Multimedia and Asynchronous Learning: Changing the Support Model for Information Technology Services

by Arthur S. Gloster II and Steven A. Saltzberg

Although the nature of the workforce is changing and the demands of higher education make it clear that institutions need to reach students both on and off campus, the way that information technology service units support faculty, staff, and students has not kept pace with these changes. Furthermore, the ability to improve instruction by integrating digital technologies across the curriculum is becoming a reality. To effect these changes, the support paradigm of information technology service units—academic computing, user services, libraries, network services—will need to be transformed. This article describes plans and support models at Virginia Commonwealth University and Randolph-Macon College aimed at enabling such a transformation.

After decades of promises based on overhead projectors, classroom video, teaching machines, and other instructional technologies, the ability to improve instruction by integrating digital technologies across the curriculum has now become a reality. Incorporating digital text, audio, graphics, animation, and full-motion video into lecture, laboratory, self-study, and interpersonal and intergroup communication activities that are fundamental to teaching and learning promises to improve the quality of instruction.

Education in the future will support both synchronous and asynchronous interaction between the learner and the sources of knowledge and information. Real-time, simultaneous two-way video presentations, multimedia presentations, and “education on demand” can be delivered to students on the campus, in their homes, or at their work places. Connectivity to the Internet and World Wide Web already is allowing students and faculty to access educational resources. Escalating costs, declining financial support, increasing demand, and diverse demographics have placed significant pressures on higher education to become more productive.

Dr. Arthur S. Gloster II (agloster@vcu.edu) assumed the position of Vice Provost for Information Technology at Virginia Commonwealth University in August 1994. He is responsible for communication services, computing, and libraries. Previously he was Vice President for Information Systems at Cal Poly, San Luis Obispo for eight years. He has over twenty-five years experience in information systems in both the public and private sectors.

Steven A. Saltzberg (ssaltz@rmc.edu) has been Director of Information and Technology Services at Randolph-Macon College since July 1996. Prior to that he served as Director of Multimedia Development and Director of Academic Computing at Virginia Commonwealth University, and previous to that was Assistant Director of Computing at California State University, Fresno. He holds BA and MS degrees from the University of California at Los Angeles.
graphics have placed significant pressures on higher education to become more productive. The focus for productivity improvement must be on learning.

It is this realization that is leading to increasing use of a teaching model in which students gain access to information resources, faculty lectures and demonstrations, conferencing, and tutorials over networks from content organized by the faculty. Productivity gains occur in information retention, more efficient use of the student’s time, easy access to group study over networks, better feedback to faculty, and organized self-assessment and self-pacing. Faculty and traditional classrooms are not replaced, but another dimension is added that greatly improves learning efficiency. As this new process develops, more students will be able to take advantage of this type of instruction.

At large research institutions such as Virginia Commonwealth University (VCU) and at small liberal arts colleges such as Randolph-Macon College (R-MC), technology is enabling new teaching and learning models that are designed to improve learning productivity, reduce labor intensity, and provide new ways of delivering education and service to students while improving the quality of instruction.

**Strategic plans and goals**

VCU’s strategic plan defines the future role of information technology in support of the University’s academic and administrative programs. The plan states that technology will be used to deliver traditional education to the University, the community, the Commonwealth, the nation, and the world. Randolph-Macon College began a technology initiative last year and is in the process of redefining the use of technology for teaching and learning. The College will change its IT support paradigm to include various technology innovations and mentoring models, and is also developing plans to include cooperative instruction with peer institutions using information technologies.

The vision that has emerged at both institutions recognizes that technology can benefit learning when it:

- allows a student to take a more active role,
- allows a teacher to express the content of a course in more than one format,
- affects students by using techniques that reach various learning styles,
- broadens the array of resources brought to a classroom and the student’s workstation,
- increases opportunities for interactions between teachers and students and among students,

- increases the productivity of those who support the learning environment.

Plans at both institutions envision that instructional computing in the next decade will be symbolized by communications using network connectivity between machines—office to office, classroom to library, teacher to student, and the campus to the world. The next revolution will be about access to information and ways of sharing information. Consequently, this revolution will involve most members of the college and university communities, not only those who have been traditional beneficiaries of technology. In the new environment, every instructor or student working alone at their office desk or working with others in any campus classroom will access not only the powerful tools of the desktop computer, but also the networked applications and information resources of the campus and the world beyond.

