

ASSURED ACCESS TO COMPUTING

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Abstract

To help create an environment where learning can take place anytime, anywhere, UMBC will require all students to own or assure access to a computer by fall of 2001. Several assumptions inform this decision:

- Technology is a tool that can enable any transaction between human beings.
- To fully realize this, all members of a community must have access to computing.
- Targeted new resources can build on existing resources to bridge UMBC's gaps in full, equitable access to computing.

It is very likely that many students could achieve the level of access UMBC will require without actually owning a computer, although an overwhelming majority will likely do so. For example, two roommates in a residence hall or apartment could agree to share a computer one of them owns. Or a student may have access to a computer through work to use after hours. Finally, a student may decide to rent a computer from the University or an external group for a semester during which the need is great. Accordingly, *Assured Access to Computing* is a plan to describe and coordinate a continuum of resources available to students to meet their computing needs each semester.

This proposal reflects discussions with campus groups, including President's Council, Faculty Senate Computer Policy Committee, IT Steering Committee, Faculty Senate, President's Student Advisory Council, and the Student Senate. Each group agrees that technology should be incorporated into the curriculum and that today's college graduate should possess proficiency with basic software tools and electronic information resources. They should also have a basic understanding of information technology. However, several issues need to be addressed in order to benefit from student ownership or assured access to computers:

- How will UMBC guarantee access to all students regardless of income?
- How will UMBC provide the necessary support and technical infrastructure to allow students to make effective use of their investment?
- How will UMBC provide the necessary support to faculty so that technology can be *easily* integrated into the curriculum in a pedagogically meaningful manner?
- How will UMBC ensure adequate classroom equipment to support instructional use by faculty?

- How will UMBC enhance electronic access to administrative services for students and provide better course management tools to faculty?

What does Assured Access to computing mean?

Assured access is a partnership between the University and student, wherein the student provides his or her basic computing needs, while the University provides the campus infrastructure and the specialized equipment needed beyond the capacity of students to own machines. Requiring students to own computers does not lessen the need for the campus to make investments in information technology resources; however, it does change what equipment and support services should be provided.

For the last decade, a major focus of University Computing Services (UCS) has been to provide computers to support basic functions such as browsing the web, sending electronic mail, accessing electronic resources, performing word processing, and basic programming. There were two reasons for this. First, computers were expensive; the cost of a basic computer in 1988 was generally around \$3,000, and at least \$5,000 for one with multi-media capabilities, well beyond what most students could afford. Second, software was much more expensive and difficult to use than it is now. As such, it was difficult to justify why students should be required to make such a significant investment.

Some schools tried to do so in the mid-eighties; however, there is little evidence that requiring computers at that time achieved the desired goal of widespread information technology literacy. The primary failure was the lack of information available online or in machine-readable formats to broadly justify the ownership of a computer by *all* students. Fortunately, the World Wide Web is addressing this issue. In addition, initiatives by the Library make UMBC a leader in providing electronic access to information.

With *Assured Access to Computing*, UCS would focus on providing technology resources that enable students to make use of their computers, providing technology enabled classrooms, and supplying specialized hardware and software that students simply can't afford. For example, it is unreasonable to expect an art student or engineering student to own a Silicon Graphics computer for course projects--the cost of the software alone is prohibitive. UMBC must supply this type of computer and software. On the other hand, it is not unreasonable to assume that a student majoring in the imaging and digital arts program should own a computer capable of utilizing basic graphic design applications such as Quark or Photoshop.

The Assured Access initiative, if implemented, may impact the resources currently dedicated and used in the delivery of computing support at UMBC.

While appreciable effort has been made to assess this potential impact, the Assured Access initiative is put forward with the expectation that the current level of computing support provided by UCS will be maintained and efforts will be made to enhance it as needed to meet the growing needs in the areas of research, instruction and administrative computing.

Why is Assured Access to computing needed?

The driving force behind Assured Access is to make it possible for learning to happen any time, any place. Information technology has become an integral component of all scholarly disciplines. Consider the following:

- The size of the web is estimated to include over 800 million documents¹ and continues to sustain high rates of growth. Through the USM Libraries Mdusa² project, UMBC has access to 46 electronic databases, many of which support full-text search.³ This growing body of electronic information makes access essential for all members of our community
- Information literacy has become an essential element in the development of critical thinking skills. As such, basic fluency in information technology and information access is a fundamental skill crossing all disciplines. The National Research Council has recommended guidelines available in their publication, *Being Fluent with Information Technology*.⁴
- Workforce demands. Companies hiring graduates consider information competency an essential skill for all jobs in the workforce. To the extent UMBC can satisfy this need across all majors, all students will have more career opportunities after graduation.⁵
- To take full advantage of investments in new administrative application systems, UMBC needs to make certain that all students, faculty, and staff have assured access to computing. This will enhance support services and improve productivity. Through tools such as *myUMBC* services can now be delivered to each customer based on his or her identity and group affiliations.

