating a wider range of interactive instructional and informational applications.

Hypertext markup language and graphical browsers such as Netscape let JEFFLINE users access the portion of the Internet known as the World Wide Web. "The Web" is composed of numerous repositories of information offered by colleges and universities, commercial ventures, and even individuals. Health information repositories span a wide range from online databases such as *McKusick's Online Mendelian Inheritance in Man* at Johns Hopkins to online Continuing Medical Education in Radiology at

the University of Washington.

Jefferson faculty, staff and students can learn about the Internet and the new features of JEFFLINE, in a series of Internet Workshops run by AISR's Education Services. These workshops will introduce you to the Internet, provide hands-on practice with JEFFLINE services such as electronic mail, and describe how to design your own resources for the World Wide Web. ▲

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