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INFORMATION TECHNOLOGY DOMINANCE AT FLORIDA GULF COAST UNIVERSITY

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EDUCATION

INFORMATION TECHNOLOGY DOMINANCE AT FLORIDA GULF COAST UNIVERSITY

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ABSTRACT

Accreditation guidelines usually dictate that information technology resources and systems shall be essential components of the university infrastructure. But, what is the competitive advantage of universities born in the information-age and the Internet revolution? As a Florida's newest public university, Florida Gulf Coast University (FGCU) is known for its strategic use of technology and innovation, including use of information technology for distance learning delivery as well as internal administration and student-service processes. At FGCU, information technology is intertwined with academic and administrative operations, such as curriculum-design, course-delivery, resource-allocation, and everyday decision-making. The objective of this paper is to examine the developmental decisions, including policy, computer hardware and software, communications networks, and user services that led to the University's accreditation in record time. It illustrates sample technology-driven course-delivery tools like the *WebClassroom of the Future*. The paper examines the outcomes, problems and solutions and provides a framework for next-generation universities.

Keywords: Education; accreditation; information technology dominance; computer infrastructure

I. INTRODUCTION

A university of the 21st century must provide information technology capability for all academic and administrative departments. Information technology should be strategically used and must “permeate” all units. All faculty and full-time staff should be capable of running standard desktop applications on a day-to-day basis. All computers must have stable access to e-mail and the Internet. Information technology should be infused into the curricula and students should have ample opportunity to acquire basic and advanced competencies in the use of computers and related information technology. Multiple training classes must be offered to faculty, staff, and students to enhance technology skills. A university must establish and implement official backup and recovery procedures in addition to sufficient security. A university must allocate its budget to continuously upgrade its hardware and software. Finally and most importantly, a university must establish a culture that facilitates both the efficient and the effective use of information technology. The performance evaluations and reward systems for faculty and staff, as well as students, must be tightly integrated with the use of information technology.

This article describes how Florida Gulf Coast University (FGCU), which began operations in August 1997, has, to a large extent, implemented these goals. FCGU had the advantage of starting with a clean slate at a time when modern information resources were available. Information technology permeates the entire university. It is positioned in the strategic quadrant [McFarlan 1984] because the university depends on information technology resources and systems to deliver its services. We believe that our experience will be of help to other institutions, even though most universities start with a legacy system rather than starting fresh.

FGCU is the newest public university in Florida, with an enrollment of approximately 3500 students in 2000-2001. Its mission statement (Appendix A),

developed in 1992 when the School was approved by the Florida Board of Regents, calls for extensive use of technology for students both on and off campus.

Between 1996 and 1998 two million dollars were allocated for developing the information technology infrastructure at FGCU and for integrating technology throughout the University. The University emphasizes the use of technology in its curricula as a fundamental tool in achieving educational quality, efficiency, and distribution [FGCU, 2000]. The University employs information technology for delivery of instruction, for administrative and information management, and for student access and support. It cultivates technological literacy in its students, faculty and staff. The Strategic Plan for Technology [FGCU Strategic Planning for Technology Committee, 1996] outlines FGCU's overall vision and approach to technology (see Appendix B or visit http://www.fgcu.edu/strategic_plan.htm).

As shown in this article, the University embraced information technology in creative, experimental, and practical ways to fulfill its mission. The following two sections describe the technology infrastructure and classroom equipment. The next section explains how technology support is provided at the University. Then, the article presents how information technology is used in the curriculum. This is followed by descriptions of the University's approach to training faculty, staff, and students in the technology and the use of technology in administration. The article concludes with descriptions of an attitude survey toward what is already accomplished and a discussion of desirable additions to the existing system.

II. TECHNOLOGY INFRASTRUCTURE

The architecture of the information technology infrastructure is shown in Figure 1. At the core of its campus network infrastructure is a 155Mb asynchronous transfer mode (ATM) backbone interconnecting each building.

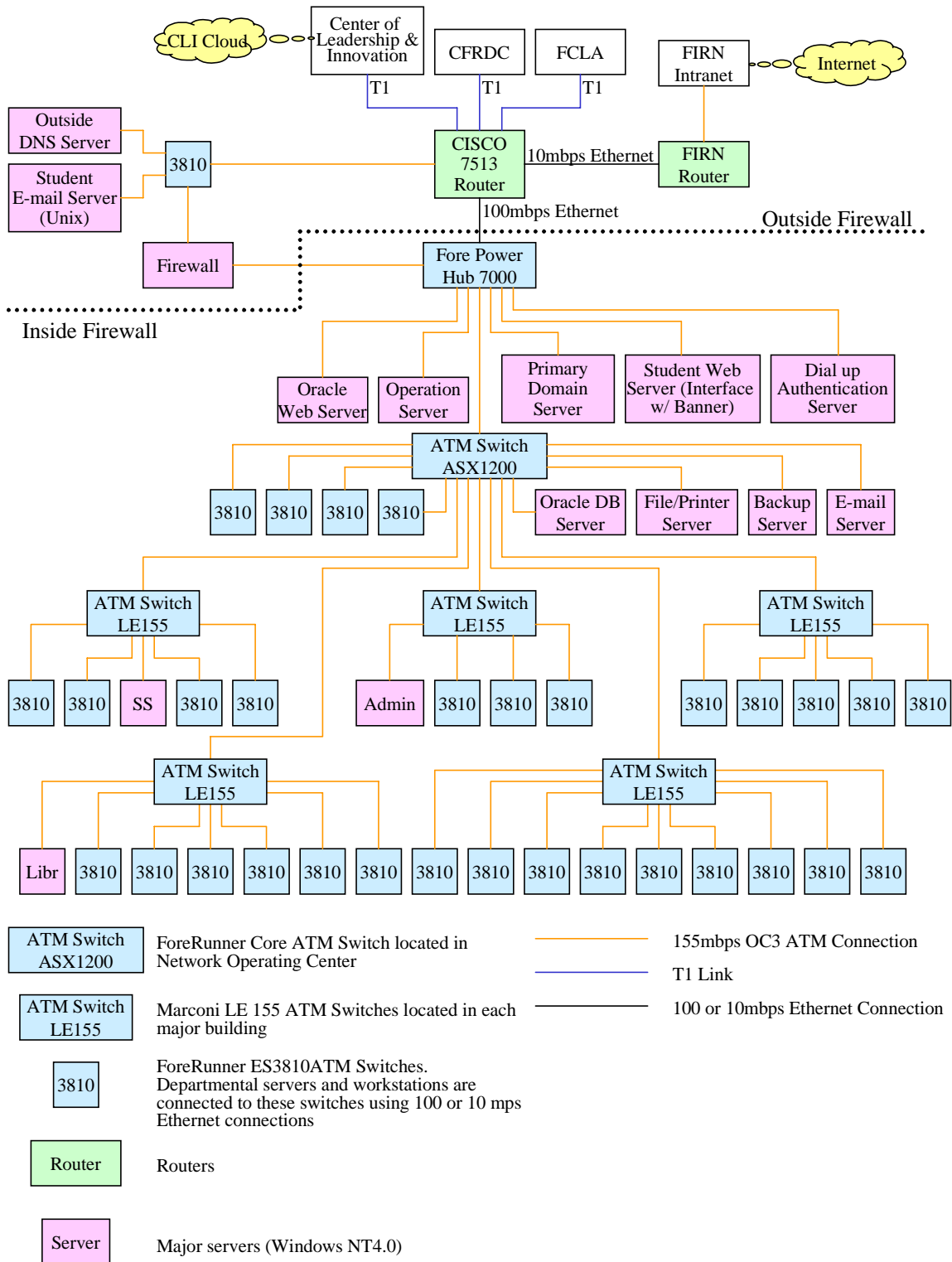


Figure 1. Information Technology Infrastructure

The main centralized servers, such as e-mail and administrative databases, are directly connected to this backbone. Desktops and departmental servers connect to 10/100 Ethernet switches. These Ethernet switches are connected to the ATM backbone via 155Mb ATM links (fiber optic cable). Full-time faculty and staff access networked desktop (or laptop) computers. All computers are connected to the Internet through the Florida Information Resource Network via a 1.5Mb frame-relay. The University also connects to regional data centers through the frame-relay system, using a dedicated point-to-point T1 data line. A Shiva remote access switch allows faculty and staff to connect remotely to campus via dial-in services from distant sites.