Institutional Responsibilities

The fundamental commitment required of the institution is to provide the necessary infrastructure for teaching, learning, and scholarship to take place. This entails the following:

- Ensure that all students have equitable access to computing regardless of income and provide those students who have financial need with a variety of options. UMBC should follow a similar to that has been successfully

¹ Dr. Steve Lawrence, Dr. Lee Giles, *Accessibility and Distribution of Information on the Web*, 1999, <http://www.metrics.com/>

² Mdusa homepage, <http://mdusa.lib.umd.edu:8000/>

³ See <http://www.research.umbc.edu/aok/main/>

⁴ *Being Fluent with Information Technology*, National Research Council, National Academy Press, 1999.

⁵ get footnote from Dept of Commerce study on job growth.

implemented by California State University, Sonoma.⁶ The options for students will range from a low-cost rental machine for those identified with financial need to special monthly purchase arrangements with suppliers and short-term semester rentals.

- Enhance our institutional commitment to the campus computer replacement initiative to ensure all faculty and staff receive adequate desktop computers. In essence, student machines will recycle every four years, but without adding resources to the computer replacement initiative, students could soon have machines, skills (and expectations) that exceed the capacity of the university's faculty and staff.
- Deploy a standard set of desktop software applications used by faculty, staff, and students. UMBC should utilize the Microsoft Enterprise Agreement and the Microsoft software as the de-facto standard⁷, augmented with other software products such as Netscape for browsing the web and Oracle for database system development.
- Provide the necessary leadership and support for faculty and staff to integrate computing technology into the curriculum and administrative functions. UMBC should follow the strategy outlined in the UMBC proposal to the Maryland Higher Education Commission (MHEC) for Faculty Empowerment through Common Tools.⁸
- Ensure that the campus has the necessary mix of presentation equipment and classroom facilities needed to support the instructional requirements of courses. UCS' focus will be to expand upon the work performed by the Office of Instructional Technology in planning classroom technology resources for multi-media instruction.⁹
- It is unrealistic to expect that all computing functions performed by students can be performed on their own computer system. UMBC will continue to provide specialized computing hardware and software systems needed for specific courses. Also, depending on students' needs for portability and conversion of their work, UCS will monitor and support demand for on-campus computing in labs and public access terminals.
- Develop administrative systems that allow for expanded access to information and enhanced services. With the successful introduction of the myUMBC

⁶ Assured Access at Sonoma State University, 1998 campus report, <http://www.sonoma.edu/University/UAreport/>

⁷ State of Maryland education enterprise agreement, <http://www.usmsc.edu/meec/>

⁸ UMBC proposal to MHEC for Faculty Empowerment through Common Tools (FACT), <http://www.gl.umbc.edu/it/umbcmhec.pdf>

⁹ Technology Classroom Guide and other Media Services, Office of Instructional Technology, <http://www.research.umbc.edu/~shewbrid/IT/techclas.html>

portal in fall 1999, a framework exists upon which to layer additional capabilities. UCS' strategy is to continue to implement the UMBC Applications Plan, 1998-2001.¹⁰

Building on existing resources

During the past few years UMBC has implemented the prerequisites to support assured access to computing. These prerequisites are actually much more daunting than the work that remains and include the following major initiatives.

1. Microsoft site license agreement that includes students, cost \$140,000/year.
2. Upgrade administrative applications and signup for Oracle SIS initiative to revamp administrative systems, cost > \$2,000,000.
3. Consolidation of student and faculty computing support services and expanded hours of operation, cost \$75,000.
4. Installation of Ethernet to the residential housing facilities, cost \$1,000,000.
5. Upgrade of the campus network backbone, \$500,000.
6. MHEC grant proposal for Faculty Empowerment through Common Tools (FaCT), cost \$200,00.
7. Online degree programs were initiated in EHS, Instructional System Design (ISD), and the planned Flexible Masters in IFSM, cost \$100,000.

