

## TECHNOLOGY INFRASTRUCTURE INITIATIVE

The Technology Infrastructure Initiative (TII) of the Integrated Technology Strategy (ITS) focuses on upgrading the campus telecommunications infrastructure and on improving the personal productivity of faculty, students, and staff. One goal of the TII is to ensure that every CSU campus has a telecommunications infrastructure capable of meeting current and anticipated information technology demands for academic programs and institutional operations. Another major goal is to ensure that all members of the university community have access to a baseline level of information technology resources and services.

To guide implementation of this initiative, ITS planners described the target environment for five components:

- ◆ the intra-campus telecommunications network
- ◆ individual workstation environment (hardware and software)
- ◆ individual network connectivity
- ◆ user training
- ◆ user support

*Measures of Success* reports the progress the CSU is making toward achieving these baseline infrastructure capabilities as percentages for the system as a whole and for each campus. “Baseline capability” for each component is achieved when the standards for access and quality reach 90 percent or more for members of all three constituency groups: students, faculty, and staff.

### Baseline Telecommunications Infrastructure

The physical telecommunications infrastructure comprises the combination of intra- and inter-building pathways, closets, hubs and routers, and media (cables) that link individual workstations to the campus backbone, and the campus backbone to the inter-campus network and the Internet. The campus pathways, network electronics, and network media are the unseen, behind-the-faceplate prerequisites that ultimately determine when, or whether, the outcomes of the Integrated Technology Strategy can be achieved.

The benefits of access to current generation computing resources and services can be realized only if workstations are linked to each other and to campus information systems, and to the Internet, by a high-capacity, high-speed telecommunications infrastructure. Interactions over the Internet or the World Wide Web cannot be accomplished faster than the intra-campus and the inter-campus backbone networks allow, regardless of the capabilities of end-user equipment or applications. For this reason, the TII is a prerequisite for achieving the outcomes of the academic, student services, and administrative initiatives.

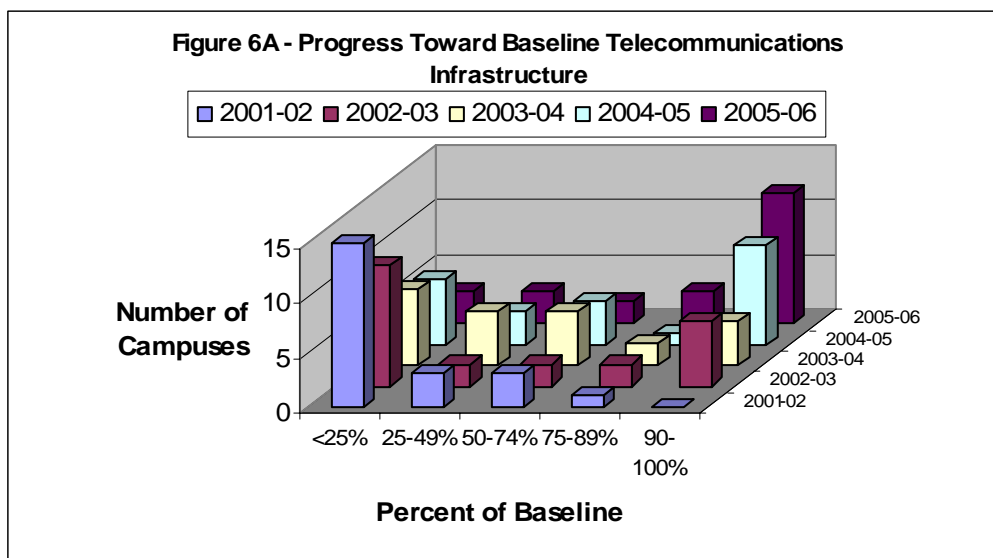
### Intra-Campus Networks

By the early 1990s, it was clear to CSU campus and system leaders that the limitations of the telecommunications infrastructures on almost all CSU campuses constituted an impediment to maintaining and improving the quality of academic programs and the efficiency of institutional operations. Unless improvements across the system were made, the technology gap among campuses in the system, and occasionally between the CSU system and the national higher education community, would very soon have a negative affect on the entire CSU. Demands for bandwidth associated with the explosive growth of multimedia and network applications, the transition from stand-alone to integrated information systems and their conversion to Web-based architecture, and the transition to electronic commerce far exceeded available resources. Upgrading campus telecommunications infrastructures to meet these demands thus became an urgent priority for the system. The TII was the solution adopted to accomplish this goal.

