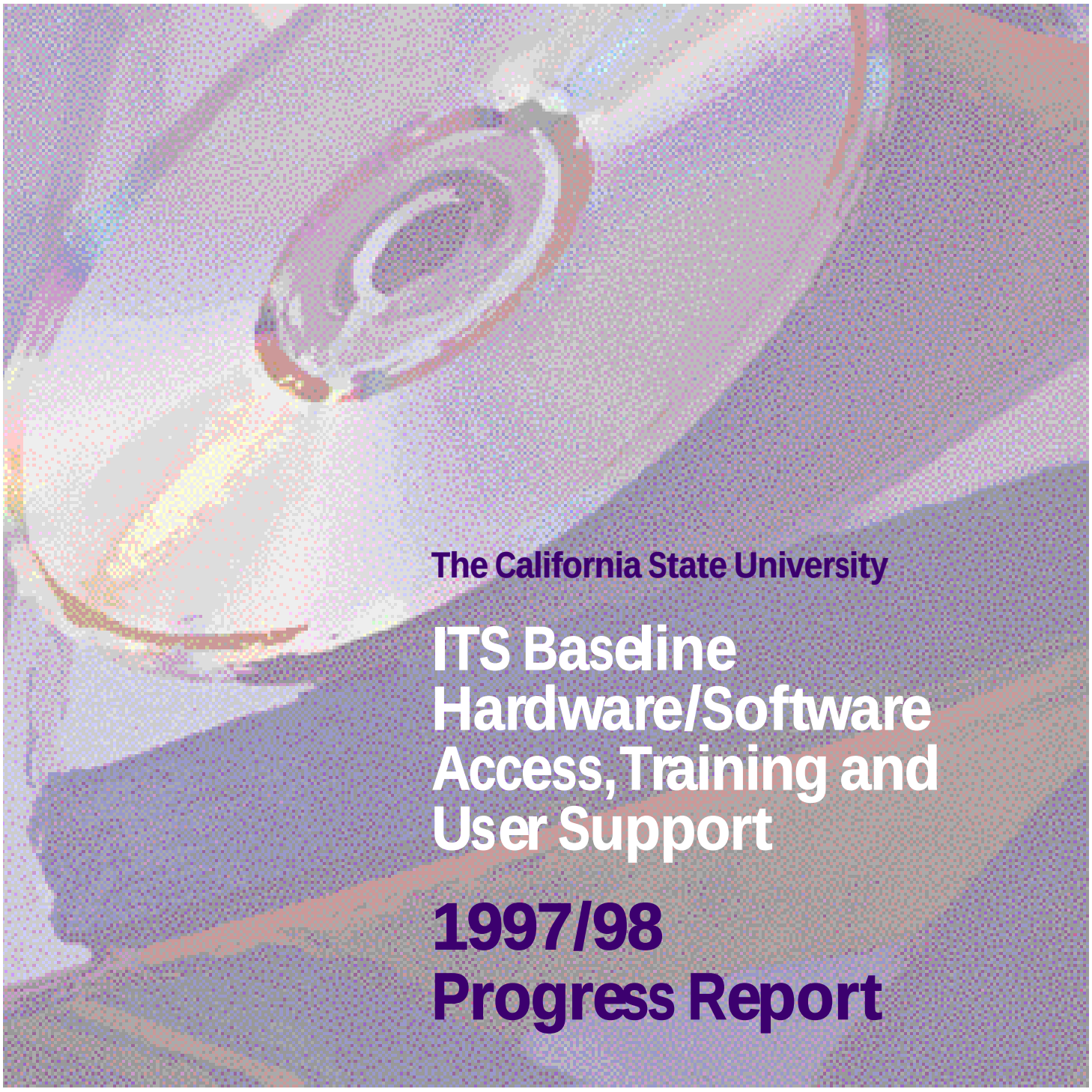

The California State University

ITS Baseline Hardware/Software Access, Training and User Support

1997/98 Progress Report

Compiled by Frank Young
Information Resources and Technology

November 1998

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Executive Summary

The Integrated Technology Strategy (ITS) is the comprehensive framework and process for moving the campuses of the California State University into the information age. ITS goals are to promote excellence in learning and teaching; improve the quality of the student experience; increase levels of administrative productivity and quality; and expand levels of personal productivity for students, faculty, and staff. Three categories of initiatives have been launched to achieve these goals: academic, administrative, and infrastructure.

The Technology Infrastructure Initiative (TII) includes five major components: hardware access; software access; network access; user training; and user support services. The initial funding mechanism to implement this initiative, the ITS Baseline Hardware/Software Access, Training and User Support (BATS) was launched in 1996/97. This report summarizes progress of the BATS project for 1997/98, the second of a three-year implementation plan.

BATS funding is intended to assist all CSU campuses in developing a "baseline" level of technology infrastructure capability; i.e., the capacity to assure every CSU student, faculty and staff member access to: a networked desktop computer, personal productivity and networking software and campus-specific applications, and training and technical support to use these resources effectively.

Using standardized guidelines, the 23 CSU campuses developed three-year plans to close the gap between the current environment and the target, "baseline" environment of the TII. An initial allotment of $5 million was awarded to begin BATS planning and implementation in 1996/97, and $10.9 million was distributed to campuses on the basis of student headcount in 1997/98 (the first year of full funding). Campus spending patterns reflected the variations in needs and readiness. Total expenditures for BATS from all sources in 1997/98 was $18.4 million as individual campuses augmented the system investment at about 71 cents to the dollar.

Expenditures of the system allocations showed the following patterns:

- Fully 61 percent of the total system allocation was used to improve student access to technology, while 32 percent was spent on faculty-related needs and 7 percent on improvements for staff.
- Almost two-thirds (63 percent) of the BATS allocations was used to purchase, upgrade, or replace computer hardware and software; 23 percent was spent on improving network access, both within and outside the campus. Eight percent of the funds was used for student and faculty training activities, and six percent was spent for equipment and personnel related to technical support services.

- In many instances, campuses reported that they had already achieved (or were close to achieving) baseline capability in one or more of the TII components, i.e., hardware and software access, network access, and user training and support. All campuses reported progress toward these goals. Greater efforts still are needed to measure or quantify both baseline levels and progress toward them.
- Modest curricular impacts were reported by several campuses as a result of BATS funding, and others noted institutional improvements in IT planning, organization, and decision making.

The report contains 12 pages of narrative discussing the BATS experience for the past year; Web addresses for accessing individual campus progress reports; a detailed series of charts and graphs showing campus expenditures of BATS system allocations as well as expenditures from all sources; and a list of "lessons learned" from the perspectives of individual campuses.

