CHAPTER TWELVE: TECHNOLOGICAL INNOVATIONS

I. Overview

Numerous technological innovations have taken place and continue to take place at Brooklyn College. These many innovations are the by-products of the Electronic Campus initiative, one of several key initiatives articulated in the Brooklyn College Year 2000 strategic plan that was issued in 1993.

Brooklyn College has made significant progress since 1993 in expanding its telecommunications and computing facilities to build a twenty first century technological campus environment for the students, faculty, and staff. The campus has been substantially networked, e-mail use is widespread, technology is increasingly being integrated with teaching, and hundreds of computer workstations have been installed. Some of the major recent and planned technological innovations are:

- Telecommunications Master Plan
- Campus-wide Network
- Library Café
- Video Conferencing
- Brooklyn Link (BLINK) Information Kiosks
- Student Information Management System and Applications
- Year 2000 Compliance

It should be noted that these innovations have taken place in a climate of dire fiscal constraints that the college has faced these past several years. A description of each of these technological innovations follows.

A. Telecommunications Master Plan

In the Spring of 1996, a telecommunications master plan was completed by a consulting firm retained by the Dormitory Authority of the State of New York (DASNY) on behalf of Brooklyn College. The consulting firm reviewed the college’s existing telecommunications infrastructure and interviewed the college’s senior executives, several academic departments, some student representatives, administrative staff, Library staff, and the Information Technology and Systems staff. The master plan defines the requirements of a telecommunications infrastructure to provide improved data, voice, and video capabilities to the campus. It is to be developed and implemented in phases through 1999, as part of the $9 million capital funded Telecommunications Infrastructure Rehabilitation project.

B. Campus-wide Network

The campus has been substantially cabled to provide Local Area Network (LAN) connectivity both within and between all buildings on campus for both an administrative network and an academic network. The administrative network hosts over 1,200 faculty and staff LAN/e-mail user accounts and the academic network hosts over 16,000 LAN/e-mail student accounts. The campus-wide network currently has 2,000 network ports, 86 remote access ports, 69 networked servers, and 28 network routers/switches and is continually growing and evolving. For example, in preparation for the Fall 1998 semester, 250 new network cable runs were installed on campus,
including the rewiring of six computer classrooms. In Spring 1999, the campus will begin the installation of a new fiber optic and copper cabling system that will support planned data, voice and video systems. This rewiring of the campus will provide every office, classroom, and lab with one or more network jacks as specified in the college’s telecommunications master plan.

C. Library Café

Late in the Fall of 1998 a twenty-four-hour Library study center (6,000 sq. ft) will open in Whitehead Hall. This $1.4 million facility, funded by a grant from the City Council, is modeled after the popular New York City cybercafes/Internet coffee bars. The facility will include over 50 multimedia-capable networked workstations and laptops with full access to the Internet, as well as access to the Library on-line catalog, CUNY+ databases, and applications on the college’s academic network.

D. Video Conferencing

In Fall 1997, a state-of-the-art video conferencing, multimedia display facility opened in the Wolfe Lab, located in 1300 Plaza. The classroom seats 25-35 students and can also serve as a small conference room. The equipment in this facility was funded by the University’s Educational Technology Initiative (ETI) grant. Brooklyn College was an early participant in the University’s distance learning program using video conferencing technologies and has offered several video conferencing courses over the past several semesters. The facility is available for instructional, administrative, faculty development purposes and provides the following:

- Multiple large screen-video displays, tracking video cameras, built-in Internet access, an instructor workstation, projection cameras and document scanners. Multiple video sources can be directed to various displays in the facility, including CD-ROM, laserdisc, and videotape.
- Live videoconferencing with outside partners, satellite feed, cable TV feed, and local workstation output for the instructor.
- A dedicated T1 high-speed phone line links the facility to the CUNY communications hub and allows interaction with other CUNY colleges. A dialable ISDN line facilitates connection to similarly equipped facilities anywhere in the world.

E. BLINK(Brooklyn Link) Information Kiosks

The college recently installed 12 touchscreen interactive, ADA-compliant kiosks throughout the campus to provide students and campus visitors with ability to access campus information or contact faculty and staff members on campus by telephone from the kiosks’ telephone directories. Each BLINK kiosk provides access to the Brooklyn College website, a campus map, event and academic calendar information, and phone directories. Advanced features will be added in the near future to enable students to view and print unofficial transcripts, check course availability and schedules, as well as change their PIN number.

F. Student Information Management System (SIMS) and Applications

Brooklyn College completed its migration from a local campus-based student information management system to the University’s centrally maintained SIMS system in 1995. SIMS is an integrated, mainframe-based, student records database that any authorized user, both faculty and staff, can access from any networked workstation on campus. The college equipped each
academic department with a networked workstation to promote departmental computing and to provide access to SIMS, as well as other campus-wide network-based applications. The following year networked workstations were allocated to department chairs and their office staffs.

In 1996, the college installed a telephone registration system, an IVR application, providing students with the ability to add and drop courses, query their grades, check billing and financial information, as well as change their PIN number by phone. Students can access this system from any touch-tone telephone, including the bank of dedicated SIMS telephones located in the basement of the Plaza building. Our students no longer have to wait in line. They can register at their leisure with no waiting.