**Baseline Telecommunications Infrastructure Standards**

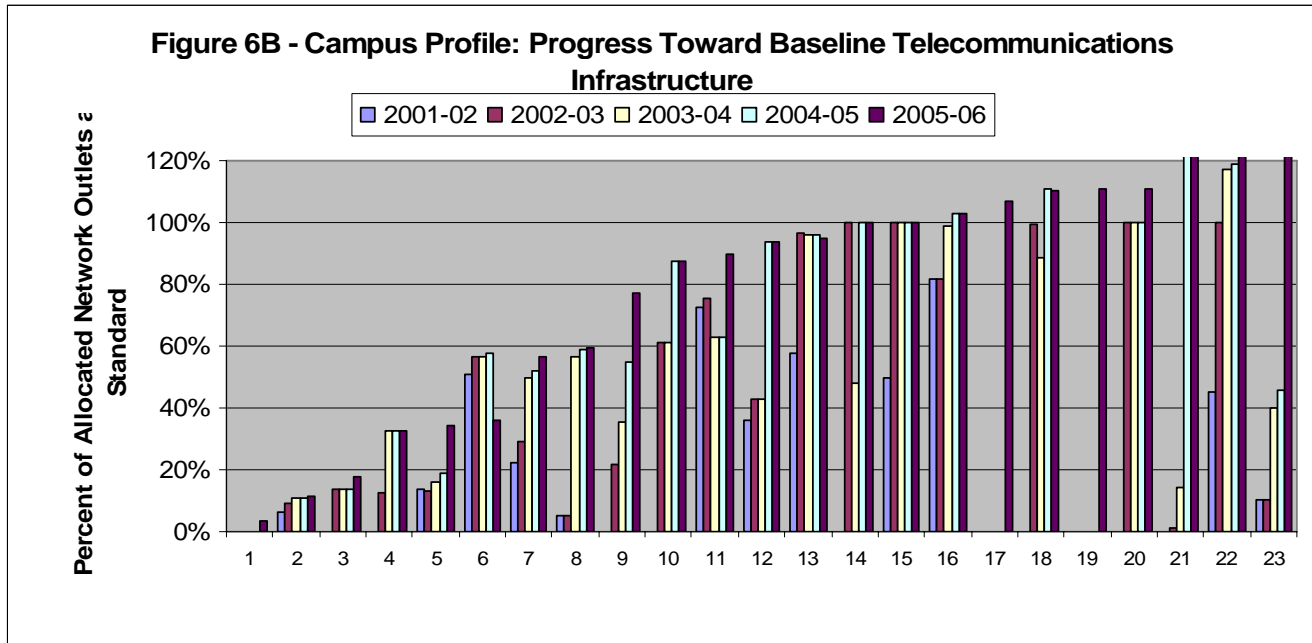
A common set of network performance specifications was adopted to ensure that each campus would have, at a minimum, a baseline telecommunications infrastructure capability adequate to meet the bandwidth demands of the present and near-term future. The progress made to date in upgrading the campus telecommunications networks is shown in Figures 6A and 6B.

Figure 6A depicts the progress campuses have made in upgrading physical communication pathways and media to provide reliable, high-speed network connectivity from the individual network outlet (faceplate) to the campus backbone network and from the campus network to the Internet. The columns represent the number of campuses on which the percentage of network outlets meeting CSU standards (see Appendix B) falls into the range shown at the base of the chart. For example, in FY 2001–02 (front row of columns), less than a quarter of the network outlets on 13 of the campuses were up to standard. (In fact, on 10 campuses, *none* of the outlets met these criteria!) Between one-quarter and one-half of the outlets on three campuses were at standard. On only one campus did the number of network outlets meeting baseline expectations exceed 75 percent. Between one-quarter and one-half of the outlets on three campuses were at standard. On only one campus did the number of network outlets meeting baseline expectations exceed 75 percent.