Most servers use Microsoft Windows NT 4.0 and PC clients use Windows 98 as the operating systems. Apple computers run MacOS9, and Appletalk and IP are used to connect to the servers. The student e-mail server is the only one that does not use Microsoft Windows NT. It uses Unix as its operating system.

An integrated Student Records Management software package (SCT Banner 2000) is used for registration; financial aid budgeting, tracking, awarding, packaging, and disbursement; application processing; degree audits; facilities resource management; and housing applications. The Banner 2000 system is maintained at the Central Florida Resource Data Center, which connects to FGCU through a T1 connection. A web interface for Banner was added to improve functionality and ease of use.

The University uses several servers to support distance learning students. Those servers allow distance students to submit a university application form, access university catalogs and course schedules, enroll in courses, and obtain instructional materials and library materials through the Internet. One server is used to host course Web sites, another one is used to host course management software (WebCT), and a third one is used to host Web Conferences

(WebBoard). The Library also uses a server to host a Web site developed for distance learning students.

III. TECHNOLOGY IN THE CLASSROOM

FGCU provides a wide variety of computer classrooms, open computer laboratories, and special purpose computer laboratories for student and faculty use. Technological advances are integrated into all of the classrooms and laboratories on campus.

Computer classrooms consist of an electronic teaching podium and networked computers (Pentium III with a hard disk drive, CD-ROM drive and a zip drive) with Internet access. Computers are loaded with Microsoft Office 2000, Internet Explorer and Netscape Communicator, Eudora e-mail, and other course-specific software such as AutoCAD, Visible Analyst, Oracle client, Visual Basic, and C++. Computer classrooms also provide laser printers.

FGCU maintains two open computer laboratories, one with PCs and the other with Macintoshes. These two open laboratories provide the same hardware and software as the computer classrooms, including an electronic teaching podium.

In addition, the following special purpose computer laboratories are available:

- Multipurpose Laboratory for tutoring, testing, career exploration, and personal assessment.
- High Performance Systems Development Laboratory for information systems and other applications such as 3-D animation.
- Adaptive Learning Laboratory with four adaptive computers. This laboratory is supported by the Office of Multi Access Services for disabled students.
- Career Development Laboratory with six computers. This laboratory, used for career resources and exploration, is supported by Counseling and Health Services

All computer classrooms, open computer laboratories, and special laboratories provide accommodation for wheelchairs.

Technology is integrated into all general classrooms on campus. For example, electronic teaching podiums are installed in the 43 classrooms that can seat 30 or more (Approximately 80% of classrooms). Features of the Teaching Podium System include the ability to present multimedia-based instruction on both a Macintosh and PC platform; direct Internet and Intranet connections; complete music and sound system; document cameras; and VHS tape and CATV feed. The podium also provides connections for a laptop computer, microphone, or other equipment. A touch-screen on the teaching podium allows instructor control and projection of both digital and analog instructional media. The smaller seminar classrooms in the University are wired for Internet and campus network connection.

IV. TECHNOLOGY SUPPORT

Technology support is provided through the organizational units of Administrative Computing, Instructional Technology, Student Services, and Library Services (Figure 2). Five of the Colleges (College of Business, College of Health Professionals, College of Education, College of Public Services, College of Arts and Sciences) also allocate internal staff resources for technology support.

The Administrative Computing unit (orange rectangles in Figure 2) provides a centralized service for the computing infrastructure and for the support of office computing, network services, and administrative servers. This unit is also responsible for maintaining information stored on its resources (backup); installing basic software on computers used by faculty and staff; evaluating, testing, implementing, supporting, and documenting the latest hardware,