Student Responsibilities

Students will be required to own or have assured access to a computer that meets certain basic minimum hardware or software requirements. These requirements will be updated and correspond to the minimum requirements associated with the UMBC computer replacement initiative released each spring.¹¹ For spring 1999 the *minimum* recommended computer would have been:

- A Power Macintosh 266 MHz or a 233 MHz Intel-based PC with at least 64MB of RAM and at least a 2GB disk drive; A 56K modem or Ethernet card (required for on-campus residents).

As of January 1, 2000, UMBC will include students in the Microsoft Enterprise Agreement. This will provide students with Microsoft Office 97 and Microsoft Office 2000 Premier (Word, Excel, Access, FrontPage, Publisher, and PowerPoint) along with Microsoft Visual Studio (Visual C, C++, Basic, J++, and Visual Interdev). These tools will be available to all students who are currently enrolled in any for-credit course at UMBC.

In addition to the Microsoft software, twice a year UMBC develops a free CD-ROM with a large number of free, high-quality software packages recommended

¹⁰ UMBC Applications Plan, 1998-2001, <http://www.gl.umbc.edu/it/umbcappl.pdf>

¹¹ Purchasing a New Computer at UMBC, <http://helpdesk.umbc.edu/purchase-computer.htm>

to the campus and used in UMBC labs. This software generally includes the Netscape browser, important browser plugins, such as Adobe Acrobat reader, and other selected Internet utilities such as FTP, telnet, and Netmeeting. UCS will advise and support students in the installation of this software on their computer.

It is expected that departments may add discipline-specific software applications as a requirement of students majoring in a program or taking certain courses¹². Students will be strongly encouraged to purchase a virus protection package for their computer; UCS is presently working with a team from the USM to develop a site license for a Virus protection software.

In terms of support, UCS will provide basic troubleshooting for supported campus applications such as Microsoft Office and Netscape. Hardware maintenance support and operating system (OS) support are the responsibility of the student. UMBC does have a hardware maintenance contract in place and students can bring their machine into the bookstore to be repaired under this contract.¹³ Other campuses that have successfully followed this approach, (e.g., Virginia Tech¹⁴ and Georgia Tech¹⁵), have utilized their campus bookstore for software OS troubleshooting and OS reinstalls on a fee basis or a student could use CompUSA.¹⁶

How Would Assured Access Operate?

Students who have signed the agreement to attend in the fall will be notified in May of the minimum requirements for a computer at UMBC along with other pertinent information.¹⁷ In addition, all required information will be on the web and will be included with the materials received at orientation.

As part of the financial aid analysis for incoming students, the Financial Aid office will conduct an analysis to determine those students eligible to receive a UMBC subsidized computer rental. This analysis will cover all students eligible for financial aid. Those students who meet the need requirements will be notified by mail that they are eligible and may receive their computer system at the UMBC Bookstore after the 10th day of classes. Students eligible for this must pay a small rental fee to cover incidental costs of this program. The computer assigned to the student is UMBC property, and UMBC will make sure the computer has a multi-year warranty to cover hardware problems. The students must sign an agreement stating they will return the computer at the end of each academic

¹² This is something we need to discuss as a committee. Options in math include Matlab student edition, Ideas Student edition, or Maple student edition. Options in other departments would likely be different.

¹³ I have verbal confirmation from CCS on this.

¹⁴ See <http://www.compreq.vt.edu/>

¹⁵ See http://helpdesk.umbc.edu/hardware/ccs_contract_information.htm

¹⁶ I need to finalize these discussions with the bookstore.

¹⁷ A model for this is the Virginia Tech Computer Requirement page, <http://www.compreq.vt.edu/>

year. Failure to do so will result in the cost of the computer being billed to the student.

The bookstore will serve as the primary point of contact with the student. UCS will work with the bookstore and Financial Aid to ensure that UMBC has an adequate supply of computers to meet demand. If the computer develops a hardware problem, the student will be required to bring the computer in to the bookstore where warranty service will be performed. The bookstore will also serve as the point of contact for distribution of the Microsoft software and other discipline-specific software packages. The University will include, free of charge, any discipline-required software packages for which the University has a site license. If the University does not maintain a site license for the package, the student will be financially responsible for purchasing discipline specific software.

Students who do not meet the threshold for financial need for a subsidized computer will have a number of options available to them. One option is that the University will have in place a number of contracts with vendors that will allow students to purchase a system through a low monthly payment. UCS anticipates the monthly payment being under \$30 a month¹⁸. The bookstore will coordinate this option for students. A second option is to have a limited number of rental units available to students to rent for a semester. The semester rental would facilitate students who have sufficient access through other means for semesters with a normal computer workload, but who find those means insufficient for certain semesters in which the amount of computer work is too great. UCS anticipates that the rental cost will be \$120 a semester (\$30/month for four months).