ITS Baseline Hardware/Software Access, Training and User Support

1997/98 Progress Report

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BATS in the Context of CSU Technology Planning

The Baseline Hardware/Software Access, Training and User Support initiative (BATS) was launched in the fall of 1996 as a major component of the Technology Infrastructure Initiative (TII) under the CSU Integrated Technology Strategy. BATS was conceived as an initial, three-year commitment by the CSU system toward enabling each CSU campus to meet the goals of the ITS-TII, and as a means to support the CSU requirement for 24-hour student access to computers and the network.

Implementation of BATS occurred prior to completion of the comprehensive TII plan. The comprehensive ITS Technology Infrastructure Initiative (ITS-TII), developed by the Systemwide Internal Partnership, supersedes the Baseline Hardware/Software Access, Training and User Support initiative, effective fiscal year 1999/2000.

Milestones in the evolution of the ITS Baseline Hardware/Software Access, Training and User Support initiative are summarized below.

System Strategic Planning for Technology

In 1990 the CSU Board of Trustees adopted—and directed the chancellor to implement—a far-reaching set of policy recommendations and initiatives related to information technology.

Among the eight **policy** recommendations were the following:

- Infuse technology, when deemed academically appropriate by the faculty, into the curriculum of all CSU academic disciplines on all CSU campuses to enhance the teaching/learning process on and off campus.
- Provide an integrated technology infrastructure on each campus and across the CSU system and state…

The following are representative of the broad scope of the **initiatives** the board endorsed to meet the policy goals:

- Ensure that *all* CSU students, including those who have limited access due to their prior educational experiences, location, job or family obligations or disability, have access to and are engaged in educational activities which are enhanced by technology.
- Develop telecommunications delivery systems designed to provide for intercampus or systemwide interaction amongst faculty, students, and staff…

24-Hour Student Access

The technology policies recommended by CSU leaders and endorsed by CSU trustees in 1990 grew from recognition of the changing nature and importance of information and of the technologies required to use it. Explosive growth of knowledge, coupled with the emergence of digital technologies and the expansion of high speed communications networks, demands new tools for accessing, storing, processing, and presenting information.

To prepare students effectively for this new environment, access to information resources must be integrated into their educational experience.

Campus concerns about inequities in students' access to information technology resources culminated in a resolution by the Academic Information Resources Council (AIRC). To assure that students least able to afford the purchase of a computer and Internet access do not fall further behind, AIRC called on the system to require all CSU students to have "24-hour access to a personal computer and to the network." While the AIRC was struggling with funding alternatives to support the 24-hour requirement, the presidents of Humboldt State and Sonoma State formally requested permission to implement a three-year pilot program in which students would be required to own a personal computer.

The AIRC resolution was forwarded to the Commission on Learning Resources and Instructional Technology (CLRIT) in the fall of 1994. After a review of colleges and universities with similar requirements, and after lengthy discussion of the impact such a requirement would have on CSU campuses, CLRIT sent to the chancellor in early 1995 a recommendation, together with an implementation plan and guidelines, for requiring all CSU students to have access to a personal computer and the network by fall 2001. The chancellor approved the policy recommendation. He also authorized Humboldt and Sonoma to proceed with implementation of assured access programs on their campuses on a pilot basis beginning fall 1995. In support of this program, the two campuses received budget augmentations in lieu of the proposed student technology fee.

Integrated Technology Strategy

Aware of the widening technology gaps on their campuses, the CSU presidents assigned themselves to task groups focusing on finding solutions to the major technology challenges facing their campuses and the system. Beginning in late 1993, the presidential task groups agreed on a comprehensive, coordinated, systemwide technology planning framework and process. They adopted an Integrated Technology Strategy for the entire system, and established commissions on institutional management and telecommunications infrastructure, in addition to CLRIT, to oversee ITS implementation. In October 1994, the presidents formed the Technology Steering Committee (TSC)—comprised of system executives and the six presidents who chair and vice chair the technology commissions—to coordinate the work of the commissions.

Intensive ITS planning that began in early 1995 confirmed great differences between campuses, and between units across campuses, in the quantity and quality of access to information technology. In 1996 the Technology Steering Committee approved "baseline" standards for the intra-campus technology infrastructure. This set of minimum expectations for all campuses was intended to insure that students, faculty and staff at every CSU campus have access to at least a minimum level of technology resources. Campuses received funding to examine their existing capacities against these standards, and to develop plans for bringing their campuses at least to minimum baseline capacity or above.

ITS Technology Infrastructure Initiative (ITS-TII)

Within the ITS, the chancellor and the presidents formed the Systemwide Internal Partnership (SIP) to develop the ITS-TII. Drawing upon data acquired through the campuses' analyses of gaps between their current and "baseline" capabilities, SIP developed a comprehensive plan for

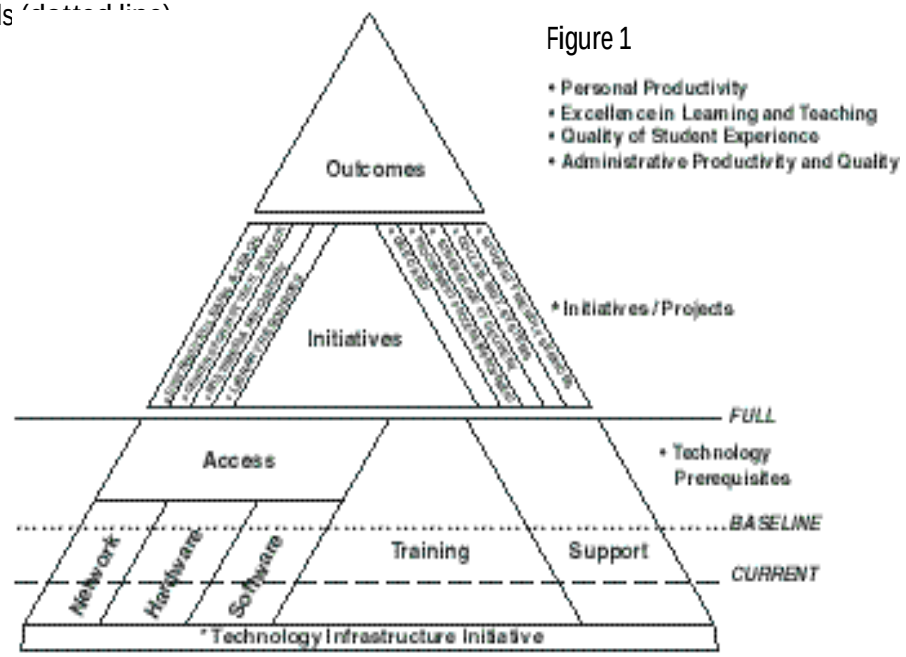
implementing the ITS-TII. Between its formation in fall 1996 and the transfer of its responsibilities to the newly established Commission for Technology Infrastructure in fall 1998, the Systemwide Internal Partnership team:

- defined all of the essential components of the baseline infrastructure in operational detail;
- developed alternative approaches for providing support services; and
- recommended strategies for bringing every campus to at least baseline capability within three years.