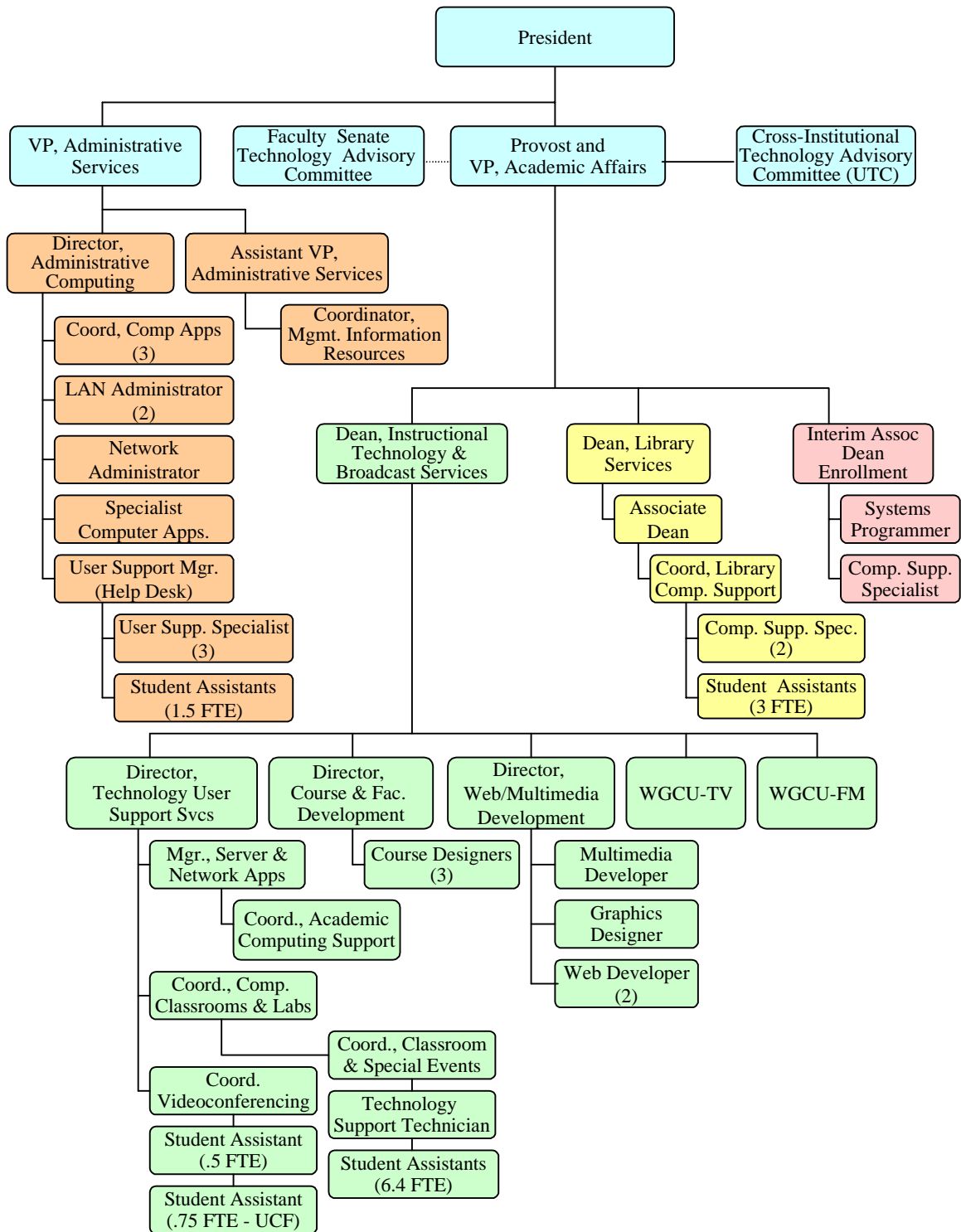


Figure 2. Organization Structure of Technology Support

software and networking technology; providing programming support to the Division of Administrative Services. The administrative computing unit also administers a centralized Help Desk to provide technology support. During Fall semester, 1997, Help Desk services were outsourced to Fujitsu Business Systems Corporation. During this three-month trial period, data was collected on usage, frequency of calls, and types of technology problems experienced by technology users. The University assumed the responsibility of providing help desk services during Spring semester, 1998. Data collected from the Fujitsu Business Systems Corporation was used to design the FGCU Help Desk. The Help Desk responds to problems and provides technology information for all users of the university's technology systems. Academic computing does not support course-specific software used by faculty and students. This software is supported and maintained by the Office of Instructional Technology (green rectangles in Figure 2).

The Office of Instructional Technology (IT) (green rectangles in Figure 2) provides support and consultation services for classroom technology; instructional computing; distance learning production and delivery; and course, faculty, and media development. Their services also include the development and maintenance of the University's main home page and academic Internet resources. IT provides technical support and maintenance of classroom multimedia, computer, and distance education technology. This unit installs and maintains course-related software applications in computer classrooms, the computer podiums, and faculty computers.

Three instructional designers are available to assist faculty in selecting appropriate technology-based delivery strategies, in creating courses that are effective as distance learning offerings, and in developing online assessment applications. Graphic, web, and digital media development staff are also available to assist faculty in the creation of instructional materials. (Sample

course URL and CIS projects are shown in Rodriguez 2000a and Rodriguez 2000b.)

The Office of Instructional Technology also packages basic software applications in a CD for students. The CD gives students easy access to software required for courses. The contents (both Mac and PC versions) are Netscape 4.73 (customized with FGCU logo), Internet Explorer 5.5 (customized with FGCU logo), Apple Quicktime 4.0, Real Player Shockwave/Flash, Adobe Acrobat Reader, and the FGCU Alma Mater (performed by the Philharmonic Center Chorale). Also included on the CD are the complete University Catalog and Student Guidebook and links to the Technology Skills Orientation and FGCU Home Page.

Student Information Systems and Technology, a unit in the division of Student Services (pink rectangles in Figure 2), is responsible for the integrated Student Records Management software package (SCT Banner 2000) and the student e-mail system. This unit also provides service for the Library NOTIS System and manages three computer laboratories (Adaptive Learning Lab, Career Development Lab, and Multi-Purpose Lab). The Division of Student Services maintains a strong Web Presence. Nearly all services offered through Student Services are available on the Internet.

Library Services (yellow rectangles in Figure 2) maintains electronic library resources and a computer laboratory. Their web site provides most of their services, including electronic request forms, on-line book renewal requests, interlibrary loan requests, and course reserved materials. They also maintain a web site to support distance learning students

V. TECHNOLOGY IN THE CURRICULUM

The University is committed to graduating students who can confidently use technology to compete in the work market and to engage in lifelong learning. At a minimum, every course has a presence on the World Wide Web and e-mail capabilities. Many courses use additional technology to enhance student learning such as listservs, interactive web based examinations, message boards, web conferencing software, course management software, chat room, video streaming, and audio streaming.

An inherent belief is that the effective use of technology enhances employability as well as improves the quality of life. Students acquire basic competencies in computer technology in all programs offered. The Integrative Program Matrix (IPM), shown in Appendix C, outlines the inclusion of university goals and student learning outcomes in each college, program, and individual courses. Technology literacy, one of the university goals, is tracked through the student's ability to develop knowledge of modern technology, process information through the use of technology, and collaborate with others using technology tools. The IPM, which is maintained by the University Undergraduate Curriculum Team, ensures that this goal is reflected in specific college-level and program-level goals. The IPM lists individual courses designed to achieve these specific program-level goals and to measure the level of achievement externally. The IPM also includes the results of the measurement. Through the use of the IPM, many instructors now require students (in both on-campus and distance classes) to use web conferencing software, chat room, and/or whiteboard, in addition to e-mail, to facilitate communication with classmates and with the instructors.

FGCU believes that access to computers and technology is essential for student learning. Access to technology can be achieved through a student-owned computer, modem, software, and Internet browser, and/or through use of technology at campus computing laboratories, and/or through use of technology

at FGCU-partnered distant sites (such as local community colleges, other Florida's state universities, and several universities in Europe and Mexico), Students can access the main campus facilities via an Internet Service Provider from home or from one of the regional computer laboratories. The cross-institutional University Technology Advisory Committee Position Statement on "Student Access to Computers & Technology" is derived from the FGCU Strategic Plan - The Use of Technology. Goals One and Five of the strategic plan specifically address technology access for on and off-campus locations for students, faculty, and staff [FGCU Strategic Planning for Technology Committee, 1996]:

“The University will establish and support a high-speed, reliable, and ubiquitous telecommunications network that facilitates electronic information sharing and retrieval for students, faculty, and staff from both on- and off-campus locations, and defines the University as a member in the global electronic community ... FGCU will emphasize distance- and time-free teaching and learning strategies in order to maximize access to educational programs and to facilitate convenient, off-campus student and faculty participation in instructional offerings.”

Enrolled students are required to be able to access to a computer compatible with the University's technology infrastructure and course requirements. Given the options provided by the University for student access, student ownership of a computer is recommended, but not required. To maximize students access, the University recommends that students purchase a computer, compatible software, and an Internet Service Provider account.

To foster student success in this technology environment, the University established standards for student access to computers and technology (Appendix D).

VI. SAMPLE COURSE DEVELOPMENT

An integrated Web-based environment (Figure 3) was developed for learning information technology at FGCU's Department of Computer Information Systems [FGCU, 2000]. The resource [Rodriguez, 2000b] consists of Java-enabled integrated tools, including frames, hypertext markup language (HTML) and Common Gateway Interface (CGI) programs. Using a Java-enabled browser, students and faculty communicate and view multimedia (slides, sounds, video, animation), electronic bulletin boards, electronic chat rooms, and video images on an anyone, anytime, anyplace basis. The system shell contains a series of modules to support CIS courses, such as Information Systems. The course modules are used to support key Bachelor of Science in Computer Information Systems program courses; and allow the University to increase its market share in the delivery of Information Technology programs and certifications [Rodriguez, 2000a]. The developmental strategy is simple: within the developed shell, each participating faculty member designs his or her course content and determines the set of existing tools that would fit the learning objectives and assessment strategies for the particular course. The next version, being developed, will allow users to navigate in three-dimensional space and in time.