In 1997, the college created and implemented the SIMS Access LAN Interface (SALI) system for both the administrative offices and each of the academic departments. SALI is a campus network that provides authorized users the ability to view or print class rosters, student transcripts, and other SIMS-related data. This Windows-based application was designed to supplement the SIMS reporting facilities and replace the need for technical staff to produce both standard and ad hoc reports. For example, SALI’s sort and selection options provide a variety of on-screen and printed inquires to generate class rosters, open-closed sections, mailing labels, student transcripts, instructor class schedules, as well as export files for further data manipulation with PC-based software. The University has adopted this application for CUNY-wide distribution.

G. Year 2000 Compliance

While the Year 2000 (Y2K) compliance is not a technological innovation, the sheer magnitude of the potential problems that may arise from technology that is not Y2K compliant merits inclusion of the college’s efforts in this area. The college is well into its evaluation and preparation for dealing with possible ill effects from the infamous Y2K computer date problem. A committee with broad representation has met several times to review areas of concern and has already noted some problem areas and validated many others as not being of concern. Brooklyn is working closely with the CUNY, New York State, and other agencies to minimize any disruption from Y2K effects.

Since the primary effects of Y2K problems tend to cluster around computer and facilities/security systems, these are being examined more closely. A campus wide computer workstation inventory is nearing completion, and the resulting information will enable a targeted upgrade/replacement effort where necessary during 1999. Although there are probably a significant number of non-Y2K compliant desktop computers in use, most are not running applications which would be adversely affected by the Y2K problem. College infrastructure projects have been reviewed for Y2K compliance and many aging problematic systems had already been targeted for replacement. The college is also working closely with CUNY to ensure that wide area and local area networking systems are compliant.

Brooklyn College expects to have addressed all major Y2K concerns by 1/1/2000 with any major modifications and upgrades of desktop systems occurring in early 1999.
II. College entities involved in promoting technological innovation

Academic Information Technologies and Information Technology Services are the two major support service units that interact with other key campus entities involved in technological innovations. Both units are charged with the support of and the promotion of technology. A detailed description of these two units and their functions, roles, and services is found in the publication *Faculty Guide to Computing at BC*. The publication is also available on the Internet at http://www.brooklyn.cuny.edu/bc/pubs/facguide/. A summary of the major college entities involved with technological innovation follows.

A. Academic Information Technologies (AIT)

AIT provides support and training for faculty and leads the college’s efforts in developing instructional technology tools. This organization works closely with various faculty advisory groups, advises the administration on appropriate allocation of resources, and suggests technological directions. AIT has a mandate to nurture faculty development, to provide one-on-one support and broad-based training to faculty in using technology tools. This includes support for developing individual and departmental web sites. The web site is http://academic.brooklyn.cuny.edu/library/bclib.htm/.

B. Information Technology Services (ITS)

ITS primarily handles all of the production or operational information technology services. ITS purchases and distributes PC equipment and software and manages most student labs. It maintains the campus network, the college’s web sites, and provides technical support for desktop computers (it does not provide extensive training or application assistance). ITS also maintains and operates mainframe related systems and scans op-scan tests. It provides accounts for the campus network, mainframe and e-mail systems, manages site-licensed software distributions, in addition to performing several other operational functions. The web site is http://techweb.brooklyn.cuny.edu/its/text/.

C. Individual Faculty Initiatives

Virtually all the major initiatives to introduce computer technology to the faculty, students, and classrooms have started as individual, unsponsored experiments by interested faculty, e.g., Web-based courses in Core 4 and the Biology core course, Web and e-mail-based CIS teaching initiatives involving Core 5, CIS courses including use of automatic homework checking, and other experiments in Modern Languages, Core 9, and Political Science. In many ways this is healthy and allows for the broadest range and widest impact. The current Brooklyn College administration has not only supported these initiatives once they have proved viable, but has also encouraged others to innovate for themselves. This policy has been one of the major successes at the college.

D. Departmental Initiatives

Several departments and a few other groups have sponsored initiatives to bring new technology and new uses of technology to the campus. These range from the creation of new...
computer classrooms dedicated to their discipline to specialized services such as DNA analysis or Perseus as a CD program available on local computers for the study of ancient Greek culture. With some exceptions, administrative support of these initiatives has been positive and beneficial.

E. Advisory Committee on Academic Computing (ACAC)

ACAC is an advisory committee to the Chief Librarian and Executive Director of Academic Information Technologies. ACAC, along with the departmental technical representatives, assists AIT in the formulation of academic computing policies in the area of faculty development and distance learning.

F. Computer Utilization and Educational Technology (CUET) Committee

Faculty Council’s CUET committee annually reports on technology issues and makes recommendations, most of which are approved by Faculty Council. Inasmuch as Faculty Council determines academic policy at the college, its technology committee is in an excellent position to help coordinate the integration of technology within the college’s academic mission. To encourage information sharing and joint decision-making, one of CUET’s members is an ex officio member of ACAC.

G. Center for Teaching

The Center for Teaching plans to increase its involvement in the area of technology and teaching with the creation of a technology production studio. The Center is pursuing a NEH grant to fund a seminar for humanists who want to learn how to use technology in their teaching. The Center for Teaching anticipates becoming a serious force for promoting faculty interest in technology and for faculty development.