The BATS Initiative

Figure 1 depicts the relationship between the Integrated Technology Strategy (ITS) and its component parts. In 1996 the Technology Steering Committee established the Baseline Hardware/Software Access, Training and User Support initiative (BATS) as an initial funding and implementation mechanism to help campuses narrow the gap between their current capabilities (represented as a system average in Figure 1 by the broken line) and the agreed upon baseline standards (dotted line).

Figure 1



The inten technology infrastructure which provides all students, faculty and staff access to a comprehensive, basic level (or "baseline") training program, user support services, and hardware/software/local area networking access.[1] " Baseline" capability means that all students and faculty, and all staff whose work require it, have *practical* access to:

- An appropriate, networked computer;
- Standard productivity, communications and networking software and campus-specific applications;

[1] Source: *Integrated Technology Strategy: Baseline Hardware/Software Access, Training and User Support: Final Plan and Guidelines*, November 1, 1996. The document is posted on ITS Web site at http://its.calstate.edu/baseline/

- Opportunities to learn how to use the above information resources;
- Professional and technical support to make effective use of the resources.

More specifically, these "baseline" capabilities and resources include:

Hardware Access

- General student computer lab equipment
- Student computer leasing program
- Classroom presentation equipment
- Electronic/studio classrooms
- Hardware for academic support staff
- Training labs
- Faculty workstations
- Kiosks
- Video/graphics production equipment

Software Access

- Software for direct academic support
- Campuswide software library, including maintenance and upgrades
- Interactive training software
- Networking software
- Campuswide e-mail system
- Basic electronic library and information resources
- Campuswide users' software tools

Network Access

- Local area networking and Internet connectivity
- Servers (e-mail, Web, news, information resources)
- Remote access (modems, dial-in, wireless, special direct lines)
- Hubs and routers and network electronics for local area networks

Training

- Basic information competency training for students, faculty, staff
- Faculty/staff training in common software and networking tools
- Student training in basic applications required by academic disciplines
- Student training in common software and networking tools
- Student training in uses of generic campuswide applications
- Advanced training for campus trainers and psupport ersonnel

Support

- Campuswide help desk support services
- Training specialists
- Instructional support consultants
- Technicians (equipment, lab, classroom, networking, maintenance)
- Computing lab monitors
- Instructional development specialists
- Curriculum applications development specialists

Based on the 1996 ITS Guidelines and their individual needs and capabilities, campuses developed three-year plans to achieve the goals of the BATS initiative. An independent review panel evaluated each plan and made recommendations for funding or revision to the CSU Commission on Telecommunications Infrastructure and the Technology Steering Committee.

On the basis of readiness, five campuses (Chico, Fresno, Northridge, San Francisco and San Luis Obispo) were awarded augmentations to begin implementation in the spring of 1997. Each of the other campuses received $50,000 to initiate programs related to information competence and faculty development, and to complete preparations for full implementation in fall 1997. Campuses received a total of just under $5 million to support BATS in 1996/97.

BATS funding for 1997/98 totaled $10.9 million. Campus allocations were based on student head count for fall 1996 and ranged from $38,622 (Monterey Bay) to $921,916 (San Diego). The campuses began the implementation of the BATS initiative from very different starting points. Recognizing the uneven challenges the campuses face in reaching "baseline" capability, campuses were asked to report on the progress they have made in terms of the goals and objectives of their own BATS plans, and how they used their 1997/98 BATS allocation to achieve these results. Individual campus reports are posted on the campus Web sites listed in Attachment A.

1997/98 Campus BATS Expenditures

For reporting purposes, campus expenditures of BATS funds are subsumed under the four general goals of the ITS-BATS initiative; i.e., access to: a personal computer (hardware/software), the network, training and support for students, faculty and staff. Campus spending patterns differ, as expected, given the differences in readiness and needs noted above; however, they parallel generally the profile of BATS expenditures for the system as a whole displayed in Tables 1a and 1b. Expenditures for each campus are profiled in Attachment B.

It is important to note that actual campus expenditures related to achieving the baseline capabilities identified in the BATS initiative exceeded considerably the budget augmentations the campuses received. In 1997/98, reported BATS spending from all sources—campus General Fund, Lottery and other sources in addition to campus BATS augmentations—totaled $18,417,621, a systemwide average campus investment of about 71¢ for every dollar provided by the system. A summary of expenditures from all sources is included as Attachment C.

