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Five years ago George Mason University began planning a new building and a technology infrastructure that would serve as a catalyst for changing the teaching/learning environment at GMU. With the fall 1995 move into the new building, these changes continue to provide a catalyst for program development, and for the development of faculty and staff involved in its use. They also have led to new working relationships among faculty, librarians, and computing professionals.

George Mason's University Center is designed to be the crossroads of the University, occupying the physical center of the evolving campus and playing a central role in the transformation of the university's learning environment. When fully occupied the building's eight acres of floor space will weave together space for innovative academic programming, a technologically-advanced library, sophisticated computing facilities, instructional and social spaces, selected student services, and a variety of food services and shops. To support this unique combination of elements, many new infrastructures are being created, including an advanced wiring network and new organizational partnerships.

George Mason University is a state-supported metropolitan university located next to the nation's capital. A young, vigorous institution building toward the future, George Mason's reputation for innovation results from its intent to be a world-class university committed to meeting the needs of a highly sophisticated Northern Virginia community, often characterized as a prototype of the high-tech, information/service-based economy of a post-industrial, knowledge-driven era. The university is exploring new approaches to a variety of needs: new curricula for undergraduates, new advanced degrees supportive of the Information Age, new openings on the cutting edge of telecommunications, new arrangements between the corporate world and higher education, and new cooperative arrangements with state government agencies and the private sector. Founded in 1957 as a branch of the University of Virginia, GMU now has an enrollment of 21,774 students and 742 full-time faculty in a wide array of undergraduate and graduate programs.
Background on New Century College:
New Century College offers a BA and BS in Integrative Studies. The key words for the program, the cornerstones to build on, are interdisciplinary, integrative, collaborative, experiential, technology rich, and competency-based. The curriculum is structured around learning communities, experiential learning, undergraduate research, and course offerings in the other academic units of the University. In the first year, students take one highly focused, interdisciplinary course at a time. They "learn to learn" by developing critical thinking skills, multiple perspectives, and reflective practice. Ideally, it is a small college within a large university, offering the intimacy of the one and the resources of the other. Examples and illustrations of the program may be presented, time permitting.

University Learning Center
The University Learning Center embodies the ideals of New Century College, offering the intimacy and community of the place and the connections to tap the resources of the rest of the University and beyond. The new building enhances the possibilities of two of the cornerstones of the program: pervasive technology and collaborative work spaces. We have combined the Learning Community model with intensive use of information technology. We believe that the computer has become the premier technology tool that enables us to work more efficiently and effectively. But more importantly, it allows us to work both more collaboratively and more independently mastering material at one's own pace. Computer use pervades the curriculum and pedagogy of New Century; it is the ground we assume is there when we built the College.

Examples of current computer use.

The physical layout of space in the University Learning Center encourages groups to meet in lounges, around tables in the food court or library. Within the New Century College space is a study area, with handouts, magazines, videos, and various items related to current courses. The hope is to encourage informal, out of class contact among students in a learning context. For easy computer access, ports and reservable ethernet cards allow network connections from many spaces in the building. There are computers for library and internet access at the information desk and in the library areas. There are computer labs, a multimedia authoring center, and a planned simulation studio. Descriptions of these three facilities may be in the other talks; particular use in New Century will be detailed here.

For the program to succeed, we constantly depend upon the smooth operation of the infrastructure--the library and the technology--and upon the imagination of the students, faculty, and staff. The pervasive high tech and flexible, communal space are the enabling environment. The overlapping of professional roles is also matched with the greying of the line of who is teacher and who is learner. Students have been successful teachers in the Instructional Development Office. Similarly, they become the teachers in each of the key technology facilities in the University Learning Center.
The design of the University Center Library began with a charge from the President of GMU to "think about a library in a student union." At that time Fenwick Library was the only library facility on campus, and suffered from severe overcrowding of stacks and seating and badly out-of-date wiring and networking. Around the same time a select faculty committee on the future of libraries was meeting, and its final report emphasized three primary needs:

a. creation of a research library to support growing graduate programs  
b. creation of a "teaching library" to help students achieve information literacy  
c. use of technology to achieve excellence, rather than relying on development of a paper collection