III. General Policies

A. Types of Technology

1. Networked computer workstations

   It is the intent of the college to provide every faculty member with a networked workstation that provides access to office automation software, e-mail, the Internet, and other campus-wide network services. Approximately 90% of the faculty now have computer workstations. The college has utilized the following programs over the years to implement President Lattin’s commitment to provide every faculty member with a computer workstation:

   • Faculty equipment grant program initially handled by the Provost’s Academic Computing Advisory Committee (PACAC) and later by the Advisory Committee on Academic Computing (ACAC) that reports to the Chief Librarian and Executive Director of AIT. It should be noted that this committee allocated approximately 450-500 computer workstations and printers between 1994 and 1997.
   • Academic departmental workstation project provided each academic department with a fully networked, multimedia-capable, faculty development workstation for shared use by the faculty within the department.
   • Web Core project sponsored by AIT provided participants with fully networked, multimedia-
capable workstations.  
• Virtual Core initiative provided participants with fully networked, multimedia-capable workstations.
• Provost’s Technology Committee (PTC), formed in 1997 to assume the role of academic equipment allocations, allocated over 200 Windows and Apple MAC computer workstations and printers in 1998 for both existing and newly hired faculty, departmental computer labs, and academic department offices.

PTC is in the process of developing a workstation replacement strategy that will be based on the ITS computer equipment inventory, currently underway at the campus.

2. Internet Access  

Brooklyn College is fully committed to providing faculty and students with Internet access on campus as part of the Electronic Campus initiative. Each of the college’s computing facilities has either been upgraded or is in the process of being upgraded to provide access to the Internet via the campus network.

3. Audio Visual Services  

There is no formal policy yet on how digital video will be provided to faculty and students via the campus network. The current plan is for the new Library (specifically the New Media Center on the 2nd floor) to function as the major campus hub for the distribution of video and audio. The college, in search of advice on this complex issue, interviewed three consulting firms that specialize in this area and has employed the firm of Shen, Milsom and Wilke for the specific purpose of advising the college about audiovisual delivery.

B. Course Preparation  

It is the policy of Brooklyn College to support faculty with technology of all kinds to assist them in their preparation and delivery of quality course materials. This support is provided by AIT and takes various forms:

• all-day colloquia and satellite presentations on using technology for instruction;
• the WebCore project to provide technological support for faculty in the Core;
• Faculty Development and Training Lab to support course preparation with such services as disk duplication, slide making, slide scanning, CD-ROM mastering, color laser printing, and so forth, in addition to extensive hardware support;
• a full-time professional staff member in the Faculty Development Lab whose only function is to support the faculty's technology needs;
• a web design specialist in the Faculty Development Lab to help faculty develop and place their educational materials on the Web;
• professional development workshop series;
• Faculty Fellows program in which AIT buys released time for one or two faculty members to serve as a resource to other faculty members.

Brooklyn College has installed and is actively using CAUCUS as an Internet Web-based course delivery system and is also currently evaluating additional systems, such as WEB-CT and other
packages. A joint AIT-ITS-Faculty ad hoc committee was formed to examine these packages. A faculty member, who holds a joint position with CIS and AIT, heads this effort. There is a defined evaluation procedure with faculty serving sometimes as instructors and sometimes as students. A structured assessment instrument was developed to evaluate these packages from administrative and pedagogical perspectives.

Finally, AIT recently received a $650,000 TIIAP grant, which includes provisions for faculty and course development and is paying for the creation of a fully virtual version of Core Biology. In addition, Barbra Higginbotham, chief Librarian and director of AIT, and Professor John Blamire of the Biology Department have received a FIPSE grant of $260,000 to support the development, delivery, and evaluation of Internet modules for Core courses in humanities and social sciences. This grant will provide released time for ten faculty course developers during the next three years.

C. Course delivery

The use of technology to assist course delivery has steadily increased. While there is no universal policy concerning the use of technology in this manner, it has been policy of the college to provide support in this area via:

- Drop-in computer labs, such as the Atrium and the Wolfe labs, as well as the Library’s two multimedia classrooms where some have also been outfitted with video projection systems.
- Departmental specialized classrooms and labs, such as the Learning Center, Art’s Digital Media Center, Center for Computer Music, Goldstein Resource Center, SUBO Computer Corner, and the Math, English, CIS/Math Core 5, CIS Networking, Sociology Statistics, Psychology/Sociology Statistics, Journalism, ESL labs.
- Large lecture halls, such as the 1300 Plaza, 143 New Ingersoll, and the Library’s theater have been equipped with video projection systems, campus network connectivity, and a lecture multimedia workstation.
- Portable lecture systems that include multimedia workstations and large screen monitors or projection systems mounted on carts.

1. AIT facilities

The policy concerning use of the two AIT-administered multimedia classrooms, as developed by ACAC, is that these classrooms are only adjuncts to regular classrooms and cannot be reserved for every class meeting throughout the semester. The instructor must reserve these rooms when there is need for a high-end, networked, multimedia facility. The guidelines insure that these rooms serve the largest number of classes and students across many disciplines. If high-end computing is necessary for each class throughout the semester, special arrangements can be made. The Library’s third classroom, Room 208 Library, is heavily used throughout the semester to teach Internet and bibliographic instruction to classes and groups by appointment. When classes are not scheduled, faculty can book the room on a session-by-session basis.

2. ITS facilities

The classroom facilities administered by ITS may be reserved for semester-long classes through the general classroom scheduling process. Special classes can be scheduled when the rooms are not in regularly scheduled use.
3. Home delivery

The college supports on-campus delivery of services for full-time faculty and students. Students or faculty can arrange off-campus delivery via the Internet by subscribing to an Internet Service Provider (ISP), such as the CAMPUS MCI or America On Line (AOL). The college provides support for modem connections for faculty and staff to the CUNY mainframe and elsewhere by providing free software such as Pro Comm Plus on request.