Table 1a
97/98 BATS Expenditures by Goal
Total: $10,721,399

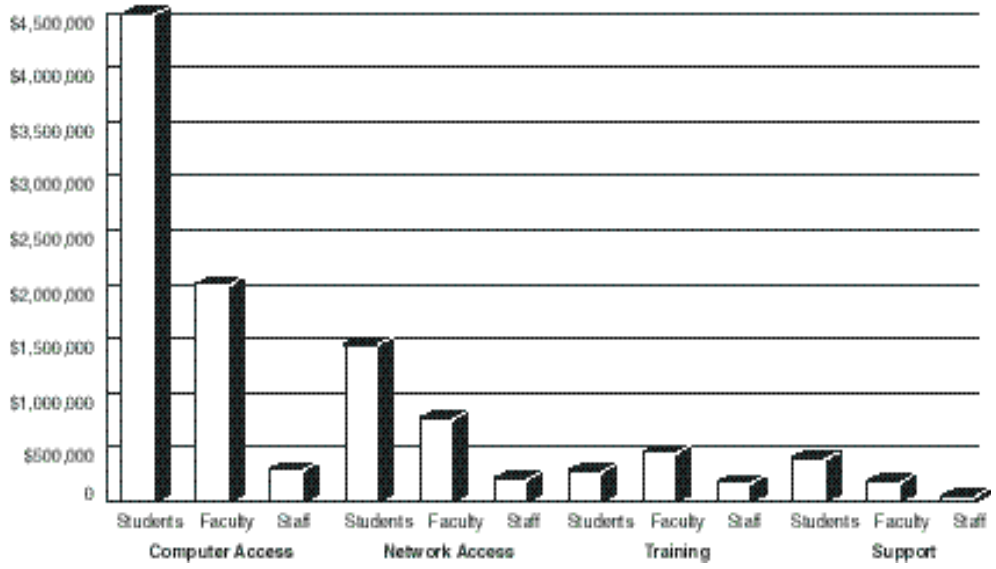
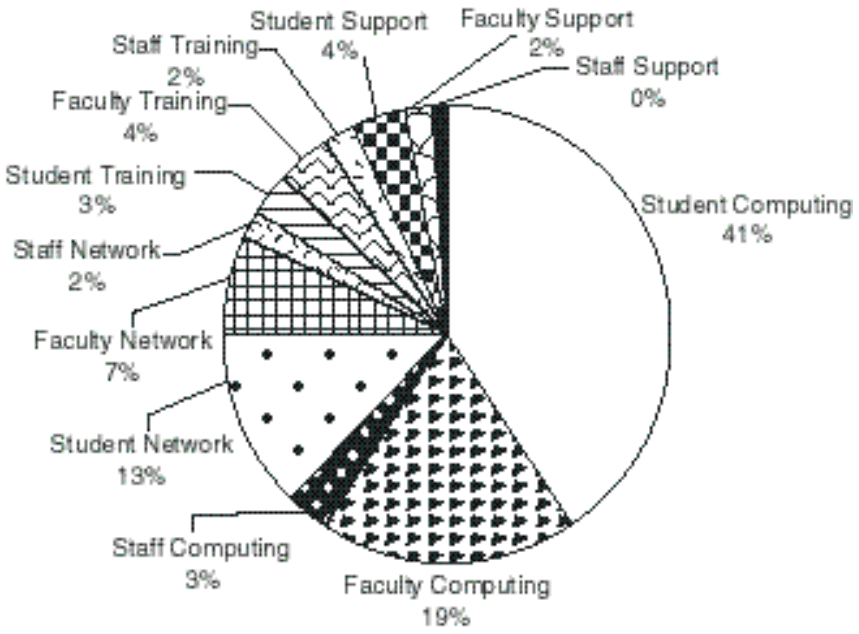


Table 1b
97/98 BATS Expenditures by Goal
Percent



Expenditures by Beneficiary Group

Most of the campuses (14) spent most of their 1997/98 BATS money to improve student access. Campuses report spending $6,611,097 (or 62 percent of the total system BATS expenditures) on improvements and programs to benefit students. Well over half of this total ($4,491,751 or 68 percent) was for hardware/software access. Almost one-fourth ($1,444,396) was for network access. The remaining 10 percent was divided between training ($276,998) and support services ($397,952).

Faculty were the targeted beneficiaries of investments totaling $3.4 million (32 percent). Most of this money ($2,002,368, just under 60 percent) was used to replace obsolete computing equipment and software. Improving faculty access to the network accounted for about 22 percent ($760,769). Just under half a million ($453,408 or 13 percent) was spent providing training facilities and opportunities. Eight campuses used a portion of their allocations ($180,045 or 5 percent) to improve support services for faculty.

Ten campuses reported expenditures aimed at improving staff access to computing and the network, and to training, and support services. Three campuses earmarked between 20 and 25 percent of their BATS funding for this purpose. Spending for staff by the other campuses averaged under 8 percent of their BATS augmentations. Of the $713,712 spent by all campuses to benefit staff, about 40 percent ($290,497) went toward improving access to computers and software, 29 percent ($207,971) for network access, one-fourth ($173,639) for training (general and IT professional training), and 6 percent ($41,605) for support services.

Expenditures by Major Goals

Providing access to a current generation personal computer, to standard productivity software and to peripherals (e.g., printers) was the highest priority for most (18) campuses. Aggregate spending on computer hardware and software for all campuses was $6,784,617, almost two-thirds

(63 percent) of all BATS expenditures for the year. Campuses used ca. three-fourths of this money to upgrade existing, replace obsolete, and/or to augment available computing equipment and software in general access computer labs and faculty and staff offices. About 10 percent of this money was spent on equipment for classroom use. The remainder was used to acquire a loan pool of desktop and laptop computers, to upgrade or add servers used to support instruction, and to equip facilities used to develop technology mediated instructional materials.

Improving access to the network ranked second in priority. Sixteen campuses invested a total of $2,413,136, or 23 percent of the 1997/98 BATS allocations on expenditures related to network access. Improvements to the campus local area network—primarily upgrading and augmenting the number of network servers—accounted for about 40 percent of this money. About one-fourth of the total was used to provide network connections to faculty and staff offices. Campuses also used these resources to: improve and integrate e-mail systems, provide network connections for laptops in high-use instructional areas, connect classrooms to campus data and video networks, and support dial-in access from off-campus.

Thirteen campuses used BATS allocations as a source of funding for training activities totaling $904,045 (8 percent of all BATS spending). Almost half of these funds were used to create or to improve training facilities. About one-fourth of the money went for programs related to student information competency, training on general software applications, and training of technical assistants to provide support for computing labs and help desks. The remainder of the money was used for a variety of training purposes; to training faculty in the design of multimedia or Internet-based instructional modules.

Eleven campuses spent a total of $619,602 (6 percent of the BATS allocation) for equipment and personnel related to technical support services. Help desk services for students, faculty and staff accounted for three-fourths of these expenditures. Most of the remaining funds were used to provide hardware and software installation and maintenance.

Campus Progress

In their BATS plans, campuses proposed actions, processes and programs designed to achieve the intended outcome of the ITS-Technology Infrastructure Initiative: i.e., provide at least a baseline level of access to a personal computer, the network, training and support for all students, faculty and staff in the CSU. In their 1997/98 reports campuses tend to focus on how BATS resources were used to meet pressing technology needs identified in their BATS plans. One campus reports that its access, training and support infrastructure now meets or exceeds baseline standards. Generally, however, campuses do not discuss changes resulting from BATS expenditures in terms of the baseline standards. For this reason, it is not possible to quantify the extent to which the gap between pre-BATS and baseline capability has been narrowed as a result of the 1997/98 implementation.

Significant progress toward narrowing the gap can be inferred for all campuses, and some campuses report very great strides. BATS funding served as a catalyst to focus campus technology planning and to accelerate implementation of technology projects and procurements. Every campus leveraged BATS funding to some extent to increase the resources available to improve student, faculty and staff access to technology.

Grouped below, for the purpose of conveying a sense for the gains attributable to the 1997/98 BATS implementation, are pieces of information from the campus reports pertaining to the four

main goals of the initiative: hardware/software access, network access, training and support. The first group includes indicators that campuses have *attained*, or are close to attaining, one or more components of the baseline standards. The second group points to *progress* campuses have made toward this goal.