Around the same time the university was engaged in rethinking the undergraduate curriculum, and librarians participated in teams working to design a new interdisciplinary, multicultural core. As part of that process, librarian held a retreat focused on our concerns that the needs of undergraduate students were being neglected in the push to support graduate-level research. Perhaps the most useful aspect of the retreat was a discussion of our individual memories of that moment when learning was most exhilarating - and the realization that those moments almost never took place in a library, almost always were in a collaborative environment, and frequently involved food and/or drink.

The process of planning a library in a student union, therefore, began with a desire to create a new kind of learning environment for undergraduates (and, coincidentally, free up the current environment for a more classical research library approach) and an interest in supporting new ways of teaching undergraduates that depended on collaborative learning, extensive use of media and technology, and an awareness of the growing diversity on our campus. So we proposed a "teaching library" that would have a paper collection supporting the undergraduate core but would also hold the entire media collection and, through its technology, have extensive access to materials in electronic format (there weren't many available then, but we were optimistic about the growth of electronic publishing). We also proposed a Student Authoring Center where students could incorporate media into their papers and presentations and a Media Distribution Center for distribution of media throughout the building and, potentially, the entire campus.

I need for a moment to describe the massive scale of this building in comparison to other buildings on campus - it is triple the usual size of construction project funded by the Commonwealth, with 8 acres of floor space, and it stands on the highest and most central point of the new campus growth, about one block from Fenwick Library. The size and location alone enable it to be central to the campus; our goal was to cluster activities in it that would assure that centrality, in order to give a "commuter campus" a heart. Fortunately for us, the University's President believed that a library should be at the heart of a university. The first transition we had to make was to believe that a library could be successfully located in the midst of food and commercial space and student service activities.

The big breakthrough in the design of the building occurred when the two major occupants
of the building - the library and bookstore - agreed to develop vertically, so that a lively atrium could be created for food services and shops. The next breakthrough was when the library agreed to treat its book collection as an "open collection," shelved along the eastern sides of the upper two floors and not separated from the rest of the building. Suddenly we had an "agora," or, as some of our less reverent librarians say, a shopping mall.

During the development of the building plans four groups of players who barely knew each other participated in several joint planning sessions: library staff, computer services staff, student union staff, auxiliary services staff. Each planning team also had student and faculty representatives. One thing I learned is how dedicated staff from these areas are to serving students, and how often they share a common sense of not being heard or appreciated (the Rodney Dangerfield syndrome). We found we were natural allies on many subjects.

The University Center Library today encompasses four major areas:

An extensive multimedia collection with appropriate equipment and a multimedia service desk for assistance in using any "machine-using" collection, including online reserves and full-text periodicals

A teaching/extended reference area for drop-in and scheduled instruction in various information sources and extended assistance in research. This includes a fully-wired interactive classroom seating forty at networked workstations.

A collection of books focusing on undergraduate learning and intentionally multicultural in content, interspersed with a variety of seating.

An Information Desk which is jointly managed with University Information Services and which provides information about the library, the building, and the university as a whole via a series of networked terminals and a University Center Home Page.

The library has a "controlled section" where media, reserves, periodicals, and reference books are shelved and where the primary service desks are located. All the seating in this area is wired and networked, and there are 56 "superterminal" workstations with high end networked computers and printers. Special facilities for disabled patrons and group viewing facilities are also available in this space. The "open library" contains sufficient shelving for 100,000 paper volumes and approximately 1000 library seats, 60% of which are wired for power and network connection. There are 32 small group study rooms, also fully wired. Distinctive carrels provide computer workstations, but the space is primarily designed for students bringing in their own laptops; networking cards will be checked out from technology services.