Improvements that have occurred over the five-year period since TII implementation began can be seen in the changes from the front row (2001–02) to the back row (2005-06). Variation in column height (i.e., the number of campuses at a given level of compliance) from left to right depicts the shift away from lower to higher percentages of outlets meeting baseline-level standards. As of June 30, 2006, 12 campuses were at baseline (i.e., 90 percent or higher), and three were above 75 percent of baseline. At the other extreme, the number of campuses with less than 25 percent of standards-compliant outlets fell from 15 to 3. Baseline telecommunications capability for the CSU system will have been achieved when a single column at a height of 23 appears in the rightmost column. Completion of all physical infrastructure projects is anticipated by early 2007.

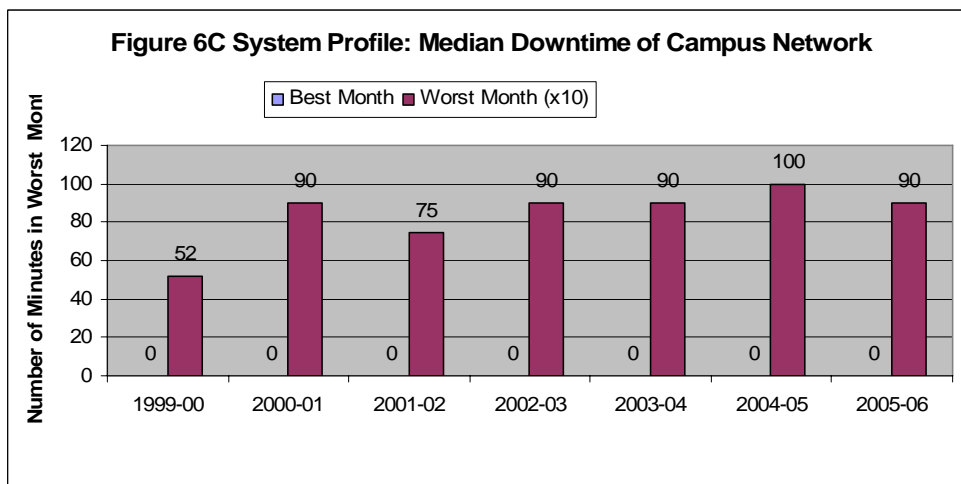
Figure 6B illustrates the progress toward baseline that has occurred on each campus over the past four years. The apparent regression indicated for campus 6 is a consequence of the campus decision to reclassify outlets installed prior to implementation of the TII as substandard pending official certification by the contractor. It is anticipated that the outlets in question will be found to comply with CSU standards. Four campuses have devoted local resources to upgrade their infrastructures beyond minimum baseline.



**Intra-Campus Network Performance**

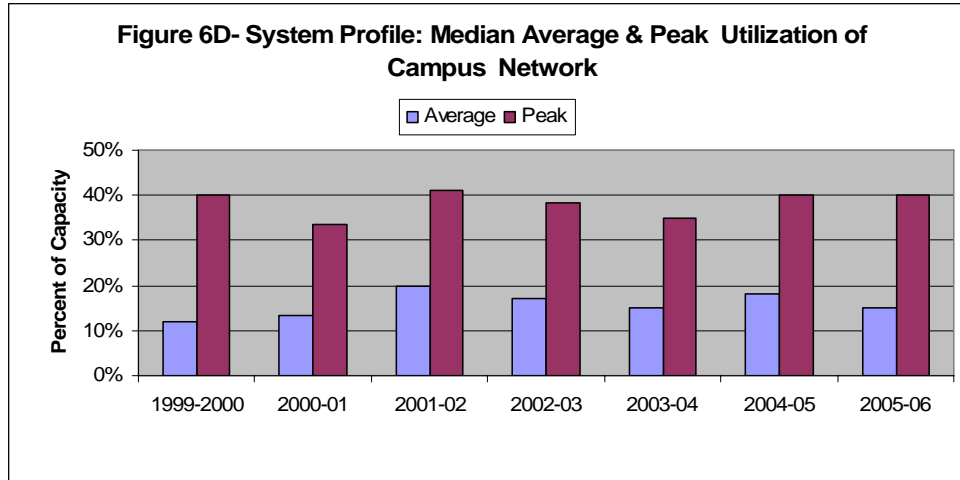
Two measures serve as indicators of campus network performance for this report: 1) the greatest number of minutes of *downtime* for a campus network in the best and worst months during the 12-month fiscal year; and 2) the average and the highest (peak) *utilization* of the campus network capacity expressed as a percentage of total bandwidth.