The generic "shell" incorporates Web technologies, such as low-bit-rate-video-streaming. The Web Classroom brings asynchronous resources stored in Windows NT servers. All commercial and customized instructional materials are available to students via the Internet. Students and faculty will communicate with one another from properly configured computers (Java-based browser, NetShow, NetMeeting clients; and other free collaborative software).

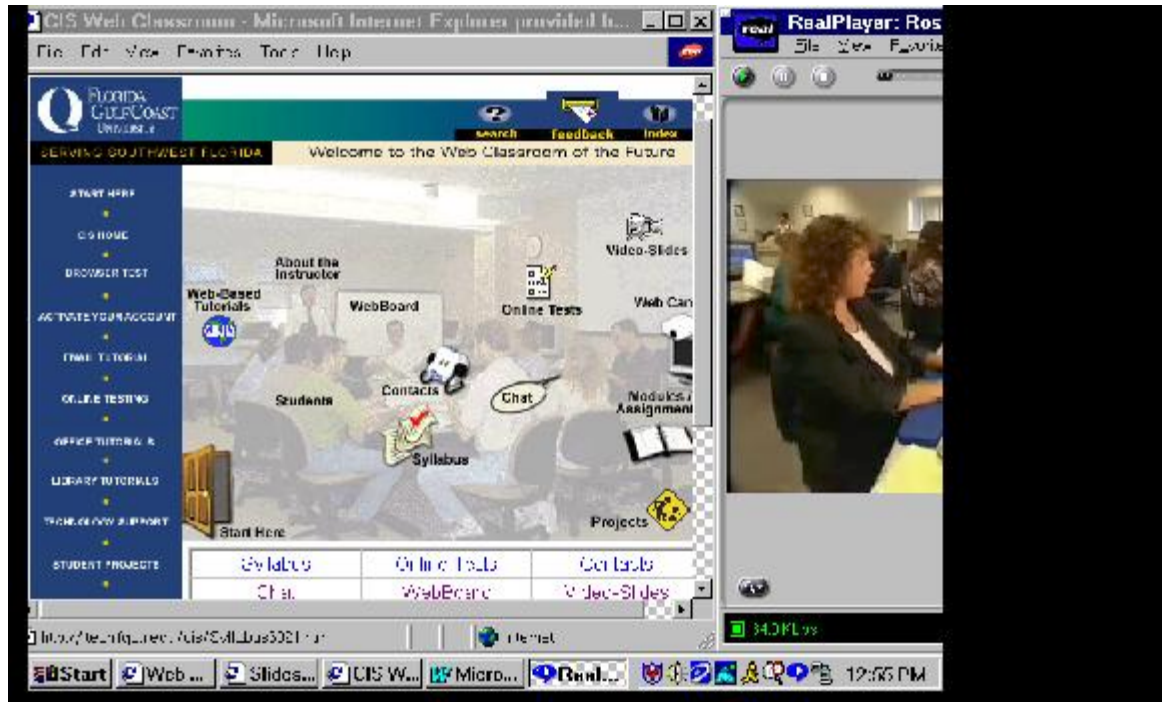


Figure 3. Web Classroom of the Future: User Interface

DISTANCE LEARNING

Distance learning programs are fully supported at FGCU. Several servers are used to maintain course web sites, course management software (WebCT) and web conferencing software (WebBoard).

As described in Section IV, the Office of IT supports course development. Course designers from this Office help instructors design their courses and learn course management software. The course designers can develop web pages, images and java scripts for instructors. Multimedia designers and programmers are also available for more complicate scripting and multimedia material development.

VII. STUDENT TECHNOLOGY TRAINING

Technology training is emphasized from the moment students enter FGCU. During orientation, students are offered a “Technology Survival Skills Self-Assessment Exam”¹ to assess their current level of computer skills. Technology training is then designed to meet the individual needs of the incoming student. In 2000, 25% of the incoming students completed the self-assessment form.

The Office of IT provides technology training to students in basic computing applications. They offer training workshops free-of-charge for students in Windows '98 Operating Systems, Macintosh Operating Systems, Electronic Mail, Internet browsers, Microsoft Word, and other basic software applications. The lab assistants in the open computing laboratories also provide assistance to students who encounter difficulty with word processing applications, database software, educational software, statistical software, electronic mail, image scanning, and multi-media software. Library Services also offers technology and information literacy courses through their Research Skills classes. Student Services provides tutoring services to students with individual assistance in the areas of writing and mathematics using advanced software tools to complement basic technology skills. They also provide technology support for disabled students who cannot access technology in standardized ways. In addition, on-line tutorials are available on the Internet.

Several Programs and Colleges offer additional technology training to students. The College of Business offers an introduction to computers course (CGS 1100) as a common prerequisite. This course provides instruction on software tools such as spreadsheets, word processing, two-and three-dimensional presentation graphics, electronic mail, and Internet browsers. The course also explores computer information systems in organizations and the use of computers to

¹ This test was developed by the Office of Instructional Technology at FGCU
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enhance productivity. Executive MBA students take an intense two-week course prior to beginning their program. This Introductory course includes an intensive, one-week-long introduction to technology. MBA students also receive hardware and software training in the MBA Foundation Course, ISM 6021, Management Information Systems. IT, Student Services and Library provide web-based tutorials for distance learning students, as well as activities such as electronic mail attachments, listserv instruction, using a web browser, accessing a search engine, and posting to message boards.

VIII. FACULTY AND STAFF TECHNOLOGY TRAINING

The Course and Faculty Development Department within the Office of IT organizes training for faculty in skill areas such as web development, presentation software, video teaching techniques, use of the electronic podiums, and instructional materials development. Over the past two years they offered 25 different technology workshops on multiple occasions. A faculty luncheon series entitled Teaching with Technology is offered monthly during the academic year. FGCU organized and offered an annual Distance Learning Conference for the past four years. The past two conferences focused on faculty distance learning issues. Approximately 80% of IT training resources is devoted to individual faculty project development. This program offers faculty one-on-one training with an instructional designer while working on a specific course-related project. This approach is especially successful in assisting faculty in developing course web pages and presentation software.

The Administrative Computing unit offers professional development and technology training to interested faculty and staff throughout the calendar year. They offer courses in Beginning, Intermediate and Advanced Microsoft Word, Excel, PowerPoint, and Exchange

IX. TECHNOLOGY IN ADMINISTRATION

Many administrative documents are maintained in electronic form. The .pdf format is used to store and share documents used by the administrative staff. This approach helps to reduce the use of paper, especially maintaining documents that are valid only for a few days. Many other administrative documents are maintained in the file servers in the electronic format. Faculty and staff can retrieve read-only documents from the file servers. University administration also uses suppliers' e-commerce sites to order supplies. Textbook orders are placed through the web site of the campus bookstore.