Baseline Attainment

With BATS funding received in 1996/97 and 1997/98, and with sizeable investment of campus funds, *San Francisco* reports that the campus has "managed to meet a minimum level of access to, and training and support for, information technology resources. All components of the information technology infrastructure . . . are intensively used, and sometimes demand exceeds the supply of a particular service. The campus will be challenged, however, to maintain this level of service in the next two years."

Access to Hardware and Software

Chico, Monterey Bay, Pomona, Sacramento and *San Francisco* provided student access to a computer lab 24 hours a day for all or a good part of the academic term. *Dominguez Hills* was able to provide a computer workstation for all faculty who have not had one. Using mostly campus resources, *Fullerton* anticipates complete replacement of all obsolete faculty workstations by fall 1998. *Hayward* replaced all obsolete computers in student computing labs, reducing the average age of campus lab computers to below four years. *San Bernardino* replaced obsolete computer workstations and productivity software in all teaching and self-instructional labs, and in faculty and staff offices. *Sonoma* expects all undergraduates to be in compliance with its assured student access requirement this fall with a personal ownership rate in excess of 90 percent.

Access to the Network

Long Beach met the goal of connecting every full-time faculty office to the network. *Northridge* and *Pomona* report that all buildings are now connected to campus data/voice/video networks. As part of *Pomona's* network upgrade, phone directory, Web, e-mail, operator, and 911 services were integrated. The campus instructional computing environment permits users to store and retrieve information on their campus account from any Internet connection. Currently, the *Northridge* network supports 28,000 accounts on e-mail and Web servers. The university's business is conducted over e-mail; e-mail and the Web are essential to many courses. This year, the campus purchased new vendor-supported e-mail (to replace freeware), two additional e-mail servers, *High Availability* software for these servers, and consulting services for installation support. *San Francisco* upgraded the library network support for current and new databases in Windows/Windows NT, and expanded the capacity of the network to make more databases accessible to students and faculty, both on-site and remotely. *San Luis Obispo* anticipates that all classrooms will be equipped with analog and digital data connections before the fall term begins.

Training

Fullerton established a pilot program requiring all first-year students to complete a two-unit course covering basic topics in computer fundamentals, network communications and electronic research tools. *Los Angeles* created a Faculty Instructional Technology Support Center, equipped it with high-end workstations and peripherals, provided support staff, and charged it with training and supporting faculty in the application of technology in the classroom and at a distance. *San Luis Obispo* has established a comprehensive training program providing self-paced, scheduled, classroom, one-on-one and course-based training on the full range of topics, from basic computer

use and standard productivity software applications through specialized training for information technology professionals. *San Marcos* trains faculty new to technology and helps them achieve technical competency while providing peer assistance with the integration of technology and course content.

Support

Fresno invested in hardware, software, network upgrades, training and ongoing support for faculty who wish to offer courses over the Internet. As a result, approximately 1,000 students enrolled in some 30 Web-based courses in 1997/98.

Progress Toward Baseline

Access to Hardware and Software

Humboldt—completing the third (and final) year of its pilot Assured Student Access program—estimates that 80 percent of all students have access to a personal computer, and essentially 100 percent of the students who are majoring in disciplines requiring computer use own or have unlimited access to a computer. With 700 microcomputers available for student use, most of them current generation, *Humboldt* is nearing its target ratio of one computer for every 10 students. *Long Beach* replaced or upgraded faculty computer workstations and software; about 75 percent of full-time faculty now have a modern computer. *Los Angeles* is on schedule to replace all less-than-baseline faculty and staff computer workstations with new high-speed machines within two years. Four campuses (*Hayward, Humboldt, San Luis Obispo and Sonoma*) established laptop pools for student use. *Fresno, Humboldt, San Luis Obispo ,* and *San Marcos* are addressing the problem of student access to costly software applications required in engineering and other computer-intensive disciplines by deploying "keyserver" technology (which enables simultaneous use of the maximum number of licensed applications). By combining BATS-funded improvements to the network and support services with campus resources and donor funding, *San Marcos* established a program to provide a laptop computer on loan to students who are least able to afford to purchase or rent one.

Access to the Network

Half of the campuses have upgraded campus e-mail systems to support accounts for all students as well as faculty and staff. Some campuses adopted integrated e-mail and calendaring systems. Ten campuses report equipping a combined total of over 100 classrooms with network connections, multimedia presentation equipment and other technology enhancements. Nine campuses made substantial improvements to their e-mail systems with about half moving toward the adoption of integrated messaging systems (combining e-mail with calendaring and/or access to Web-based communications tools). Five campuses made substantial progress toward providing convenient, secure, Web-based access for students, faculty and staff to university data warehouses and information systems to facilitate interaction and transactions (registration, financial aid, etc.). *Pomona* focused on creating a data network that mirrored the reliability of the campus PBX system. The campus installed a comprehensive, 10BaseT Ethernet data network, thereby doubling the number of available network connections (3,000 to more than 6,000) ports in 44 buildings. Upgrade to Switched Ethernet capable of supporting streaming video and virtual LANs has begun. *San Marcos* purchased networking software to enable students to connect laptops from many places on campus without having to reconfigure their network settings. The campus also

installed a "firewall" system, to monitor and restrict remote access to information-sensitive databases, and added a system that enables students to interact with campus systems for registration and student records using a convenient Web interface.

Training

At *Bakersfield* and *Fullerton*, faculty agreed on entry- and exit-level information competency levels expected of all students, and have identified training options to enable students to meet them. *Fresno* is opening a second electronic classroom to support a program integrating information competence skills into required first-year courses. *San Bernardino* and *San Luis Obispo* licensed "technical" and "end-user" (i.e., productivity software), self-paced, computer-based training courses to supplement training courses and workshops offered by campus faculty development and technology programs. To meet growing demands, *San Diego* built a new training center in the library with two electronic classrooms equipped with 65 workstations, an ADA-compliant workstation and an instructor workstation with presentation equipment. *San Marcos* established the STARS program (Student Technical Assistant Resource Staff) aimed at developing a team of student assistants with expertise, skills and practical experience in computer technology and support. Participating students receive the benefits of this education while providing important services to the campus.

Support

Bakersfield matched BATS funding to increase greatly the quantity and quality of support available to technology users, students in particular. In connection with the improvement of support services, *Bakersfield*, *Los Angeles*, *Northridge* and *San Luis Obispo* installed help desk management software to improve service and enable more effective use of support personnel. At *Chico*, BATS funding enabled the hiring of personnel to provide a help desk and a 24-hour help line; "thousands of students" have availed themselves of these support services.