“Downtime” means that a user cannot send or receive information because of a problem in the network itself, not because of problems originating within the user’s desktop equipment or because of interruptions of service provided by local power and telephone utilities. The CSU collects year-to-year changes and customer satisfaction data. For all campuses in the system, the median “best-month” downtime has remained at zero minutes since Measures of Success reporting began in 1999–2000; median “worst-month” downtime has not exceeded 100 minutes (Figure 6C).



The percentage of available bandwidth utilized at peak and non-peak periods is another important measure of network capability. Generally, the lower the percentage of available bandwidth required to support network uses, the

better will be the performance of the network and the lower the risk of interruptions to network access.\* The increases in capacity and reliability associated with network improvements have had the positive effect of providing robust and reliable capability to handle rapidly growing network traffic (Figure 6D). Satisfaction with on-campus network connectivity has remained generally high (mean score above 7.5 on the zero-to-ten scale) for faculty, staff and students since systematic surveys began in 2000.



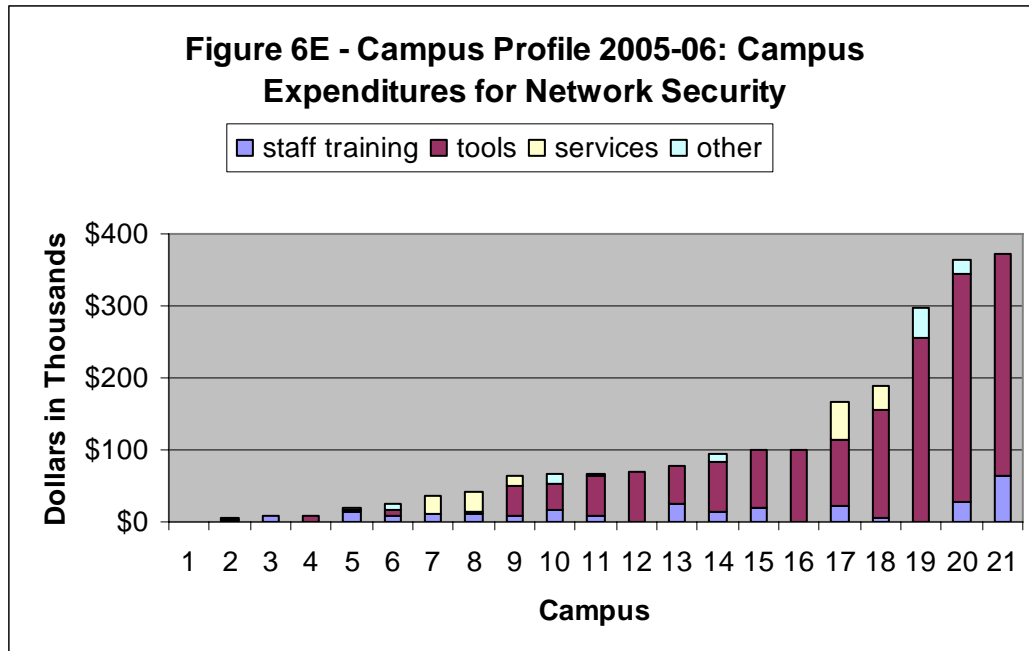
### Network Security and Business Continuity

As more and more university activities, both academic and administrative, are carried out using Internet or Web applications, issues of network security have assumed increasing attention. Major security breaches have occurred in recent years, most notably a criminal hacking incident, which potentially exposed personally identifiable information for over 200,000 individuals. Inadequate information security poses an onerous liability for the CSU that cannot be ignored.