Over the years the University Center has evolved our working relationships have also undergone a transition, so that we now are working very intensively with University Computing, especially their Telecommunications group, and with Information Services. We continue to work with Student and Auxiliary Services, and have added the Center for the Arts for programming display and performance space. We expect these relationships to grow now that we're actively occupying the building. Perhaps most significant is our
new partnerships with faculty, especially with New Century College, and our evolving role as part of the team of mentors students rely on as they work their way through college. Adjacent to the library is the Multimedia Authoring Center, about which Randy Gable will tell you more.
Infrastructure Support
Walter W. Sevon Jr.

The University Learning Center telecommunications infrastructure was designed to complement the work being done on the campus through the Communications Infrastructure Project. To understand and fully appreciate the University Learning Center infrastructure one must understand what George Mason University has done through the Communications Infrastructure Project.

Through the Communications Infrastructure Project the university is installing:

- A complete **underground conduit system**, with manholes, encased in concrete, that connect all 107 buildings on the Fairfax Campus. The system is sized to allow future growth and support GMU for 20 years.
  
  Statistics: 7.1 Miles of concrete encased conduit; 24 total miles of Conduit; 47 Manholes.

- An **interbuilding cabling system**, connecting all 107 buildings on the Fairfax Campus with fiber optic cabling, copper cabling, and coax cabling to support all data, voice, and CATV requirements at the Fairfax Campus. This cabling will be installed in the underground conduit system.
  
  Statistics: 588 Miles fiber; 30,000 copper pairs installed.

- An **intrabuilding cabling system** consisting of rewiring 90% of Fairfax Campus buildings with fiber optic cable and high capacity copper cabling (Unshielded Twisted Pair (UTP)) that will support the new voice system and current and future high speed data requirements.
  
  Statistics: 2,400,000 feet of the highest quality UTP.

- A new **high speed data network** backbone (interbuilding data network) and wiring concentrators (intrabuilding data network) for all GMU locations. A high speed Pilot Multimedia Network (ATM) connected to the data network backbone and the new Interactive Electronic Classroom. Our new data backbone can carry 40 times more data than today and improved service will be provided to all computer labs and all other network users. Students will now have data connectivity to the mainframe and access to the Internet from their residence.

- A **Video Distribution system** that will distribute 30 CATV entertainment channels and 10 additional GMU channels to all residence halls and all buildings on the Fairfax Campus. It will be possible to film a class/performance in any building and to broadcast it over the CATV network.

- An **Electronic Classroom/Distance Learning System** that includes 2 electronic classrooms at the Fairfax Campus and distance learning classrooms at the Fairfax and Prince William Campuses. Professors will be able to prepare multimedia presentations for their classes that can be delivered to the Electronic Classrooms over the CATV network, the Pilot Multimedia Network, or the data network.

- A new **voice system** that includes telephone systems (PBXs) at the Fairfax Campus, Arlington Campus, Prince William Campus, Commerce I & II, the Mathy house, and the
Center for Professional Development; links these PBXs together; and gives a single system image. The system includes over 3200 digital & analog telephone sets and also supports Integrated Services Digital Network (ISDN) capability. This system replaces the Rolm and Centrex service and will provide improved service levels at reduced cost to GMU.

- A new management system that will control the voice/data/CATV systems that will be based from a new Network Control Center located in Thompson Hall. This system will allow GMU personnel to rapidly reconfigure voice and data networks and give immediate support to students, faculty, and staff.

University Learning Center Infrastructure

The above is a good description of what the Communications Infrastructure Project will provide the university. The University Learning Center is an extremely large building and has a robust telecommunications infrastructure of its own which consists of the following:

- 740,000' of Category 5 UTP cable encompassing 4139 data/telephone outlets. The outlets are distributed throughout the center with a large percentage of the outlets located in public areas. 8.35 miles of installed fiber optic cable distributed to every Telecommunications Closet in the building.