Impact on the Curriculum

Because 1997/98 was only the first full year of funding for most of the campuses, it would be surprising to find changes in the curriculum attributable to BATS implementation. Comments like the following, however, together with reported faculty and student participation rates in training programs, suggest that academic programs are already beginning to reflect benefits of better access to technology. In subsequent years campuses will be asked to report specifically on the impact of curriculum changes resulting from implementation of BATS.

- Deployment of First Class (a groupware application) at *Chico* was "a tremendous success and demonstrated the need for a simple collaborative on-line environment" to support teaching and learning. As a result, the campus will be offering WebCT as a course tool beginning fall 1998.
- *Fullerton* reports that about 10,000 students per term completed one or more of the approximately 117 courses offered by the campus which rely extensively on computer technology.
- *Hayward* reports that faculty, students and staff are "communicating in an explosion of connectivity."
- *San Bernardino* recognizes that it is essential to think of technology in terms of the classroom as well as the labs and the offices: "Students must have access to data, voice, and video in their classrooms, for the purpose of both presentation as well as interaction."

- *San Francisco* purchased software to support CSULink to provide students and faculty access to the combined holdings of six other CSU libraries.

Humboldt and Sonoma—both of which completed their third year of funding for pilot programs to implement assured student access—include in their reports descriptions of the impact improvements in the technology environment have had on teaching and learning.

- *Humboldt* reports that almost all faculty now assign homework requiring computer access; about 100 courses now include a significant component of technology mediated instruction. Staff have developed network software applications that allow faculty to create a grade book for each class, and to manage class discussion and assignments via a secure listserv. Faculty may also use an on-line testing capability (*ExamMaker*). This system supports a variety of multimedia test item formats, routes essay exams to faculty for anonymous grading, assigns the grade to the appropriate grade book, and routes exam results and comments to students.
- *Sonoma*'s policy of required assured student access to a personal computer has elicited "an extraordinary degree of enthusiasm and support" from inside and outside the campus walls. Contrary to critics' predictions, applications for enrollment at the university have increased each year since the requirement was adopted. Moreover, the persistence rate of entering freshmen has improved, while the average student unit load has increased modestly. The number of faculty and students using information technology in teaching and learning has increased dramatically.

Impact on Campus Information Technology Decision Making

Although they were not required to do so, half of the reports include information about how campuses went about implementing their Baseline Access, Training and Support plans. The availability of funding, although inadequate in terms of the final target environment, appears to have stimulated a high level of engagement in technology planning across the campuses. Considerable continuity is evident between the planning that produced the campus BATS plans (in 1996/97) and efforts to implement them. Generally, the core group of people who worked on the plan has continued its participation and has been augmented by a larger number of colleagues. The volume and level of communications between them and their constituencies has increased. Implementation priorities and schedules have been revised and updated in response to more systematic and inclusive needs assessment.

Planning and Organization

In most cases, responsibility for guiding the BATS implementation effort was assigned to a campuswide council or committee comprised of key academic, administrative and technical leaders, and, on several campuses, students. The president chaired this group on two campuses; on at least four others the group reported directly to the president. Charges to these groups typically included: recommending policies, priorities, standards and timelines; overseeing, coordinating, and evaluating implementation activities; and strategic planning. Rather than working through a single, large council, at least three campuses established steering committees charged with guiding and coordinating the work of task groups focused on specific aspects of the initiative (e.g., student access, curriculum/courseware development, information competency, workstation standards, help desk, etc.). *San Diego* hired a full-time BATS coordinator to conduct needs assessments, coordinate baseline training and help desk support, and work with committees, departments, college computer consultants and others.

Technology-related services have been reorganized on a few campuses. At *Humboldt*, for example, Media Services, the Courseware Development Center, and the Faculty Development Laboratory were combined into a new unit, the Instructional Media Services (IMS), within Computing & Telecommunications Services. The IMS group is responsible for seamless support of faculty in the development of courseware, and for coordinating faculty members' projects with other units. Other campuses (e.g., *Fullerton* and *Los Angeles*) created new faculty development or learning technology centers to support the creation of technology-mediated materials.

Strategies

Three campuses (*Fullerton, Los Angeles, San Bernardino*) have adopted a campuswide set of hardware specifications and standards in the interest of improving training and support service levels. *Los Angeles* adopted a Master Rental Agreement leasing model negotiated by the Procurement Division of the State Department of General Services for acquiring/refreshing workstations. This approach resulted in 50 percent replacement of all less-than-baseline machines used by faculty and staff and a replacement of 33 percent of less-than-baseline machines used by students. *Sonoma* is offering a selected group of five incoming tenure-track faculty special appointments as a strategy to overcome barriers to effective faculty collaboration across disciplinary boundaries. Half of the workload for these new faculty is within the academic discipline, and the other half is part of a faculty development team working across disciplines to help faculty develop effective strategies for incorporating technology into their teaching. The team will work closely with the library, the Center for Distributed Learning, the Center for Teaching and Professional Development, and other campus organizations that support learning through technology.

Lessons Learned

Campuses were encouraged to share "lessons learned" through implementation of the initiative in 1997/98. About half of the campuses chose to share their experiences in the form of comments ranging from the very general to the highly specific. A list of "lessons" applicable apart from specific campus contexts is appended as Attachment D.

The insights articulated in the progress reports tend to reflect the perspective and opinion of the authors, rather than the view of a committee, and often address disparate concerns. Following is a distillation of "lessons learned" about three common challenges facing CSU campuses.

- Where decisions are made on the basis of campuswide consultation and of broad participation by constituencies affected by changes, implementation of the BATS initiative is strongly supported and viewed as successful.
- Adoption of a common set of standards for equipment and software for the entire campus—and of provision for choice within these standards—enables campuses to make the most effective use of available resources for acquisition of equipment and software, and for training and support services.
- Demands for access to information technology, and for support in making effective use of IT resources, continue to outpace campuses' ability to provide them. Campuses need to take into consideration the total cost of ownership, and must continuously examine alternative approaches and solutions to make effective use of precious human resources.