These plans include providing high-bandwidth network connection to faculty offices and classrooms, network ports distributed throughout the campus, and high-bandwidth or telephone access from off-campus sites or residences. Classrooms will be equipped with systems for displaying prepared lecture material and sharing information resources and there will be online processing of grades and other student records. From the desktop, the user will search and retrieve a wide variety of library materials, including multimedia, international journals, databases, reference works, and scholarly discussion groups. Envisioned is a new methodology for faculty to conduct and publish research, create and deliver lectures, and interact with students.

The speed and scope of change in instructional methods promised by the new technology is unprecedented in educational history and will require unequivocal institutional support, not only to create the infrastructure to make this possible but also to meet the need for faculty motivation and training. These plans call for institutional policies to encourage individual faculty to make the required investment of time and effort. The institution could provide incentives for faculty development, such as release time or direct pay to conduct and/or attend training; consider professional development in this area for retention, promotion, and tenure purposes; or support faculty with well-defined projects for experimenting with new technologies and innovative ways of employing them in the teaching, learning, and research processes.

Achieving these goals will move our institutions toward becoming fully integrated “virtual universities,” utilizing asynchronous learning networks in which students, faculty, and staff are linked by electronic mail, two-way interactive
video, online processing, electronic databases, library services, multimedia on demand, and other information technologies, without regard to physical locations. The potential benefits of moving in this direction include:

- enhanced quality of instruction
- access to information and library resources
- high levels of support services to existing students
- increased access to academic programs by non-traditional students
- improved effectiveness in uses of limited human, program, and financial resources
- net revenue streams to offset infrastructure and operating costs
- incentives to faculty to develop new educational materials

Infrastructure requirements

Several infrastructure elements are required to effectively use technology in teaching and learning.

Electronic campus and digital library

VCU and R-MC are rapidly becoming “electronic campuses,” providing access to all major resources through a ubiquitous network. This fiber-optic network connects all buildings and residence halls at both institutions, and at VCU it will link to a “digital library.” The ubiquitous network infrastructure is the baseline required to support the concept of a virtual university and asynchronous learning, as shown in Figure 1. The digital library will provide faculty and students with access both on and off campus to a full range of information technology resources (voice, data, video) in an integrated, networked educational environment. It also will facilitate local and statewide access to full-text articles and publications, electronic library services, databases, multimedia presentations, a central repository of CD-ROM materials, interactive television, and a wide variety of other material, including slides, graphics, and video.

Authoring workstations

State-of-the-art multimedia workstations must be available to faculty for scanning and digitizing images, video, and audio, and they must be loaded with complete editing tools to produce professional quality work. VCU is equipped with both IBM and Apple authoring workstations and software tools, including image editors, video editors, and authoring packages. Other resources available to faculty include scanners and digitizing stations to convert source material from word processors, VHS tape, laserdisc, CD-ROM, illustrations, and artwork. Full video production facilities include a videotaping studio, hand-held video cameras for off-site work, digital, video, and sound editing studios, and in-house support for creating VHS tapes and CD-ROMs.

(continued on page 34)
Multimedia ...

(continued from page 29)

Electronic classrooms

Another element of the required infrastructure is the "electronic classroom," equipped with high-resolution projectors, quality audio systems, and microcomputers with high-speed network access and presentation software. Faculty using these classrooms connect to a local or remote server, and access a wide variety of digitized materials to enhance a classroom lecture under their individual control. This concept is illustrated in Figure 2. VCU and R-MC have several classrooms equipped with large-screen video projection systems, Macintosh and IBM-compatible computers, and network connections. Although delivery of full-motion video remains limited, several programs at VCU (e.g., the School of Pharmacy and the Department of Radiology) are developing content that requires the delivery of full-motion streamed video.