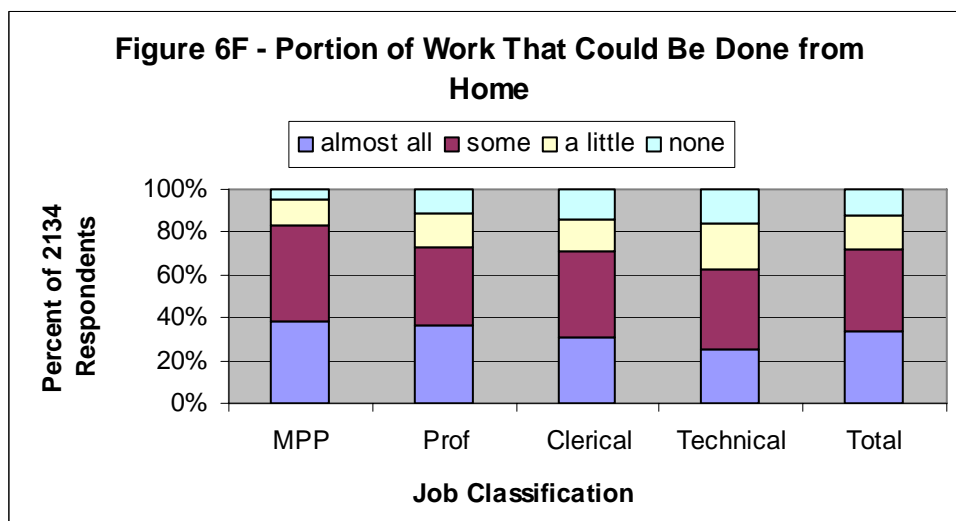
The 2005-06 technology survey included new questions about campus network security practices and support costs. The survey results confirm findings of a CSU funding gap study conducted in 2004-05. The study concluded that approximately \$6 million in additional annual funds are needed to provide core security services and support. To meet the security challenges facing the university, thirteen campuses have appointed information security officers and tasked them with coordinating and managing network security on their respective campuses. Staff positions dedicated to information security range from zero to four positions. The average number of staff positions to support information security is 1.6 for the 21 campuses reporting. Total spending for information security in 2005-06 by these campuses totaled over \$2 million. This represents an average per-campus-expenditure of \$103,291.

Figure 6E shows the total expenditures for information security reported by 21 campuses. Just over three-fourths of the system total of \$2 million went toward the purchase of security tools; i.e., hardware, software and middleware. Of the remaining one quarter, about half was paid for training staff in the use of the tools. The remainder covered the cost of special services and other related costs. The median campus expenditure for information security in 2005-06 was \$67,550. According to the 2006 national Campus Computing Survey, the CSU experienced more incidents of theft and data file attacks than comparison institutions and fewer virus and spyware infestations.

\* Individual campus methods for calculating these indicators may differ. Utilization rates are usually established by sampling network traffic on a specific day(s) and time(s) of the week associated with average usage patterns and with high usage patterns.



The same survey found that fully 91 percent of CSU institutions have completed a strategic plan for IT disaster recovery versus 74 percent for comparison institutions. The results of the staff 2006 survey make very clear that the World Wide Web is, in fact, a primary tool for communication and for carrying out work-related tasks. This has important ramifications for disaster recovery. More than nine out of ten survey respondents said that the department or office in which they worked maintained its own Web site. More than half use the Web daily; almost half use the departmental Website daily or almost daily. And use of the Web extends far beyond the physical workplace. Fully one-third of non-faculty employees said that they could do “almost all” of their work from home, including 30 percent of the clerical staff and 25 percent of the technical staff. Among all staff, three-fourths said they could do “almost all” or “some”. Only 12 percent said they could do “none” of their work away from campus, and significantly fewer MPP class employees said they could do none of their work at home (Figure 6F).