- A high speed data network consisting of 880 Ethernet 10BaseT Ports and 48 10/100 MBs ports. The 10/100 MBs ports are used to segment the network and to support servers and other high performance workstations. 406 of the 880 Ethernet 10BaseT Ports are dedicated to the library, with most of the ports dedicated to public access terminals and positions within the library where students can bring their laptop computer and access the network. Additionally, ports are provided for public access in the coffee house and other public areas.

- The headend of the Video Distribution System is located in the center. There are 62 coaxial connections that can carry the GMU/CATV channels and they are distributed throughout the center in assembly/classrooms, meeting rooms, library video carrels, media viewing rooms, commercial spaces, and public lounges. The facility will allow assembly/classrooms in the center and classrooms throughout the campus to schedule and control VCRs, laserdisk, CD-ROM, betacam, audio cassette, and CD-Interactive sources. It is located adjacent to the library in order to have immediate access to the library media collections that can be scheduled to play at scheduled times on assigned GMU channels.

- A computer lab with 54 90 MHz Pentium computers, 25 PowerMac 6100/66 computers, and 2 handicap workstations. The computers will all have Internet access as well as access to a dedicated high performance server.

- A pool of laptop adapters that can be checked out to faculty or students when they bring in their personal laptop computers.

Media Authoring Center (MAC) - The MAC will provide an access facility with equipment, software and expertise to assist students and faculty in the preparation of media and multimedia based projects. The MAC will closely collaborate with the Instructional
Development Office and New Century College to ensure a comprehensive and consistent program of new media services for the campus. The MAC will have a video production studio, video editing stations, an audio recording booth, a sound editing station, and 5 multimedia equipped computer workstations (PowerMac 8100AV). The latter will have access to input from VCR, videodisk, CD-ROM, flatbed and slide scanning, and common audio sources. The emphasis will be on providing a migration path for the GMU community to move from analog presentations to full digital multimedia equipment.
What Faculty Development is Becoming

**What Comes First: The Technological Chicken or the Egg or the ???**

- **Student Development:** Literacy - Motivation - Expectation
- **Technology Development:** Networks - Labs - Electronic Presentation/Interactive Classrooms
- **Faculty Development:** Curriculum modification/enhancement - Culture change - Support

**Faculty Development: A High Priority**

George Mason University decided that Faculty Development was a high priority, and as a result, many faculty are both willing and able to incorporate into their teaching the resources of the Technologically Enhanced University Learning Center.

**The Process: Curriculum modification/enhancement**

- Early 1980’s: The PAGE Program was inaugurated. This two-year Plan for Alternative General Education incorporated programmable calculators and e-mail on a Cyber mainframe. New interdisciplinary courses were created by the faculty for this program.
- Mid 1980’s: Computers and Writing. Sections of English 101 were revised to take advantage of technology.
- 1994: New Century College (discussed earlier)

**The Process: Culture change - Support: The Instructional Development Office (IDO)**

Conceived by President George Johnson's “Project Team on Learning Initiatives,” the Instructional Development Office (IDO) was established in the Spring of 1991 and is charged with bringing information technology to bear on the educational mission of the University.

The IDO is a faculty support facility, managed by faculty, serving the entire GMU academic community.
The IDO:

- provides support for faculty in:
  - designing courseware
  - using the technology-enhanced classrooms
  - applying computer-based communications to extend classroom discussion
- manages a training/production computer/multimedia laboratory
- teaches workshops in the latest tools for the application of technology to teaching
- organizes discussion seminars on pedagogical and policy issues related to technology integration
- tests and then recommends hardware and software solutions to the problems of creating and delivering technology-based learning environments
- provides a range of video and graphics support: from basic editing and scanning to video production and computer animations
- seeks partnerships with outside corporations and agencies which enable the production and dissemination of technology-based learning environments
- contributes (via presentations, workshops, and demonstrations) to the ongoing national dialogue on the role and future of technology in teaching