Virtual classrooms

The evolution of the digital library and products such as VCU’s Web Course in a Box™ (WCB) are extending teaching and learning beyond the walls of the classroom. The authoring workstations provide the capacity to digitize lectures, which can be edited, indexed, and stored along with course materials. Both the lectures and materials can be retrieved later to supplement existing classroom instruction, either as stand-alone video, or more likely integrated with interactive multimedia presentations. Several systems for interactivity are being used to encourage conferencing and interaction between participating faculty and students. Initially, this was accomplished through electronic mail, bulletin boards, and newsgroups.

Today both VCU and R-MC are actively promoting the use of the Web for instruction and using WCB to create these courses. To date VCU has delivered slow-motion video over an ATM network to a multimedia classroom in the School of Pharmacy, and there are approximately 100 courses that distribute instructional materials on the Web, half of which were created with WCB. With these tools, students and faculty can communicate electronically whenever they like. Assignments can be given and received electronically. Faculty can hold virtual office hours, freeing them from rigid schedules, and enabling students to obtain information quickly. Although the method for student/faculty interaction will change, these technologies should enhance the quality of interaction or improve it over current levels. VCU has experienced tremendous success with an accredited master’s degree program in Health Care Administration, which utilizes the virtual university concept.

The infrastructure requirements continue to change with rapid advancements in technology, and to take advantage of innovation, higher education must restructure information technology services. The traditional academic computing or library services role in audio, visual, or media instructional support faces significant restructuring to support asynchronous learning and other non-traditional instruction.

Restructuring IT services: Using the tools of asynchronous learning

Prior to 1980, information technology support units in academe typically operated a mainframe and provided software consulting support to the users of these large, timesharing machines. When the personal computer revolution began, academic computing centers invariably took the lead in offering all levels of support: consulting, training, even repair. A decade later, personal computers became ubiquitous. In the 1990s the use of instructional technology finally matured, and client/server technologies forced a change in the infrastructure we had relied upon for decades. IT support units are now struggling to find creative ways to support a new generation of computer users with increasingly sophisticated applications and desktop equipment, while rebuilding their aging hardware infrastructure.

At VCU and R-MC the increased demand for IT service is beginning to change the IT units in many ways.

Faculty support

The role that IT service units play in faculty development is changing. In the past, the training has primarily been given in brief training sessions of one to three hours, and has been a scatter-gun approach that usually only provided resources and training to the 10 percent of the faculty interested in being at the leading edge of technology. Academic computing and library services staff have offered “brown bag” lunch series in the use of various information technologies to faculty, staff, and students. This series of training sessions has grown, as new databases and new technologies are introduced and created in the academic environment.²

VCU and R-MC are now developing ways to provide intense hands-on training for all interested faculty members in all the newest technologies of multimedia and asynchronous learning. Workshops and institutes have been developed to provide instructional support to faculty to

¹ WCB is a Web-course creation system, using templates, forms, and clickable options. See http://www.mmd.vcu.edu/wcb/wcb.html

² See http://www.rmc.edu:80/administration/ITS/schedule.html and http://www.vcu.edu/vcu/ucsac/services/servic2.html
create content that can be accessed over the University’s data network, the Internet, and the World Wide Web. Faculty members come away from training ready to take an active role in planning and implementing changes in the way they teach. At both VCU and R-MC, strategies are being developed to support a faculty mentoring program. These programs seek to provide the tools, training, and release time for interested faculty to develop multimedia programs and serve as future expert resources to other faculty within their own schools and colleges.

**Instructional development**

Teaching faculty are only now learning to use multimedia workstations to deliver instruction. A new faculty support unit was created at VCU as part of the restructuring of technology units. The Instructional Development Center (IDC) was created with staff reassigned from University Computing Services, Library Services, and Media Services. The mission of this new unit is to support faculty use of instructional technology through consulting, training, project development, and creation of teaching media. The IDC works with individual faculty and with academic units in the planning and development of computer-based instructional projects, using both network solutions such as World Wide Web and stand-alone authoring environments such as Macromedia Authorware.