D. Distance Learning

The college is very serious about investigating the use of distance learning and is encouraging both dialogue and experimentation. Several initiatives are under way at the college to explore integration of distance learning into the curriculum. The college currently supports delivery in both synchronous and asynchronous modes. The mode employed in such courses is subject to the approval of the Faculty Council Curriculum Committee and of Faculty Council. Some examples follow:

- In Spring 1998 and Fall 1998, students in the Modern Languages department took part in a teleconferenced German class, which originated at Hunter College. The class was held in the college’s video conferencing facility.
- On April 24, 1998, a Shakespeare teleconference was held at Brooklyn College’s video conferencing facility, in collaboration with the CUNY Graduate School and the University of Pennsylvania.
- Starting in Spring 1998, the Virtual Core Task Force (VCTF) has sponsored several experimental “virtual Core” courses utilizing asynchronous delivery via the Internet on the web based CAUCUS system.

E. Campus Network Access

It is Brooklyn College's goal to have all campus computer workstations linked to the campus network to provide access to the Internet, the CUNY mainframe (including SIMS and the interlibrary catalogue known as CUNY+), and Brooklyn College web servers. As new Internet-based services are developed and brought on-line, the college is expanding the number of Internet-accessible computer workstations in public access areas. This goal will be realized when the Telecommunications Infrastructure Rehabilitation project is completed. On a temporary basis, network access is being provided by request on a department-by-department basis and departments are encouraged to buy computers and create their own networks.

1. Student Access

It is college policy for students to have readily available access to college computer facilities on campus. This policy is based on the assumption that most students still rely on campus computers for all of their computing needs. The Library currently provides thirty PCs dedicated to e-mail and WWW searching. They are available during Library hours. The Plaza Atrium open laboratory provides sixty IBM-compatible computers and forty SUN UNIX computers with Internet access. The Wolfe laboratory has sixty-two WINTER and fifteen SUN UNIX computers with Internet access. Thirty-eight Macintosh computers are also available in these facilities without access to the Internet. These facilities are open during weekend days as well as four
nights per week on a first-come, first-serve basis. Smaller labs such as the Learning Center, SUBO Study Corner, and specialized departmental or programmatic laboratories, provide Internet access on a more limited scale within the context of their individual missions. Two classrooms in the Atrium, each with thirty-one PCs, are opened to general use during times of peak use.

There are currently no 24-hour computer facilities for students on campus. The Library Café, with over fifty networked computers, is expected to provide 24-hour access to the Internet, all Atrium software, word processing, the Library catalog, and CD-ROM databases. Those students who have computers at home can use an Internet Service Provider (ISP) of their own choice, including the University-contracted MCI (Campus MCI), which provides low-cost access to e-mail, the World Wide Web, and other Internet services.

ITS and the Library are responsible for providing basic information to students about how to use computers in general and a limited number of applications such as CUNY+, Internet browsers, and e-mail. Departments and programs are responsible for teaching the students how to use specific applications required for courses and for the material content of courses.

At the beginning of each semester ITS regularly provides students with a basic orientation to the Atrium and Wolfe computer labs and instruction in the use of Internet, e-mail, and CUNY+. In addition, a large number of mass training sessions in the use of Word Perfect are conducted for English and Core students at the beginning of each semester. Tutorials on using adaptive computer equipment are conducted at the beginning of the semester and as needed. The Library provides a variety of drop-in workshops on a number of topics including CUNY+, Internet basics, e-mail basics, the use of the CD-ROM data bases, etc. Moreover, many of these topics are the subject of either one-period or two-period hands-on sessions that are scheduled by the instructor as part of scheduled courses and taught by Library faculty. Approximately two hundred classroom sessions are scheduled each year.

2. Faculty Access

As mentioned earlier, it is the goal of the college that every full-time faculty members have a networked computer workstation that provides access to the campus network, the Internet, and to the CUNY mainframe. AIT provides an extensive development program consisting of workshops and "master-class" sessions for faculty. In addition, faculty are encouraged to visit at their convenience the Faculty Development and Training Lab for one-on-one training. Examples of topics covered include word processing, spreadsheets, Internet browsers, scanning, and graphics. Small group and individual courses can also be arranged. The college encourages faculty to make use of the resources of the AIT program for course development. These resources include software, hardware, the expertise of the Director of Library Services and AIT, the AIT Facilities Manager, and the Library faculty.

F. Network and Internet

1. Web Servers

College web servers are centralized to maximize availability and support capability and are organized according to three areas of service:

- Academic web site: faculty and department/program web pages and course materials posted by faculty;

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• Administrative web site: information about the college provided by the administration;
• Student web site: web pages for student organizations and clubs.

The college administration takes responsibility for the content of the administrative web site only. The content of the other two college web sites are controlled by faculty and students, who are allocated accounts on the respective web server and given File Transfer Protocol (FTP) access to update their web pages. Web server accounts are not provided for individual student web pages.

ITS maintains the three major college web servers and administers accounts on each web server. The ITS network group provides technical and administrative oversight for the various Internet resources. The Network group creates and maintains the directories which contain the web page files that faculty transfer by FTP software. AIT provides technical support to faculty in developing their web pages for the academic web server. The Assistant Dean for Student Development determines which student organizations and clubs are entitled to have web pages on the student web server.