The Dean's Office of the College of Business developed a custom database application that maintains all course schedules, faculty service records, and faculty publication and other research efforts. This database allows the Deans, chairs and committees to retrieve and search a variety of information, such as historical course enrollment data, faculty performance data, and course evaluation data. This database is also being used to produce reports for AACSB - *The International Association for Management Education* accreditation. In addition, the College of Business maintains a web site for the AACSB accreditation process. [FGCU College of Business (2000)]

X. POLICY-MAKING IN THE ALLOCATION AND USE OF TECHNOLOGY

The University Technology Committee (UTC) is a standing committee within the University. It was appointed by the President of FGCU in 1995 to:

1. develop and maintain an Information Technology strategic plan;

2. formulate, review, and recommend information technology policies and practices; and
3. ensure that information technology policies and practices are congruent with the FCGU Mission, Guiding Principles, Goals and Policies.

Approved policies are available to faculty and staff on a file server and on the University's intranet. In addition, critical policies related to information technology are disseminated to each administrative/academic unit through deans. Currently, all Information Technology Policies are centrally located on a file server and on the Administrative Computing Intranet that is only accessible to faculty and staff.

The faculty senate created a Technology Advisory Committee team that addresses technology issues of importance to faculty. The Technology Team consists of one faculty member representing each academic unit and an ex officio member from the Office of IT. The Technology Team functions as an advisory group to the Office of IT, Academic Computing, and other University Computing bodies. The team reviews and recommends policies concerning all matters relating to University computing, including distance learning needs and requirements.

The University budget incorporates a 3-year staggered plan to upgrade or replace outmoded technology that would allow for 1/4 of all equipment to be replaced or updated on an annual basis. In 1998, FGCU had 503 PCs (85 PCs with a 133MHz processor, 78 PCs with a 166 MHz processor and 32 MB or more RAM, 246 PCs with a 200 MHz processor and 32 MB or more RAM, and 96 PCs with a 500 MHz or faster) and 53 Macs. These machines will be upgraded to a 500 MHz or faster processor or replaced with new PCs as shown in Table 1.

Table 1. The Number of Computers After Upgrade and Replacement

Processor type	1998-1999	1999-2000 Year 1	2000-2001 Year 2	2001-2002 Year 3
133 MHz	85	0	0	0
166 MHz (32 MB RAM)	30	0	0	0
166 MHz (>32 MB RAM)	48	31	0	0
200 MHz (32 MB RAM)	193	0	0	0
200 MHz (>32 MB RAM)	53	246	106	0
500+ MHz	94	226	397	556
Macs	53	53	53	0
Total	556	556	556	556
Budget		\$340,000	\$311,000	\$292,000

XI. SECURITY: CONFIDENTIALITY AND SYSTEMS INTEGRITY

The majority of University servers run Windows NT (Section II), which provides appropriate security for the network. The student e-mail servers run UNIX. Network administrators developed different levels of access to files and servers for faculty and staff that is determined by username at logon. Students at FGCU do not have access to the network servers, unless required for a class. The network administrators of the library systems, administrative systems, academic systems, and student systems monitor and protect the confidentiality and integrity of data. Incremental backups are done daily and full backups are done weekly for all servers. Recovery plans for damages incurred to the network are in effect. The recovery plans are being modified to be consistent throughout the University.

The majority of computers available to students have adequate security to prevent manipulation of the operating system and hard drive. Security for the desktops in the open library computer lab is implemented in layers, which

provides a more comprehensive yet less intrusive control over the PC's, and allows students to use the standard Windows 98 interface. Slightly less security is provided in the computers in the multi-purpose lab. The security for computers in the Macintosh lab is being developed. All computers are loaded with virus protection software. Backup of files on individual computers is at the discretion of the user

XII. ATTITUDE SURVEYS

Prior to the Southern Association of Colleges and Schools (SACS) accreditation visit, the Office of Planning and Evaluation at Florida Gulf Coast University administered a survey to faculty, staff, and students to determine views on fundamental education issues at FGCU. The purpose of this anonymous survey was to evaluate how well the University was doing as an institution of higher education. The Annual Survey was sent to one-half of faculty, staff, and students selected randomly. Respondents were asked to rate each item using a scale of 1-6, where 1 = Strongly Disagree and 6 = Strongly Agree. The results ranged from 1.0 to 6.0 with a mid-point rating of 3.5.

FACULTY SURVEY

Eighty-five surveys were sent to faculty. The return rate was 75% (64 responses). Of the 83 items, nine questions related to technology at FGCU. The results of these technology questions are shown in Table 2.

STAFF SURVEY

One Hundred and Twenty Three Agree/Disagree surveys were sent to staff. The return rate was 53% (65 responses). Out of the 64 items, three questions related to technology at FGCU. The results of these technology questions are shown in Table 3.

TABLE 2. Summary Results of Annual Survey of Faculty Regarding Technology

Question	n	Mean	% Agree
FGCU's computing resources are adequate	63	4.11	70
The technology used in the classroom is effective for accomplishing learning objectives	63	3.84	63
Information technology has been adequately incorporated into curricula	58	4.12	76
FGCU's curriculum will develop students' information technology skills	60	4.70	90
Adequate technology is available to support faculty scholarly activities	54	3.87	65
FGCU's computer laboratories are adequate for my graduate instructional needs	45	4.47	82
Electronic access to the library is adequate for my needs	59	4.14	66
Overall, the instructional technology resources at FGCU are adequate	62	3.66	53
Overall, the Instructional Technology staff is helpful	60	4.45	78

TABLE 3. Summary Results of Annual Survey of Staff Regarding Technology

Question	n	Mean	% Agree
I have adequate technical resources to perform my job	65	4.86	89
FGCU's computing resources are adequate for my needs	64	4.66	88
Electronic accessibility to the library is adequate for my needs	49	4.53	86

STUDENT SURVEY

Four Hundred and Sixty One Agree/Disagree surveys were sent to FGCU students. The return rate was 68% (314 responses). Of the 72 items, five questions related to technology at FGCU. The results of these technology questions are shown in Table 4.

TABLE 4. Summary Results of Annual Survey of Students Regarding Technology

Question	n	Mean	% Agree
The instructional technology in my courses contributes to my learning	308	4.65	85
Electronic accessibility to the library is adequate for my needs	285	4.80	90
FGCU's computer facilities are adequate for my needs	288	4.88	91
Adequate technology is available to support teaching	292	4.85	92
At FGCU, distance learning is an effective alternative to traditional instruction	282	4.10	71

During analysis of data, a mean score greater than 3.5 was considered an indicator of good performance. All technology questions had a mean rating between 3.66 and 4.88. Students were most positive about technology, with 92% agreeing that there was adequate technology to support teaching. Faculty were most positive about the ability of the curriculum in developing student's information technology skills. Results suggest that faculty, staff, and students were satisfied with technology at FGCU.

XIII. WHAT REMAINS TO BE DONE

As described in this paper, the University achieved many of its goals to be a university of the information age. However, it still faces challenges to keep up with rapid changes in information technology and in the needs of the society. This section presents what remains to be done.

INFRASTRUCTURE

While technology is incorporated into the majority of University operations, a few technological advances have not been integrated into the University infrastructure. At this writing, the University does not have an automated system for document management, imaging, and workflow management. Digital signing is not being used. Electronic Data Interchange (EDI) is used for the management of transcripts but not for admissions, applications, testing, and other administrative services such as purchasing.

TRAINING

While faculty and staff training courses are widely advertised, not all faculty and staff take advantage of available technology training. The University must ensure periodical update of technology skills and knowledge of faculty and staff to provide quality services to its stakeholders.