Key Accomplishments:
- Established a responsive, competent, well-funded facility which encourages and supports faculty to integrate technology into their teaching (established in Spring 1991)
- Designed and managed the installation of four high-end technology-enhanced classrooms (1992)
- Received a Virginia State Council of Higher Education Grant: “Infusing Technology into Teaching, Learning, and Community” ($115,000, 1994-96)
- Instituted the “Showcase for Technology in Innovative Teaching” (1991, 1993, spring 1996 [planned for the University Center opening])
- Organized Intensive Faculty Development Workshops:
  - Early Adopters (25 participants, summer 1992)
  - Summer 1993 at the IDO (110 faculty participants in study/development groups)
  - Distance Learning Workshop (30 participants, summer 1994, supported by Bell Atlantic)
- Taught workshops for faculty on teaching and technology (207 registrations this year alone)
- Provided a focal point for innovative teaching for our faculty and visitors to the GMU campus

* How the IDO is getting ready for the University Learning Center *

Showcase for Technology in Innovative Teaching:
For the Opening Ceremonies (Spring 1996), the IDO will organize a showcase where faculty will demonstrate their use of technology in their teaching.
Technology Learning Competition (TLC):

The IDO has been involved in helping organize the TLC, for which teams of Faculty/Staff/Students/Community Members will create interdisciplinary projects designed to foster a sense of community involvement and to demonstrate GMU’s links to local businesses, institutions, and agencies. Although this is an opening day event, it is expected that it will be continued each year.

Faculty Orientation Presentation: “The Student Paper of the Future”

We provided demonstrations to faculty of the kind of research paper (multimedia enhanced) that students will now be able to submit: created in the University Center Student Authoring Facility and submitted via the campus network.

The Web

We have been teaching a number of workshops for faculty on Web Publishing. We have also provided enhanced support to certain faculty who have been incorporating the Web into their teaching, with particular attention to faculty asking students to publish class projects on the Web.

In Short

The IDO is helping faculty to get ready to expect changes in both their students and in the University, changes that reflect the possibilities that the new technologies bring to teaching.

How The Future of Faculty Development Depends on

The UC Library + The Center Activities + The Infrastructure

Student Support/Help Facility

Finally, located in the University Center, there will be a technology support facility for students. Faculty have been hampered in their efforts to encourage students to apply technology to their learning, for to do so often required the use of valuable “class time.” The IDO should now, finally, be able to say: “If you create it (or incorporate it), your students will be able to use it.”

Raising Expectations of Faculty: The Network

“Don’t Worry. – – As soon as the network is finished......”  Faculty have been hearing this for quite a while. We are all wondering if the use and capabilities will be in synch. For example, as faculty hear that video will be distributed from the University Center Media Distribution Facility, they want it on their desktops, on their students’ home computers, and in the classrooms where they teach. One of the deterrents to IDO’s helping faculty to create and incorporate new digital materials has been that it was not so clear where the data would be stored and if the bandwidth of the network was sufficiently high to deliver reliably such materials. The new network is supposed to resolve this problem.

Raising Expectations of Faculty: The Data

What will we put on this new network? The range expected is from “not much more than we already do” to “everything.” Faculty may expect that much of the Library resources will be digitized, if not momentarily then very soon. In addition, faculty will expect that the UC Library increase its purchases of digitally stored materials and that the Librarians work with faculty to created an innovative digital library.
Faculty-Student Teams: Creating New Teaching Materials

Currently, the IDO has been supporting faculty in the modest production of new teaching materials. Faculty have discovered that this process takes considerable time. Even more important, some have come to realize that the better model for these activities relies on the use of faculty/student teams. The new Student Authoring Facility will be the training grounds of those students who will eventually join such teams.

Student-Centered Learning

Many faculty are eager to create environments in which students take more responsibility for their own learning. That the new University Center is being called a Learning Center (rather than a Student Union) reflects this desire. Such a change requires efforts on both the faculty and the students. It is the faculty anticipation that the University Center, with its Undergraduate Library, its emphasis on Technology, its numerous breakout and study facilities, and, yes, its bistro, will indeed become such a facility.