2. Web Server Access

It is the goal of the college that all Web servers be available at all times. The availability of the college web servers from both within and outside of the college is fundamental to the electronic campus. Accessibility thus far has been acceptable with some notable exceptions, but as critical instructional web-based course applications are implemented, there must be an increased emphasis on system availability on a 7 day a week, 24 hour a day basis.

3. Bandwidth issues

Usage is regularly monitored, and as excessive demand causes bandwidth to constrict use, the system is reengineered to increase capacity to meet anticipated demand. Currently only the Library is apportioned a dedicated slice of bandwidth in order to assure response at their many public access terminals. The remainder of the College shares a larger pipe to the Internet.

4. E-mail and Newsgroups

Communication between students and faculty by e-mail and news groups for instructional purposes is an important goal of the electronic campus.

Full-and part-time faculty are eligible to receive college e-mail accounts, but some faculty have taken advantage of the aforementioned low-cost Campus MCI agreement or another commercial ISP. Faculty may obtain separate e-mail accounts for communication with their students, and instructors are given the e-mail addresses of all students in their classes. Faculty access to e-mail varies from individual to individual and department to department. Some faculty have their desktop workstation connected to the campus network, while others access their e-mail from one departmental computer dedicated to this purpose. The college is in the process of migrating its current e-mail system to Microsoft Exchange; this will allow all faculty who subscribe to an ISP to have access to their e-mail from off campus via the Internet.

In Fall 1997, all students were given e-mail accounts that are accessible on campus or via the Internet. Those enrolled at the time were mailed account numbers. Students who enroll
subsequently can receive accounts by visiting the Atrium Lab or by accessing a special web page. Many students still do not use their college e-mail accounts either because they have not participated in training sessions or prefer not to wait for an available networked computer workstation on campus. They use an outside e-mail service like JUNO (free), AOL or Campus MCI.

Although the college has installed and is currently utilizing CAUCUS to support experimental “virtual Core” courses, it is also examining additional conferencing software programs that allow the development of Internet-delivered course modules which will include the ability to manage e-mail threaded discussions. The primary intent of these programs is to facilitate course-related student discussion groups, which can operate under professorial guidance. AIT provides assistance to faculty for using newsgroups, conferencing tools, and creating web pages.

5. Proxy Service

The CUNY Office of Library Services recently made available to faculty and administrators a Proxy Service that enables access to licensed World Wide Web resources when connecting to the web from off campus. It applies to a number of resources that are currently licensed for the entire university, including Britannica Online, Lexis Nexis Academic Universe, InfoTrak Searchbank, and the journals from the American Chemical Society.

G. Non-Internet Servers

The placement of software on individual servers or laboratory computers is at the discretion of the entity responsible for the facility. Thus ITS is responsible for the facilities in Plaza (Wolfe, Atrium and SUN teaching labs and the Atrium open lab), AIT is responsible for the facilities in the Library (three teaching laboratories), and departments/centers are responsible for their own facilities. Access to these servers from other locations is also at the discretion of the entity responsible for the facility.

Brooklyn College maintains a separate academic instructional/lab network as part of the campus network to which most microcomputer labs are attached. Since these labs are on the same network, they can be configured to access shared resources in the Library or primary computer labs. As new labs are created, they are connected to this network to promote sharing of resources and information.

1. ITS facilities

Computer classrooms in the ITS area support WINETL, APPLE/MAC, and SUN/UNIX in separate facilities. Delivery of instructional software and hardware for these facilities is based upon requests by the faculty and recommendations made by ACAC to the Provost. Decisions about the purchase of software for these facilities is currently made by ITS with input from AIT, academic area heads, and course instructors. For instructional software, one semester lead-time is requested in order to have software up and running.

Faculty who desire to place course material on these servers are allocated subdirectories on the appropriate servers. The faculty are responsible for the contents of their allocated
subdirectories. In addition, faculty who request access to lab servers from off campus can be accommodated via "remote control" dial-in facility dedicated to the lab systems. With the transition to Web-based instruction, these facilities will be needed less as instructors load their materials onto web pages via FTP from their college desktop or via an external Internet Service Provider.

Computer labs are maintained on a rolling basis with major preventative maintenance work done between terms. Computers in classrooms are treated as higher priorities, with open access stations repaired thereafter. PCs are typically down no more than 1-2 days. There is no policy mandating a certain level of operational capacity since all outages are considered important, with classroom outages given priority.

2. AIT Facilities

Room 208 Library (WINTEL) and the two multimedia classrooms (1 WINTEL, 1 MAC) each contain twenty-four networked PCs with an additional instructor station. The multimedia classroom is equipped with two instructor stations. A small number of additional chairs enable students to share PCs.

AIT makes software decisions for the two AIT/Library multimedia classrooms and the Library teaching computer classroom (208). Funding for educational software is requested from ITS and is supplemented by additional AIT/Library funds. Requests are based on faculty recommendations and recommendations made by ACAC. Approval is based upon cost, funding source, and expectation of future use.

For developmental and instructional purposes, faculty can also be assigned subdirectories with FTP access on the AIT's multimedia web server located in the Faculty Development and Training Lab. If desired, this web server can also support student use in the two multimedia classrooms.