Also, despite the Banner system's dominance, a formal training program for this system has not yet been developed. For example, a majority of course and student related information is stored in the Banner system. Effective use of information maintained in the Banner system could help to develop a more effective plan of resources (faculty, rooms, equipment, and rooms) usage. A formal staff training facilitates more effective use of the Banner system.

POLICY ISSUES

Long range planning needs to be established to ensure that resources and services will continually be evaluated and that resources are allocated based on university priorities. One problem is that funding sources for continuous improvement of technology have not been identified beyond the 3-year plan discussed in the Section X. The University Technology Committee was urged to develop an approved practice that describes how the University's information technology will be continually evaluated and updated to incorporate technological advances into its operations. At of this writing, the Committee is in the initial

stage of developing a recommendation that a percentage of the University's operating budget be set aside to update and replace computer technology. Annual funding should be established at comparable national levels for maintenance and improvement in computer performance, networking, support services, and software. Furthermore, a method for distribution of these funds must be developed.

The Committee believes that FGCU should develop and use electronic forms whenever possible, digital signing, document imaging, electronic data interchange and more web based information on the University Intranet. Currently, many administrative documents are stored in the digital format in file servers. All policies and procedures relating to computing, technology security, and information technology should be compiled, indexed, held in an accessible centralized location, and made available on the Intranet. To achieve such advanced use of information technology at all levels of operations, the performance evaluation and reward systems should be tightly integrated with the use of information technology.

SECURITY

While disaster and technology security plans are drafted, they are not maintained in one centralized location. The University Technology Committee is in the process of compiling all disaster and technology security plans and policies into one centralized source.

XIV. CONCLUDING REMARKS

At FGCU, the importance of information technology is not only clearly stated in its mission, but is also at the core of its mission. Information technology infrastructure was designed and implemented to support all levels of activities at university, from daily administrative tasks to delivery of education. Three

computing units are organized to support faculty and staff's daily activities, development and delivery of quality education, and support students' learning and extra curriculum activities. Because of the rapid advances in technology, information technology training programs and assistance are provided for faculty, staff and students in a variety of forms for their convenience. The university, colleges, and departments continue to provide funding for faculty and staff training and instructional developments. Moreover, the Integrative Program Matrix (Appendix C) is used to assure that a university goal of technology literacy is reflected in college-level goals, program-level goals, and individual course-level goals.

A reliable data network and connection to the global Internet is available for all students, faculty, and staff. This network is built of all new components. The essential components of this network are covered by maintenance contracts with vendors supplying immediate round-the-clock support should something malfunction. The University developed a disaster and back-up plan, including departmental procedures for each of the units. The University Technology Committee is overseeing the process of compiling all of the disaster recovery plans that relate to technology into one document.

Being new, FGCU, could start with a clean slate with modern information resources. However, many other universities are still in the process of replacing their legacy systems to newer information technology infrastructure. But, the good news is that universities, old and new, can start anew! All it takes is for university leaders to recognize that to remain competitive they must reinvent their university, integrating information technology in all its processes and embracing innovative modes of teaching and learning. With the development of a strategic IT plan, cultivation of technology-oriented organizational culture and reward systems, cooperation from information technology vendors, alumni and corporate partners, universities can prepare themselves as technologically advanced institutes for the new information age. The newest public university in Florida

provides a model for the policies and technologies that new and old universities may follow to reinvent themselves, and to be competitive in the information age.

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REFERENCES

EDITOR'S NOTE: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.
4. the authors of this article, not CAIS, is (are) responsible for the accuracy of the URL and version information.

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APPENDIX A

FGCU MISSION

This appendix presents the mission statement for Florida Gulf Coast University as approved in 1992 when the University was authorized by the State of Florida. It is taken from: State University System of Florida. *Ten Year Development Plan for a New University In Southwest Florida* Report 2-3. Board of Regents: November 20, 1992.

The new university, located in Southwest Florida has, as its primary mission, undergraduate education, with a broad range of programs in arts and sciences, business, environmental science, computer science, education, nursing/allied health, and social services. The programs will be planned for community college transfer students and beginning freshmen. Selected graduate programs in education, business, social services, and arts and sciences will be introduced as needs are identified and allow.

The region in which the university will be located combines rapid population growth in a geographically constrained area, the Gulf of Mexico to the west and Lake Okeechobee to the east, with a unique and sensitive environment. The university, therefore, will be ideally suited to emphasize study of the environment. Building on a strong program at the undergraduate level, the university will have the opportunity to ultimately develop as a center for environmentally oriented graduate programs and research.

The primary service area will include Lee, Charlotte, Glades, Hendry, and Collier counties. Specialized degree programs will draw students from throughout Florida and beyond, especially as alternative teaching systems and technology are employed.

Graduate education and continuing education will primarily serve the needs of part-time working individuals whose professional growth will demand programs arranged at convenient times, places, and in modules to accommodate their employment. In addition to the traditional campus program schedule, a "weekend college" program will be offered in selected subject areas to enable students to earn complete degrees solely through evening and weekend study.

An important element of the university will be the variety of alternative learning and teaching systems. Parts of many degree programs will be available via television courses, computer-assisted instruction, and competency-based exams,

which will permit those who have special achievements or experience in a variety of settings to satisfy some of their degree requirements. Students who enjoy and are able to succeed at independent study will be able to move along at their own pace. Specialized faculty will be available to advise students to establish individualized learning plans by selecting one or more of the options.

Some existing programs established through the University of South Florida will be expanded, where feasible, to permit full-time students to obtain a bachelor's degree during the developmental stages of the university. This will bring about a smooth transition in the development of the University of South Florida's regional center into the new university. Clinical practice and portions of the curriculum which require hands-on experience will be developed in close coordination with regional health care, education, social service, and other professions to minimize the need for specialized laboratories and equipment on campus. Applied degree programs will strive to have a strong community-based component involving clinical/adjunct faculty, based on memoranda of agreement, and contract relationships.

Although the primary emphasis of the university will be on undergraduate education, it is anticipated that within ten years, up to fifteen percent of the instructional load will be at the graduate level. This instructional load will be divided between degree programs and continuing education. Faculty will be expected to focus on public service activities and projects that are primarily community-based with the relative need being assessed with input from regional community organizations. Complementing the public service mission will be a student volunteer service designed to provide each student with exposure to a planned community project, thus developing in the student a commitment to public service after graduation. Faculty research will support the teaching and service mission and will have as its primary focus the application of research to serve state and regional needs.

Undergraduate students will have a mentor/advisor who will guide them during a senior project or paper, in order to synthesize the work done in the curriculum and prepare the students to organize ideas from across disciplines in a final research document.

The library will be the heart of the university's learning environment. In addition to a collection appropriate to the selected degree offerings, the library will include a learning resource center, and an instructional development center to assist faculty, and will utilize available data bases to access library materials from across the state and the nation.

APPENDIX B

EXCERPT FROM STRATEGIC PLAN FOR TECHNOLOGY

This appendix presents an excerpt from the *Florida Gulf Coast University Strategic Plan - The Use of Technology* submitted to the President McTarnaghan by Strategic Planning for Technology Committee on January 5, 1996. The full plan is posted at http://www.fgcu.edu/strategic_plan.htm

TECHNOLOGY AS AN AGENT FOR TRANSFORMATION

The rapid evolution of computer, video and integrated communication technologies has revolutionized the means available for human communications and the ways in which information resources are created, stored, shared, and accessed.