Benefits of Assured Access?

UMBC is a leader in the region in terms of information technology. We are the largest producer of technology graduates in the State; in 1996 we produced 39% of the IT graduates.¹⁹ However, the demand for people skilled in technology continues to increase. The U.S. Office of Technology projects that the United States will need one million additional IT workers by 2005.²⁰ It will be impossible to meet this demand simply through growth in information systems and computer science/electrical engineering graduates nationwide. Instead, UMBC needs to broadly educate all students in basic computer and information literacy skills.

A benefit to students is that skills in information technology help them command higher starting salaries than are generally the case with other majors. It is now very common to see CS/EE majors get starting salaries of \$50,000 a year, and

¹⁸ Examples include Gateway's Yourware program and the Apple leasing program.

¹⁹ Maryland Department of Business and Economic Development survey of IT graduates by institution, 1996.

²⁰ America's New Deficit: The Shortage of Technology Workers, Office of Technology Policy, <http://www.ta.doc.gov/reports/itsw/itsw.pdf>

IFSM students often command over \$40,000. Students who can demonstrate competency in information technology are highly sought after by employers, regardless of their major,²¹ UCS is a classic example of this paradigm. Current UCS employees have majored in English (2), history (2), biology (2), and mathematics (3), to name a few. This is very common and offers students additional options for work. If fostered more broadly, this could allow UMBC to provide broad technology skills and focused technology training as a means of encouraging students to pursue non-technology majors that may be their true passion.

A broad benefit to the faculty is that the university can begin to develop much better support for basic technology skills in students. Presently, faculty considering the use of technology in a course cannot assume students have either adequate training or access. Worse, without defining a common technology literacy standard, support from the campus is inconsistent and falls on faculty. Through Assured Access, UMBC can identify these common standards for technology literacy and develop campus support mechanisms.

One approach to this would be to identify important courses to infuse basic technology training. One example is English composition. As part of the English composition requirement, students coming to UMBC could purchase the same instructional book on Microsoft Office. They are taught the basic skills of writing collaboration found in Microsoft Office, and also receive training through a self-paced online module that reviews information retrieval for writing a research paper. With this online module the students can go back and refresh themselves whenever they get a new writing assignment.²² Similar examples could be developed in science, engineering, and mathematics with software from Matlab or Maple.

Ultimately, once students and faculty are technically "plugged in," the more likely they can proceed to being educationally "turned on." To create a traditional learning environment between students and faculty, or the sometimes more elusive, but equally rich collaboration that can take place between and among peers, Assured Access is a critical first step that must occur for learning to take place anytime, anyplace.

²¹ See "Testing students' computer savvy," by Michael Hill, *The Sun*, October 25, 1999. The article focuses on the new liberal arts "Tech Exam" (<http://www.tekxam.com/>), introduced in Virginia and recently administered in Maryland.

²² Teaching with Technology, Dr. David Brown, Wake Forest University, <http://iccel.wfu.edu/publications/DBrown.htm> UMBC's English department is currently offering six courses of ENGL 100T, a technology enabled composition course that could become the standard for all students.

Other Alternatives Considered

Purchasing laptop computers for all students or requiring laptops by all students.

This is the "Wake Forest" or IBM Thinkpad model. The cost for this model approaches \$1500 per student/per year and is not feasible for a public university such as UMBC that is concerned about affordable access to education. This alternative does have benefits since it supports information portability and any classroom can become a "computer lab." Students can also take their laptop to the library or create impromptu study groups; however, the additional costs do not seem to warrant the benefits received.

It is our belief that it is still premature to require all students to have laptops and doesn't warrant the added expense. Within the next 15 years as wireless communication becomes more commonplace and laptop computers drop in price, this approach becomes more practical. In reality, it should actually cost less to produce a laptop, and over time, students will migrate to this model. When the majority of people are purchasing laptop computers, UMBC should reconsider this question. For the present, students will have the option of purchasing a laptop and UCS is developing the infrastructure to support mobile computing.

Fund this through financial aid grants to students.

This is the "University of Florida" model. The problem with this approach is the cost, which UCS estimates to be four times the cost of the proposed model. The major drawback is that UMBC would be funding students with financial aid grants to purchase a computer when they often already have a computer. In addition, students may get financial aid from UMBC and then transfer to another school in the following year. UMBC has paid for the computer but didn't benefit as an institution.