The staff who maintain the Faculty Development and Training Lab also support the two Multimedia/Library classrooms. Faculty who teach in the multimedia classrooms are entitled to an immediate emergency response if problems occur.

3. Interface between AIT and ITS and other facilities

The policy is to promote shared use of resources through both system design and cooperation. At the present time, faculty can access the AIT and ITS systems, but students cannot access ITS teaching lab materials from either the Library or AIT facilities. When the Library Café is completed, it is expected to provide access to these materials.

H. Personal Hardware and Software Purchases

The college provides information to faculty, staff, and students about University-negotiated discounts for the personal purchase of computers and software. Some software site licenses, however, permit distribution that is either free or at greatly reduced prices. The publication Faculty Guide to Computing at BC has a detailed list of such software. In addition, the College Bookstore stocks academic edition software and has installed an electronic kiosk linked via the Internet to the GateWay computer company to support purchase of their products.
I. Software Evaluation

The Faculty Development Lab (Library) contains a large number of products available for faculty examination and testing. This collection includes Prentice Hall's Partners in Technology New Media Collection. The *Faculty Guide to Computing at BC* has a detailed inventory of software.
1. Testing of a New Product

The Faculty Development Lab will purchase products for testing and general Lab use, depending on cost and potential for future use. AMOS and BMDP are examples of such purchases.

2. Trial use in a course

The primary considerations are licensing and cost.

IV. Assessment

A. Background

Technology is playing an expanding role in our curriculum. Development is an objective that should be formulated within the context of the college's mission. For the purpose of this report we assume that the rapid changes taking place in technology have a major effect on instruction and research. But the changes in technology are so rapid that evaluation of each individual change is impractical. One must keep up with these technological changes in order to choose the proper implementation of technologies in the classroom and the research laboratories. Policies regarding development require constant monitoring of faculty and student literacy. And to insure that faculty and students stay current requires insuring universal access to the technology and also a support policy. This portion of the report will try to summarize the current situation in these areas and recommend steps to be taken to improve the situation.

B. Faculty and Student Literacy

1. Faculty Literacy

The main tool for assessment of current faculty literacy was a questionnaire distributed to the faculty on Wednesday, February 18, 1998, at a stated meeting of the faculty of Brooklyn College. One hundred and eighty-four questionnaires were returned by the end of the meeting. Thus, about 40% of the full-time faculty responded to the survey. If we assume random sampling, then conventional statistical assumptions suggest that, should the survey be repeated, the chances are 19 out of 20 that the results would be within about 7% of the results reported below. On the other hand, if one assumes that the respondents came from the more computer-literate parts of the faculty, the results can be heavily biased in the direction of literacy. The issue of how objectively to monitor the literacy distribution of the entire faculty, short of a compulsory test, is one of the major questions that lies at the foundation of trying to establish policy of faculty development. Seventy-eight per cent (78%) of the respondents use personal computers on a daily basis, 18% several times a week, and 3% only rarely. Most of the respondents use the computer for word processing, e-mail, and Internet connection. Seventy-three per cent (73%) are not doing any computer programming.

2. Student Literacy

To assess student computer literacy, a survey was distributed to a number of English 1 and English 2 classes. A total of 111 English 1 students and 193 students in English 2 responded,
for a total of 304 students. English 1 and 2 were selected for the survey for two reasons: (1) as required courses, they draw on a cross section of the student body, and (2) students presumably take English 1 at the beginning of their college careers and English 2 after they have completed at least 48 credits. The results do not show major differences between the two populations, and we will present here only the overall averages. Twenty-five per cent (25%) of our students do not have computers at home. (One quarter of them expect to get one in 1998.) Fifty-four per cent (54%) indicated home access to the Internet. Twenty-one per cent (21%) of the students do not use computers on campus; the other students use one or more of the college’s facilities. Ninety-five per cent (95%) of the students surveyed use computers for word processing. This number is considerably higher than the availability of computers at home and the use on campus; it suggests that there may be only a small overlap of students who have access to computers neither at home nor on campus. Sixty-one per cent (61%) of our students use the computer for Web surfing while 59% use e-mail. Forty-one per cent (41%) of English 1 students do some programming on the computer while only 27% of English 2 students use the computer for programming. Most students do not use the campus e-mail, and most of them do not know their campus e-mail ID. Significantly 19% of English 2 students use their campus account but only 8% of English 1 students. Forty-five per cent (45%) of our students use the computer several times a day while 21% of our students rarely use computers. It should also be noted that Brooklyn College is now officially recognizing the principle of computer literacy as requisite for graduation; a practical implementation has not yet been determined. The survey of Juniors and Seniors in the spring of 1998 indicated that almost half the students have home computers with Internet capacity.

C. Faculty Training

Many faculty are interested in the instructional possibilities that are emerging from the new technologies. In fact, it has been the faculty who have generally been out in front in this regard. In virtually every department several faculty members have taken the initiative with regard to new applications of technology to teaching and research. However, many faculty members often do not know what hardware, software, and support are available.

A survey of department chairs revealed a common expectation that the burden of technological innovation is likely to fall primarily on faculty hired in the years ahead. And, in fact, many of the faculty members who are currently most active in areas such as developing departmental Web pages and the like have been hired in the last few years. This reflects the fact that they developed relevant skills while still in graduate school. But depending entirely on such new blood to keep the college up-to-date seems dangerous. Given the pace of change, the skills of these new faculty members are also likely to be dated within a few years if they do not continually invest time to update them. From this perspective, it is a tribute to the many faculty members who have acquired new skills in these areas on their own with little help or compensation from the college. To insure that this continues, the college should consider ways to encourage and reward the efforts of faculty in these directions. At the same time, the college should consider the risks to the careers of new untenured faculty members of expecting them to shoulder a major part of the work in these areas.