Consequently, a revolution is also occurring in regard to how academic programs are structured and delivered, how information resources get managed and accessed, how scholarly work occurs, and how information is provided in support of the administrative and student support functions of universities.

There was a time when it was sufficient for a university's design to include buildings, books, electricity, phone lines, faculty, and limited support staff. It was also acceptable practice to require all students to 'come to the temple' according to a time schedule determined primarily for the convenience of the institution. This simply is no longer the case.

Higher education is being transformed into an age of information geared to the individual learner, and information technology is a primary instrument of the transformation. Current and emerging computer and communication technologies allow us to:

- offer expanded educational opportunities;
- provide local and global access to information resources;
- form electronic communication and information links with other public agencies and community groups; and
- support the administrative functions of the university in ways that are far more flexible in terms of time, place, and pace.

Thus, to create a new public university today is a rare circumstance that carries with it the responsibility to build a new and much more powerful infrastructure

from its inception. FGCU therefore acknowledges that it is imperative that a technological, human, and financial support plan be designed that can help ensure that Florida Gulf Coast University will fulfill its mission into the 21st century. It is toward this end that this strategic plan for using information and communication technologies will be directed and continually evaluated.

THE VIEW OF INFORMATION TECHNOLOGY AT FGCU

When FGCU has successfully built an environment that incorporates and supports the effective use of current and emerging communication and information technologies, its students and visitors will find:

- A Telecommunications Utility – a network that consists of interconnected desktop computers, mobile laptop computers, campus servers, Internet servers, interactive and broadcast television linked together by cabling and switching schemes; that is ubiquitous in nature, technically heterogeneous, and as intuitive in its use as voice communications or electrical service; and that is the key ingredient making feasible a networked learning, distance-free, knowledge navigation-based environment for the learner.
- Open Classrooms – Computer conferencing, electronic mail, and voice mail applications that allow students to communicate with faculty and each other around the clock, allowing a new freedom of discussion, questioning, and clarification even in large enrollment courses.
- Distance- and Time-Free Learning – A combination of personal computers, television and videotapes, print materials, electronic library resources, multimedia courseware servers, and networked delivery systems, that allow the University to loosen the rigidity of class schedules, relieve space pressures, and accommodate schedules of the nontraditional student.
- Customized Personal Learning – Interactive multimedia instructional software that allows students to control learning segments and explore new segments at a depth and pace appropriate to their own learning needs.
- Community Partnerships – Electronic links that extend the campus to community partners such as public schools, health centers, business and industry, government and non-profit agencies, cultural facilities and library resources.
- Open Information Access – University information databases that are available for students and faculty to access and update, as authorized, allowing for more convenient and efficient services such as off-site registration, financial aid and admissions processing, and grade reporting; and that are tailored for enrolled and prospective students and faculty to access through personal computers, touch-tone phones, and the Internet.
- Transformed Organizational Structure – An organization that models and capitalizes on the benefits that technology offers for transforming traditional organizational structures. In particular, networked technologies and software tools will affect the way decisions are made by expediting the availability and distribution of data throughout the University. Cross-institutional work groups

and an appropriate balance between distributed and centralized technical support will make possible collaborative planning and resource management.

STRATEGIC PLAN FRAMEWORK

With the University in a formative stage of development, the strategic plan serves to define a role and scope for the use of information and communication technologies at FGCU. The construction of this initial plan is guided by several key precepts that provide the framework for defining specific technology goals. They are:

- A technology infrastructure that permits video, data, and voice communications among faculty, students, and staff independent of geography.
- Expanded access for constituents to educational programs, knowledge resources, and administrative systems.
- Organizational structure and processes for the planning, administration, training, and service support of information technology that reflect departmental interests and needs while maintaining University-wide priorities.
- Funding strategies for technology that support the institutional mission and priorities.
- Utilization of information systems to improve productivity and organizational effectiveness.
- Ongoing evaluation of the technology enterprise with a view toward continuous improvement.

APPENDIX C

SAMPLE INTEGRATIVE PROGRAM MATRIX (IPM)

This appendix contains two samples of the integrated program matrix for the School of Business. The first shows the Master of Science in Computer Information Systems and the second describes the MBA program.

INTEGRATED PROGRAM MATRIX SAMPLE 1: MASTER OF SCIENCE IN COMPUTER INFORMATION SYSTEMS

University Student Learning Outcomes (Graduates will:)	College Core Competencies (Graduates will:)	Program Student Learning Outcomes	Assessment Criteria and Measures	Use of Assessment Results for Continuous Improvement
		1. Students completing the MS in CIS will be prepared for leadership positions in the information technology field. They will be equipped with the following foundations and perspectives:	100% of the courses in the CIS curriculum will have syllabi showing evidence of linkage to the "Program Student Learning Outcomes."	
Demonstrate excellence in critical thinking, problem-solving, analysis and strategic planning.	Critical and Analytical Thinking: be able to link data, knowledge and insight to make quality strategic decisions on a timely basis.	1a. Use multiple paradigms and frameworks to understand organizational processes and design appropriate information systems solutions. [ISM 6021, 6336, 6121, 6122, 6127, 6231, 5236, 6237, 6122, 6316, 6337; QMB 6305]	-Solve assigned problems. - Develop web-based portfolio. - Projects and/or examinations. - Problem solving exercises.	
Demonstrate effective use of a variety of communication skills and modalities.	Communication Skills: in their leadership position, be able to give and exchange information within meaningful contexts and with appropriate delivery and interpersonal skills.	1b. Communicate effectively using oral, written and media skills. [ISM 6021, 6336, 6121, 6122, 6231, 6316, 6337]	-Case presentations. -External practitioners and faculty.	
Exhibit professional and technical expertise consistent with discipline and/or content area specific accrediting or licensing bodies.	Systems Orientation: understand the inter-related nature of the various functional areas of organizations and the information needs and flows of the organizations. They will also be able to lead and to adapt to changes in the internal and external	1c. Evaluate and employ IT to solve information related problems. [ISM 6021, 6336, 6121, 6127, 6231, 6237, 6122, 6316, 6337]	- Projects and/or examinations.	

University Student Learning Outcomes (Graduates will:)	College Core Competencies (Graduates will:)	Program Student Learning Outcomes	Assessment Criteria and Measures	Use of Assessment Results for Continuous Improvement
Be prepared for leadership roles in professional and occupational areas and in communities in which they live and work.	Teamwork and Interpersonal Skills: be able to work with others in diverse and cross-functional environments, and to lead as the need arises.	1d. Community awareness and involvement in local information-based service entities. [ISM 6121, 6122, 6316, 6337]	- Projects. - External practitioners and faculty.	
Demonstrate capacity for continued learning, growth, and scholarly activity in their respective disciplines and fields of study.	Technological Proficiency: be able to use technology to facilitate life-long learning, to enhance leadership development, and to add value to stakeholders, customers and employers.	1e. Apply hardware and software tools to create solutions to information problems, including programming, database, and networking. [ISM 6021, 6336, 6121, 6127, 6231, 5236, 6237, 6122, 6316,6337]	- Projects and/or examinations.	
	Ethical Framework: in their leadership role, understand that organizations operate within a global environment with a responsibility to their stakeholders to consider the organizations' impact on legal, ethical, social and environmental issues.	1f. Recognize IT security and ethical issues affecting the information systems function. [ISM 6021, 6336, 6231, 6237, 6122, 6337]	- Cases. - External practitioners and faculty.	
		2. Graduates and alumni will be knowledgeable in the core areas of financial reporting, analysis and markets; domestic and global economic environments; creation and distribution of goods and services; and human behavior in organizations; and in legal, ethical, social and international perspectives that form the context for business	In the first administration of the survey, benchmark criteria will be developed for the percent (90%) of the CIS graduates and alumni reporting that the curriculum includes at or above the "Average Amount" of coverage of the foundation and perspective areas in an AACSB Curriculum Content Survey.	Results not yet available.