Attachment A

Web Page Addresses for Campus Progress Reports

Web Page Addresses
Campus Progress Reports

Campus	Web Page Address
Bakersfield	www.csubak.edu/InfoRes/98BATSReport.html
Chico	www.csuchico.edu/inf/T2000/baseline98.html
Dominguez Hills	www.csudh.edu/infotech/pubs/bats0998.htm
Fresno	www.csufresno.edu/ait/bats98.htm
Fullerton	www.fullerton.edu/it/bats.htm
Hayward	www.csuhayward.edu/baseline/rpt9798.htm
Humboldt	www.humboldt.edu/~cats/divisions/admin/asai/
Long Beach	www.csulb.edu/web/bats/97-98
Los Angeles	www.calstatela.edu/ats/baseline/bats97.pdf
Maritime Academy	
Monterey Bay	www.monterey.edu
Northridge	www.csun.edu/itr/BATS_Report.html
Pomona	www.csupomona.edu/~iit/connecting/batsrpt.html
Sacramento	www.csus.edu/acaf/24-bats.htm
San Bernardino	tns.csusb.edu/~irt/BATSDOC2.htm
San Diego	www-rohan.sdsu.edu/~bats/Report/SDSU_BATS97_98.html
San Francisco	www.sfsu.edu/~compsvcs/bats.htm
San Jose	www.sjsu.edu/depts/cio/batsreport.html
San Luis Obispo	www.calpoly.edu/~its/bats/reports/0898/index.html
San Marcos	www.csusm.edu/computing/plan/1997BATS-report.htm
Sonoma	www.sonoma.edu/University/UAreport/
Stanislaus	www.csustan.edu/oit/BATS_97-98.html

Attachment B

Campus Expenditures of 1997/98 BATS Allocations

Attachment C

Campus Expenditures from All Sources for 1997/98 BATS Implementation

Bats Implementation 1997/98
Some Lessons Learned

The following, lightly edited comments have been excerpted from the 1997/98 BATS progress reports. For overview purposes, "lessons" have been grouped into topics suggested by a review of all campus reports and ordered alphabetically by campus. Persons interested in a more detailed understanding of a particular comment are encouraged to view the campus report on the Web site listed in Attachment A.

Implementation Management

Broad-Based Planning

Fresno: A broad-based planning effort can succeed. BATS planning and implementation have helped the campus identify severe weaknesses in the infrastructure and validated the need to strengthen it.

Northridge: Planning for technology should be done on a campuswide basis. The roles of all stakeholders must be well defined. BATS funding should be distributed in a highly consultative manner. Involvement of the executive officers was an important factor in campus planning. Staff from the technology units must be involved in all planning efforts.

Pomona: Engaging the campus in the discussion is the reasonable way to develop pathways that meet the broad range of people's needs.

Sacramento: 24-hour access and BATS revealed that centralized and distributed information resources could be developed collaboratively as a campuswide effort. These initiatives impact all academic entities. BATS planning took substantially more time than expected. Establishing priorities early on was a "liberating factor" in addressing the core baseline requirements.

San Bernardino: Though difficult, implementing BATS through a committee with representation from all five divisions was essential to its success. The priorities established by the BATS committee have generally been accepted by the campus community as representing broad, basic needs that no one can deny, and which everyone can support.

Timing/Sequencing

Fresno: Baseline infrastructure must be in place to enable utilization of the technologies. . . Availability of excellent training is pointless unless the infrastructure supports the application of the training in classrooms.

Pomona: The ordering of outcomes decided upon in the campus planning framework—(1) training, (2) support, then (3) access—was the right choice for putting the most difficult challenges first. The highly non-technical assumptions and principles that underlie any IT project are of critical significance. A variety of pathways are needed through the IT forest…

San Francisco: Speed is an issue. A year is a lifetime in technology; we need semi-annual budgets. We need to get value from purchases before they become obsolete. We need to acquire and deploy technology in a much shorter timeframe than we currently operate under.

Complexity

Sacramento: Bidding hardware programs to assorted vendors cannot be overly complicated. Mixing and matching direct purchases with lease/loan programs, of institutional/personal purchases is too complicated to handle as one deal.

San Francisco: It takes considerable resources just to operate projects and initiatives and even more if you want to progress.

San Marcos: Over the past few years campus has suffered from "too many good ideas." When the least available resource is people, it becomes extremely important to view new and continuing projects with an eye not only to cost, but also to effort. Because of competing priorities, some initiatives could not be addressed. Technology changes come so rapidly that what you plan is sometimes obsolete before it is published. Examples: Network Computer technology did not happen; Switch from ATM to Gigabit Ethernet.

Standards

Los Angeles: Campus has come to understand the importance of adopting standards that support the necessary diversity in communications software, but also allow for user choice. This has allowed our users a choice of mail clients that can be used on-campus and remotely.

San Bernardino: For the first time all campus divisions have agreed on the necessity of standardizing equipment purchases to achieve the best possible discounts, and to enable the best possible servicing and training options for the future.

San Francisco: Coordination/compatibility of hardware and software for student use in multiple campus locations is necessary to allow students flexibility in where they use campus computing resources.

San Francisco: Library faculty and staff need hardware and software that is compatible with publicly available versions. Differing purchasing cycles for public vs. faculty/staff replacements and upgrades can lead to faculty and staff teaching and advising users about different versions.

San Luis Obispo: By replacing many diverse, older systems with a smaller number of new platforms, support and training can be focused to maximize the ability of faculty to use IT more effectively. Lessons learned while fixing one of the new systems are usually transferable to other systems of the same model and configuration.

Stanislaus: Campus selected MS Exchange/Outlook as e-mail server solution based on expectation of platform interoperability. While this turned out to be true for e-mail, it is not the case for calendaring, which does not work seamlessly for Macintoshes. This is a serious drawback in a mixed platform environment.

Demand for Technology and Support Services

Hayward: Campus faculty, students and staff are "communicating in an explosion of connectivity—an explosion that threatens to overwhelm our network infrastructure and to undermine our traditional ways of providing technology support services." The total number of computers (faculty, staff and labs) is just over 2,000. Network technology is being embedded in a wide variety of devices; card scanning vending machines, etc., are being moved onto networks, and e-commerce is just beginning to catch on. Traffic on the campus backbone is increasing at an alarming rate (from 1.5 terabytes in November to almost 3 terabytes/mo. in April).

Los Angeles: Applications involving remote access cannot be fully realized due to the limitations of the current physical infrastructure linkages to external resources. Because so many students work and come to the campus briefly, they need to have access to a computer for class assignments and projects late at night and on weekends. There is a pressing need for labs to be open longer and to provide 24-hour access.

Los Angeles: It proved difficult to mandate disk quotas for students because no limits had existed previously. Management of technological resources requires continuous monitoring and reporting.

San Bernardino: Computer refreshment is essential to the currency of curriculum in teaching and self-instructional labs, as well as for faculty and staff desktops. Technology is as essential to the classroom as to labs and offices.