D. Training Models

A question in the faculty survey, "Which of these BC resources have helped you increase your computer skills and/or solve computer problems?" produced the following results:
Seminars/workshops at BC — 28%; Help Desk — 26%; Academic Computing Center — 30%; Colleagues — 61%; and None — 16%.

AIT workshops are useful; so far just under a third of faculty have registered for or completed workshops held in the multimedia classrooms in the Library. The Director is attempting to increase the number by sending trained student consultants to faculty members in their offices, but this effort is on a small scale because of limited staff and budget. The workshops are structured in three series, “beginner,” “advanced,” and “master class” levels, so that every faculty skill level can be addressed and enhanced. In some departments individual faculty members have taken responsibility for training other faculty. The importance of departmental assistance is one of the reasons that the AIT technology Representative (Tech Rep) program was created. Tech Reps serve as liaison between academic departments and AIT; the Tech Rep web page provides current information about computing at Brooklyn College: http://depthome.brooklyn.cuny.anthro/techrep/.

Recently Brooklyn College hired a faculty member with a joint appointment between CIS and the Library. When asked, "What is your charge or responsibility concerning faculty development?" she responded:

- to support the activities of faculty curriculum developers;
- to secure grants to continue and expand the program;
- to design and provide faculty training in curriculum development for Web-based teaching;
- to design and provide faculty training in the technical aspects of Web-based teaching;
- to play a leadership role in identifying and evaluating appropriate teaching technologies for Brooklyn College;
- to assist faculty in developing evaluation tools for Web-based teaching;
- to serve as Brooklyn College's distance education resource specialist and analyst.

E. Availability and Usability of Technology

Policy issues that relate to access to technology need to be addressed separately in terms of access for full-time faculty, part-time faculty, and students.

1. Full-time Faculty

In general, all full-time faculty members have access to a personal computer, with 88% having a PC at the college. However, 12% of the faculty do not have ready access to computers at the college and, instead, depend on their own PCs at home. Only about two-thirds of the full-time faculty has and uses Internet access while one-third of our faculty do not. This should be a serious concern given the increasing role that the Internet resources, particularly the Web, are playing in new curriculum developments.

Microsoft DOS/Windows is the dominant operating system with the exception of Computer Science, where UNIX is preferred. Although 19% of the faculty report being Macintosh users, only 7% are exclusively Macintosh users. Macintosh use is most common in the School of Education and in departments such as Art that rely heavily on graphics. The college has generally focused on supporting the majority of users, who use the Microsoft operating systems. However, a Macintosh technician has now been hired.
Although most full-time faculty appear to have reasonable PC access at the college, many of these PCs are older machines (e.g., ATs) with limited resources. Although adequate for basic DOS word processing and e-mail, these machines do not have the computational power needed for newer applications; they limit the possibilities for faculty to learn and develop new software tools for teaching. In these cases, faculty are frozen in their present level of utilization and prevented from actual participation in dynamic integration of new technology into their academic environment. Partly in order to solve this problem, without attempting to generate resources for a global upgrade every three years, ITS has equipped each department office with a computer with network access and a scanner.

2. Part-time Faculty

Part-time faculty often teach in evening hours and weekends when departmental and other college facilities are less accessible. Since these part-time faculty often spend little time at the college, they have little time to learn to use even the limited resources available to them. This leads to a situation where college goals of computer literacy for students are unlikely to be met in a fairly large number of courses.

3. Students

It is the policy of Brooklyn College to provide for student use a combination of drop-in computer areas, like the Atrium facility, with departmental access centers. About 70% of the departments maintain computer classrooms, labs, or other facilities that are used by students. Several of the departments have equipped student clubrooms or lounges with at least one computer. Often these facilities are maintained by the departments even though the departments have few resources to do so.

F. Networking

1. Technology

Although many faculty with PCs in their offices or labs do not have access to Web browser software, providing access is part of the ongoing Telecommunications Infrastructure Rehabilitation project, as is the migration from MS Mail to MS Exchange for e-mail.

2. E-mail

Detailed instruction in the use of e-mail is provided in the Faculty Guide to Computing at BC, and other guides provided by ITS. ITS has also been running well attended e-mail classes twice weekly since Fall 1997. Assistance to faculty is also provided by AIT on a more personal basis.

Off-campus access to college e-mail has been a problem, but as the college moves, slowly to be sure, from MS Mail to MS Exchange, the problem is receding. Many faculty members read their MS Exchange mail from off campus, and anyone with access to the Internet can do so. During the years when it was not easy to provide off-campus access, many faculty members made other arrangements, often using free e-mail access services, and now see no reason to change and lose their "identity."
G. Centralized versus Decentralized Facilities

One issue that confronts Brooklyn College is striking an appropriate balance between computer facilities and classrooms at the departmental level on the one hand, and general college computer facilities on the other. There are arguments on both sides. Presently, as noted above, about 70% of the departments have computer facilities for their teaching needs. These facilities were usually created by departmental initiatives coupled with support from the administration. The justification for these facilities in some cases is that they provide specialized hardware and software that is uniquely suited to particular teaching needs. Also, locating these facilities at the department level means that faculty members can more readily supervise the operations of these facilities and keep them running. And having dedicated facilities available makes it easier for faculty to develop and modify curricula that use these facilities.