College of Business Mission Statement (Revised)

The Florida Gulf Coast University College of Business is dedicated to providing leading-edge educational programs and services designed to enhance the skills and competencies of university students and working professionals in the five county region of Southwest Florida. We achieve this through a variety of flexible partnerships, programs and scholarship within a 'second circle' model

that bridges the university and the domestic and international community in a technologically advanced and rapidly changing global economy.

Program Objectives (Description)

The Master of Science in Computer Information Systems (MS-CIS) will prepare graduates for leadership positions in the information technology (IT) field. The program will emphasize the life-cycle management and development of computer information systems and networks. The program will provide a solid background in information systems management, systems analysis and design, database management and administration, information systems application, data communications and networking, project and change management, electronic commerce and contemporary business practices.

INTEGRATED PROGRAM MATRIX SAMPLE 2: MASTER OF BUSINESS ADMINISTRATION INTEGRATED PROGRAM MATRIX

Levels of Course Coverage

P = Primary = 3 or more 50 minute classes

M = Moderate Coverage = One to Two 50 minute classes

S = Some Coverage = Less than one 50 minute class

Note: The format of the matrix was modified from the original matrix so that it could be presented on 8 1/2 x 11 sheets.

Goals		Foundation Courses								Core Courses			Cap Stone
		ISM 6021	ACG 6025	FIN 5405	MAN 6055	MAR 6805	ECO 5005	QMB 6305	QMB 6603	MAN 6266	MAN 6607	MAN 6501	GEB 6895
University Student Learning Outcomes	Demonstrate excellence in critical thinking, problem-solving, analysis and strategic planning.	M	P	P	P	P	P	P	P	P	M	P	P
	Demonstrate effective use of a variety of communication skills and modalities.	M	M	M	M	P	P		P	P	M	S	P
	Exhibit professional and technical expertise consistent with discipline and/or content area specific accrediting or licensing bodies.		M	P	P	P	P	P	P	S	P	P	P
	Be prepared for leadership roles in professional and occupational areas and in communities in which they live and work.		S	P	P		S			P	P		M
	Demonstrate capacity for continued learning, growth, and scholarly activity in their respective disciplines and fields of study.		S	P	P					M	S		M
College Core Competencies	Creative and Analytical Thinking: be able to link data, knowledge and insight to make quality strategic decisions on a timely basis.	M	P	P	P	P	P	P	P	P	M	P	P
	Communication Skills: in their leadership position, be able to give and exchange information within meaningful contexts and with appropriate delivery and inter-personal skills.	M	M	P	P	P			P	P	M	S	P
	Systems Orientation: understand the inter-related nature of the various functional areas of organizations and the information needs and flows of the organizations. They will also be able to lead and to adapt to changes in the internal and external environments.		M	M	P		P			M	S	S	P
	Teamwork and Interpersonal Skills: be able to work with others in diverse and cross-functional environments, and to lead as the need arises.	M	S	M	M	P				P	P	M	P
	Technological Proficiency: be able to use technology to facilitate life-long learning, to enhance leadership development, and to add value to stakeholders, customers and employers.	M	S					P	P	M	P	S	P
	Diverse Environment of Business: have a broad perspective of the diverse environment of business and of the issues and challenges encountered by profit and not-for-profit entities, entrepreneurial enterprises and business functioning in a global economic environment.		M	S	M	P				M	P		P

Continued

Goals		Foundation Courses								Core Courses			Cap Stone
		ISM 6021	ACG 6025	FIN 5405	MAN 6055	MAR 6805	ECO 5005	QMB 6305	QMB 6603	MAN 6266	MAN 6607	MAN 6501	GEB 6895
AACSB Basic Skills	Quantitative Analysis			P	M	M	P	P	P	S		P	P
	Written and Oral Communication	M	M		M	P	M	S	P	P	M	P	P
	Computer Usage	S		P	S	M		P	P	P	S	S	M
AACSB Perspectives	Ethical Issues	M	M		P	M	S	M		M	P	S	P
	Legal and Regulatory Issues		M	S	P		M			S	S		S
	Political and Social Issues		M	S	P		M			M	M		P
	Demographic Issues				P	S				M	P		S
	Technological Issues	P		S	M			P	P	S	S	P	P
	Global Issues -- Environmental Issues			S	M					M	P	M	P
AACSB Core Areas	Creation of Goods and Services				M	M	P				S	P	S
	Distribution of Goods and Services				M	P	M		P		S	M	S
	Financial Reporting		P	P	M								P
	Financial Analysis		P	P	M								P
	Markets			P	M	S	P				S		P
	Human Behavior in Organizations		P		P	S	P			P	P		M
	Domestic and Global Organizational Issues			S	P					S	P	S	P

APPENDIX D

STANDARDS FOR STUDENT ACCESS TO COMPUTERS AND TECHNOLOGY

UNIVERSITY TECHNOLOGY PLANNING AND SUPPORT COMMITTEE POLICY

Student E-mail and Remote Computer Access

In order to participate in electronic course offerings, communicate with faculty and other students, access course materials, personal academic records, library resources, and remote databases through the Internet, all students will be assigned e-mail accounts and be given appropriate access to campus networked computing resources and services. Initial student demographic data, however, indicate that within the first year of opening as many as 50% or more of FGCU students will not own personal computers. Therefore, the University will fulfill its

responsibility to provide access for these students through University owned, networked computers located on campus and remote University sites. The University will also offer a means to access these resources from off-campus locations for those who own personal computers.

FGCU policy guidelines regarding the provision of student e-mail and access to University and Internet resources are:

FGCU will provide and maintain e-mail accounts, Internet addresses, and access to appropriate University information resources for all registered students. FGCU will provide public computers on campus (and remote university sites) for students to use in accessing their e-mail accounts, campus networked resources, and the Internet.

It will be the responsibility of those students (faculty and staff) desiring access to these resources from personally-owned computers from off-campus to use a non-University service provider. The University shall, in good faith, reach an agreement with a commercial service provider that offers terms and function favorable to an educational setting and provides the individual subscriber with a cost-effective option for remote access.

The Director of Administrative Computing Services (ACS), with UTPS Committee concurrence, will be responsible for the development of requirements for a dial-in service provider agreement for access to e-mail, University networked resources, and the Internet for the University. The acquisition, implementation, and support of this service shall be the responsibility of ACS, and will be periodically reviewed by the UTPS Committee to assure the service effectively meets the needs of the student and are in the best interests of the University.

For additional information, point your browser to:

<http://condor.fgcu.edu/eagle/index.html>

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