San Francisco: Sustainability is an issue. The bar continues to be raised; expectations are constantly being heightened. We need to do everything better and faster. Our technology support systems need to be reliable. Each new service, once deployed and initialized, becomes the new base from which to build and measure progress.

Training & Support

Need

Pomona: Despite impressive gains in capability by some staff, significant effort is needed to help people to use effectively information age tools.

San Bernardino: Providing sufficient technical and consultative staff is essential to the efficient operation of the campus. Training suitable to the average learner must be timely, efficient and well presented.

San Francisco: We need more technical staff, better trained and more nimble than in the past. We need more training in less time. We need faster response from other campus units responsible for supporting the technology environment.

San Jose: We need creative ways to structure technical support for the colleges and other service units. The "pool" concept holds strong possibility of providing economy of scale support while providing a strong measure of distributed support.

Self-Paced Training

Los Angeles: The intuitive interface and comprehensive help menus available in the *Office* productivity software allow for training and assistance to be tailored to specific user needs. The user spends less time learning a particular application, and more time discovering how these applications can be applied to the instructional environment.

One-on-One Training

Stanislaus: We found that proper training of users is critical to facilitate migration from one mail system to another. One-on-one training, or training of very small groups, was found to be more effective than a workshop approach.

Specialized Training

Chico: Greatest training success (as measured by number of attendees) was for course-specific software (e.g., *First Class*). As a result, more emphasis is being placed on integrating training into the curriculum.

Los Angeles: As individuals became increasingly valuable due to their knowledge of *PeopleSoft,* they became desirable to companies looking to implement the software. Approximately 20 percent of those for whom Cal State LA provided advanced *PeopleSoft* training no longer work for the university.

Program Design

Los Angeles: Workshops, tutorials and documentation need to be consistent among all faculty, student and staff labs and trainers to ensure that users receive compatible and dependable information. Training programs are more effective when the skill levels and experience of trainees are relatively similar. Placement based on assessment of skills should be used to improve training program effectiveness.

Cost

Fresno: Benefits of technology have a high cost.

Humboldt: The actual cost of the Assured Student Access program in 1997/98 was $110 per student per semester, far more than the initially projected $36. Full funding for a refresh cycle of three years would require an expenditure of approximately $185 per student per semester, of which only $85 is currently available.

Humboldt: High-end software applications required in many disciplines are too expensive for students to buy. Universities must provide access to these applications in disciplinary labs and/or through licensing agreements that permit dual installation (via keservers, for example).

Sacramento: Economies of scale can be achieved by acquiring workstations and other resources in mass. Including a management system as part of the hardware can contribute to lowering the total cost of ownership over the life of the products. Construction costs for converting existing spaces to self-instructional labs can be very expensive.

San Francisco: Growing inventories of hardware and software require increased funding for maintenance and technician support, as well as for frequent replacement cycles.

Stanislaus: Televisions with VGA adapters offer a very cost-effective solution for computer output projection in small to medium-sized classrooms. They are a fraction of the cost of LCD projectors, and do not require complex installation.

Engaging Faculty, Students, Staff

Chico: BATS funding allowed campus to create a "very visible and high-level student computing center in the library." The positive response to this demonstrates the importance of a recognized central location for student access to computing and support.

Fresno: The quality of education can be enhanced and enabled by creative use of new technologies; this includes enhancement of traditional classroom pedagogies.

Humboldt: Because the resources (including training) necessary for faculty to design and develop courseware are available, faculty become excited about the possibilities and want to participate. Creation of the Faculty Development Lab and the Courseware Development Center resulted from faculty-generated plans and the faculty provide vision, management and technical support through an advisory committee.

San Bernardino: For the first time, the campus addressed the necessity of upgrading and maintaining computer labs of all kinds, and also of continuing the process of establishing "smart" classrooms at key locations throughout the campus. All parties agreed that providing e-mail for all segments of the campus community is an essential part of BATS, and a high priority for the campus as a whole.

San Diego: Periodic needs assessments with faculty, staff, student and administrators are valuable in guiding implementation decisions.

San Francisco: Faculty and students must be involved in the planning and implementation if we are to significantly impact technology-enhanced teaching and learning. Faculty will embrace technological innovations if they are presented in the context of the curriculum and their pre-determined learning outcomes. Innovations must be integrated into the existing framework and tied into student learning rather than in isolation.

San Jose: The Council of Deans is engaged and is providing the leadership that is crucial for the success of BATS and IT support in general.

San Marcos: Build on successful programs that continue to serve the campus community.

Resource Utilization/Rationing

Chico: Installation of presentation equipment can be more difficult, expensive and time-consuming than expected due to physical pathway demands and scheduling demands on the rooms.

Humboldt: Demand for access to lab where help desk is located results in waiting lines while workstations in other labs go unused. Since many of the students who needed help initially persist in using one lab out of habit, although they no longer require assistance, the campus is investigating ways of posting the number and location of open workstations in conspicuous locations.

Humboldt: It is cheaper to build large computer labs rather than multiple smaller ones where campus architecture permits. Start-up and operational costs can be significantly lower.

Los Angeles: Contrary to planning assumptions, campus usage statistics for the CODEC facility showed that the system was underutilized. More training must be provided to faculty in utilizing this technology to encourage more activity.

Los Angeles: Installing new workstations efficiently is a major challenge. Pre-configuring of workstations by vendor significantly reduced the costs of deployment and setup. Communication with end-users is a problem: relying on the administrative chain of command works effectively in only some schools. This approach needs to be augmented by alternative, direct communication methods needs.

San Bernardino: For the first time, the principle of providing matching funds was agreed to by all divisions, and all contributed monies to this cycle of BATS.

San Diego: Communication between various campus constituents is critically important to effective resource sharing.

San Francisco: Expanded electronic resources available through public workstations in the library mean that users spend much longer at workstations. The library needs to ensure priority access at its public workstations to those who need to use the catalog and other library services and resources.

San Marcos: When request for a 2nd shift computing lab manager was denied, campus adapted standard UNIX-level services (user login, security, home directories, disk quotas, etc.) to a Windows NT environment, thus providing a satisfying lab environment.

Desktop Resources

Chico: *First Class* has been a tremendous success and demonstrated the need for a simple collaborative on-line environment. Limitation: it does not integrate with the Web and is missing critical assessment and on-line course support features.

Humboldt: Laptops are not popular with students: (30 percent vs. 70 percent for desktops); they are too easy to: lose, steal, drop, and break, and too costly. Vision of virtual labs created by students bringing their own laptops is far off. Universities must continue to provide access to computing in traditional labs.

The California State University