On the other hand, there are drawbacks to such facilities: 1) maintaining the software and hardware imposes a major burden on the department; 2) students can only do course work at these particular sites, and access to these facilities by students is often very limited; and 3) these facilities may be underutilized in some cases.

Centralized general facilities, such as the Atrium or Library multimedia classrooms, solve some of these problems but raise others. These general facilities are generally better maintained and more reliable than departmental facilities. Also, these facilities are generally open to students for many more hours than is the case for departmental facilities. On the other hand, it is more difficult for departments to plan courses contingent upon the availability of such facilities, and faculty supervision and support of students in these environments are much less likely. There are benefits and costs to both types of facilities.

Curricular development and faculty involvement are most likely if the facilities are close to the faculty members who use them. However, there should be general facilities accessible to students at any reasonable hour that permit the students to work on assignments for all of their courses, to the extent possible. As an example, a number of departments use the SPSS statistical package in their courses. While it is reasonable to have classrooms dedicated to this purpose where faculty can work closely with students, it should also be possible for students to work on SPSS assignments from any computer facility anywhere on campus. Hopefully, this will be achievable with improved campus networking.

H. Support policy

The rapid expansion of computer technology and the rapidity of hardware and software change and obsolescence have created major challenges for information technology providers to support users in a distributed computing environment, as has been widely noted in the computer press. In line with this general trend, the survey of faculty revealed much dissatisfaction with the current support with respect to both software and hardware. In part, the complaints reflect a lack of information about where to turn when problems arise. The *Faculty Guide to Computing at BC* is a positive step toward dealing with this problem. The survey also elicited complaints about the quality of service provided by the ITS Help Desk and technicians. ITS recognizes these problems and, as noted elsewhere in this report, is working to improve user support.
Currently both ITS and AIT are charged with providing user support and services. Although there are good reasons for separating the support missions of these two organizations, it seems likely that users will not always be clear where to turn. And the problem may get worse if the activities of the new Center for Teaching overlap those of AIT. Support is likely to remain an ongoing problem for the foreseeable future.

Another long-standing problem had been an almost total lack of documentation for e-mail, networking, and other services. Again, the Faculty Guide to Computing at BC addresses these problems.

I. Maintenance and Upgrading

The college faces major problems of computer and software maintenance and upgrading. With the current rate of change in software and hardware, every computer in the college needs to be upgraded or replaced every three years or so. In conjunction with this problem, one important issue concerns support for departmental classrooms and labs. ITS sets up, maintains, and troubleshoots virtually all departmental facilities. Its personnel have difficulty, however, in securing access and working around classes scheduled in rooms. The problem essentially is the difficulty of being able to assist a faculty member who is trying to teach and has technical problems during the class. As teaching becomes more and more dependent on technology in the classroom, there is a need for some sort of "strike force" waiting to run in if problems occur during a class.

V. Recommendations

1. Faculty development is central to the ability of faculty members to perform their mission. This realization should exist in every structure of the governance of the College and University. It should be realized that unless more time and resources are allocated to faculty development, the faculty will be handicapped in transferring the benefits of the advances in the technology to the students and to the institution.

2. Because of the importance of basic computer skills for students, Brooklyn College should encourage faculty to develop mechanisms to assure that students develop basic computer literacy while at the College.

3. Distance learning is a rapidly evolving paradigm shift in instruction and understandably, faculty members have raised concerns over issues of faculty workload, course format, and intellectual property rights. The college should continue to work with the University on these issues, which are currently the subject of negotiations between the University and the Professional Staff of Congress (the faculty union).

4. After five years of rapid development, Brooklyn College is just on the point of passing beyond its adolescence in terms of technology. It is perhaps not unusual that policy in this area is somewhat fragmented, overlapping, and often established from the ground up by default. This stage of development can in fact be seen at many other colleges attempting to move in the same direction. Nonetheless, Brooklyn College is entering a stage of its technological development in which policy and lines of authority and responsibility must be more clearly spelled out and made known to the whole college community.
5. Other colleges have found it useful to appoint a full-time director of distance learning, and Brooklyn College should consider this option. This is an area that might benefit from centralization of authority and responsibility for distance learning. Currently, the Virtual Core Initiative is under the direction of the Dean of Undergraduate Studies.

6. The college has only one full-time Network Support Manager, and this individual is the only person who is familiar enough with the whole system to deal with major problems that may affect large numbers of users. Ideally, the Network Support Manager should have a staff, each of whom has a special responsibility for individual parts of the system. Absolute dependence on one person leaves the electronic infrastructure in a very vulnerable position.

7. There has been some confusion in providing guidance to faculty as to what services and support they can expect from the college in critical areas such as hardware, software, development, evaluation, and delivery. The situation has been improved by the publication of the *Faculty Guide to Computing at BC*, which is also available on Brooklyn College’s web site. Additional methods have been used, such as colloquia, open meetings, Announce-1 discussion list, Access (the AIT/Library newsletter), *Inside ITS* (the ITS newsletter), and the Library web site. The college, however, should continue to pursue other avenues, for example a web-based discussion list employing conferencing software like CAUCUS, to provide a forum for interchange of ideas between faculty and administration and for rapid broadcasting of policy changes.