Given its limited staff, the IDC strives to maximize the assistance it can offer by creating tools to enable faculty themselves to create computer-based learning materials (such as Web Course in a Box, described earlier). IDC is committed to helping faculty become knowledgeable about innovations in instructional technology and find effective ways to use technology to enhance learning. Each summer a series of seminars is hosted by IDC; summer and winter institutes offer longer-term learning opportunities. IDC’s Web site features a “self-study lab” with information on learning resources as well as locally created demos and tutorials. VCU is evaluating Lotus Notes Domino as a hybrid approach to deliver MPEG standard video through the integration of a CD-ROM in a client with Internet access.

Although R-MC is just planning a multimedia studio, their Website is creating an online support and learning environment.

**The virtual consultant**

The traditional role of technology support staff has been to provide Socratic-style support, sometimes in a small training classroom, but usually one-to-one and face-to-face. As faculty

---

**Figure 2: Electronic classrooms**

The electronic classroom provides a mechanism for delivery of content and a facility to access content from the “digital library” and other network resources.

---

“[Faculty support] programs seek to provide the tools, training, and release time for interested faculty to develop multimedia programs...”

---

3 See http://www.vcu.edu/mdcweb/

4 MPEG refers to a standard for data compression and storage of full-motion video produced by the Motion Picture Experts Group.
and staff demands increase and the base of support fails to expand at the same rate, the consultant will need to learn how to provide consulting services without necessarily seeing the person face-to-face. In fact, the consultant will use the same tools that are being developed for teaching and learning at the virtual university.

Library services
Libraries and librarians have assumed new roles to support information technology use. The explosion of electronic resources, and the demands by consumers to access those resources at any time and regardless of location, have forced changes in library operations and management. New statewide networks like the Virtual Library of Virginia, better known as VIVA, have been created to maximize state funding to negotiate licensing agreements with online vendors of bibliographic and full-text databases. Libraries are creating digital collections of unique in-house materials and making them available on the Web. Like their computer colleagues, librarians play a vital role in faculty development by teaching faculty to use and organize digital information.

Access to the ubiquitous network
Providing full Internet access is a major support issue. Since R-MC is primarily a residential campus, wiring each dorm room and office has met its major access requirements. Although computers are not required at R-MC, more than 50 percent of the students have one in their dorm room, and in the first few months of implementation, over 25 percent of student computers have been networked.

VCU, with the majority of students living off campus, has, in addition to wiring their campuses, outsourced Internet access from home to a private Internet provider. This piece of the infrastructure offers additional support challenges. The infrastructure to create this function for 2,000 faculty, 5,000 staff, and 20,000 students is prohibitively expensive in today’s changing market. In fact, it is likely that the entire infrastructure will need to be changed in two years. Today’s 28.8 kb modem over analog dial-up may be the current technology choice, but ISDN and the 56 kb modem are likely to replace it in the next several years as the need for higher and higher bandwidth to the desktop is dictated by the emerging technologies of the World Wide Web and the digital library (e.g., full-motion video and high resolution imaging). VCU and R-MC are both exploring higher bandwidth alternatives to deliver integrated video, data, and telephony with both voice and cable companies.

The role of technology support has changed because the level of access to information has become so pervasive. In a brief twenty years, requirements have increased from supporting a few mainframe users with terminals on campus to supporting students, educators, and staff who demand better service from their office, home, or residence hall.

Conclusion
Technological advances to deliver education on demand are progressing rapidly. Not only has technology changed the way instruction is delivered, but it provides cost-effective solutions to the technology support issue. VCU plans to take this technology and apply it to education in order to overcome the economic, cultural, and physical barriers to learning facing the United States and the world. R-MC’s plans include not only an improved infrastructure for delivery but implementation of new support models.

The current economic restructuring is being combined with unprecedented growth in demand for higher education, and will require colleges and universities to mirror business and industry by delivering “just-in-time” rather than “just-in-case” education and support. We will also have to pursue cooperative efforts with other higher education institutions and the private sector to achieve this vision. Institutions like Virginia Commonwealth University and Randolph-Macon College will proceed deliberately, with a careful eye on changes in technology that may change the goals, and on vicissitudes in the economy that enable them to implement the new pedagogical paradigm. Still, colleges and universities must begin proceeding now toward a networked learning environment and a new faculty and staff support model if they are to deliver the education the students will need and demand, and provide the level of faculty and staff support to enable this change.