Yes, it is critical to guarantee those with financial need access; however the University should focus as much of our resources on facilitating technology into the teaching and learning process. The goal of this proposal is not to get the student a computer but to utilize it in teaching and learning.

Do not require students to own computers.

This model is what UMBC presently follows, but it allows a minority of students who don't own computers to influence the level of technology used in courses. Providing widespread access to technology is difficult and it is costly to build sufficient general-purpose computing labs to meet demands. By requiring students to bear the cost for basic computing, UCS can focus our resources on

specialized labs and integrating technology into the teaching and learning process.

Implementation Plan and Costs

Costs

| Department | Item | Cost |
|---------------|--|--------------------------|
| Financial Aid | Money for subsidizing the purchase of computers by needed students. UMBC currently has 629 students attending UMBC with the maximum Pell grant. For the freshman class of 1999 this number is 107. Based on the experience at Sonoma, UMBC should estimate about 1/3 will take advantage. This would require 40 computers per year be purchased. In addition, UMBC should purchase 35 machines to be used as rental units. | est. \$75K ²³ |
| Provost | Increase funding for computer replacement initiative by \$200,000. | 200K |
| Library | Increase staffing for electronic course reserves and reference services. | 100K |
| LRC | Increase funding for information literacy tutoring | 50K |
| Inst. Tech. | Classroom equipment | 50K |

Of the costs identified above, only the cost for financial aid is a new cost solely attributable to the Assured Access proposal. The other costs have been broadly discussed as necessary enhancements to UMBC regardless of whether UMBC adopts Assured Access. These budget enhancements could be implemented over the next few fiscal years but ultimately UMBC will need to expand this to something in this range to broadly support technology on campus whether we require student ownership or not.

²³ Based on analysis of 1999 Financial Aid information.

In addition to operating costs outlined above, UMBC needs to look at adding sufficient staff to support this initiative. The Hezel Report²⁴ did an analysis of UMBC support services in terms of offering online programs. In most cases, the support recommendations presented by Hezel are what UMBC needs to support Assured Access.

| Department | Item | Staff Needed |
|-------------|---|-----------------|
| Inst. Tech. | Two positions to support technology training for faculty. If MHEC grant is funded this would be the same as was requested there. | 2 ²⁵ |
| UCS | Two fulltime staff for the UCS helpdesk to provide after-hours supervision of student helpdesk staff and provide enhanced support services. | 2 ²⁵ |
| Library | Increase staffing to provide support for creating electronic course reserves. | 2 |
| Faculty | Lecturer to teach introductory computer literacy courses. | 1 |

Implementation Plan

This plan would begin in the fall semester of 2001. While there is much to do, the campus has been implementing the prerequisite requirements to prepare for this, including:

1. Microsoft site license agreement that includes students.
2. Upgrade administrative applications and signup for Oracle SIS initiative to revamp administrative systems.
3. Consolidation of student and faculty computing support services and expanded hours of operation.
4. Installation of Ethernet to the residential housing facilities.
5. Upgrade of the campus network backbone.
6. MHEC grant proposal for Faculty Empowerment through Common Tools (FaCT).

²⁴ See <http://www.gl.umbc.edu/it/it-plans.shtml>

²⁵ See Hezel Report.

²⁵ See Hezel Report

Clearly, UMBC has spent more money to accomplish the above initiatives than it will cost to implement the remaining requirements. The most pressing issues that must *still* be addressed are:

- Enhance the funding for computer replacement. We had to turn down over 30 requests this year, all of them very legitimate requests. It is imperative that UMBC develop a funding model that replaces faculty and staff desktop computers on a regular basis. One of the charges from the IT Steering committee is to develop a campus inventory of computers. UCS is researching software to do this and is expected to report back later this fall.
- Begin implementing the FaCT plan. This plan is well defined and offers the campus the opportunity to leverage the Microsoft site license expenditure to broadly enable faculty use in the classroom.

Proposed Decision Making Process

This proposal is important and requires broad campus discussion, commitment and support to be successful. The proposed model for discussion is the following:

| | |
|--------------------|--|
| September 27, 1999 | Draft 1 submitted to IT Steering Committee for initial discussion and review by campus groups represented on IT Steering Committee |
| November 22, 1999 | Motion to forward this to the campus for further discussion and action was passed by IT Steering Committee |
| November 23, 1999 | Initial presentation to academic chairpersons |
| December 1999 | Initial discussion at the Faculty Senate and Student Government Senates |
| December 1999 | Discussion at Provost Council |
| February 1999 | Proposal with discussion comments submitted to President's Council for review |