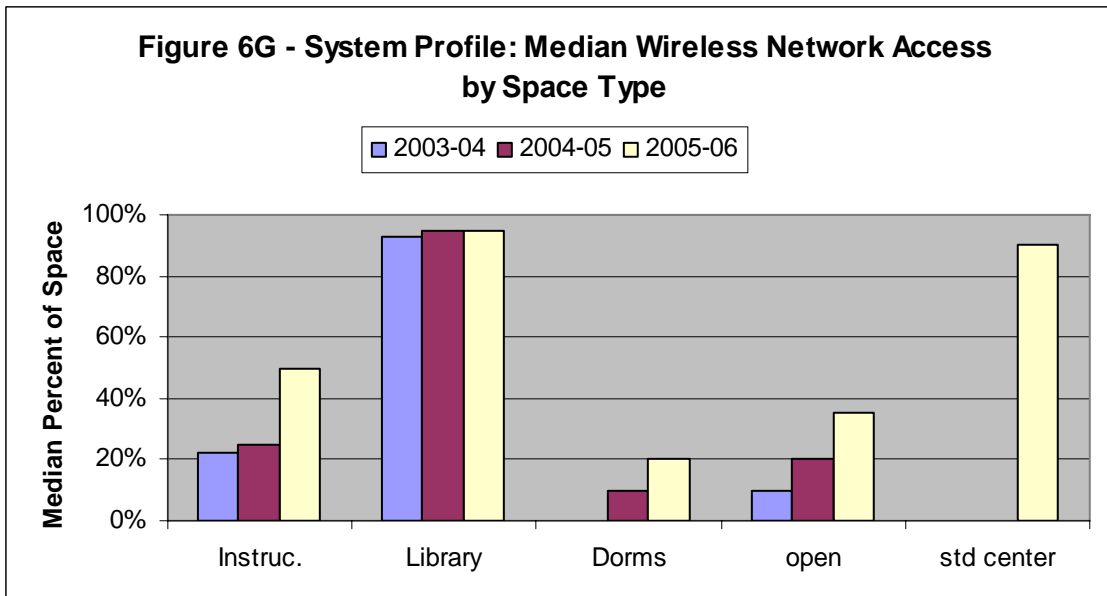
**Wireless Network Access**

The importance of providing wireless access to campus computing networks has increased dramatically in the six years since the *Measures of Success* report was initiated. In the spring 2005 technology survey, over a quarter of

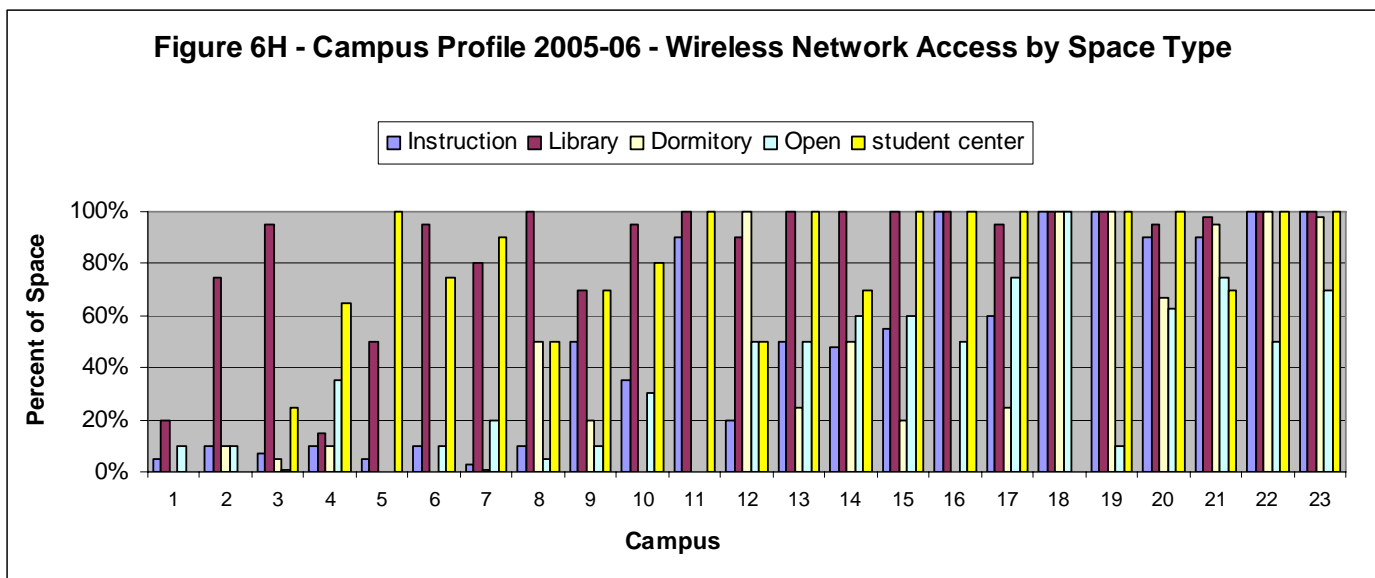
## MOS VIII: Information Technology Infrastructure Initiatives

CSU students said that they regularly accessed their campus networks via wireless connections. Tracking of faculty use of wireless connection to the network began in the 2004 MOS. Reported use grew from about 13 percent of the survey sample to almost half in 2006, a remarkable upsurge in the use of wireless technology. Staff use shows a similar pattern.

Figure 6G shows for the system as a whole the advances that have been made in the past two years in providing wireless connectivity from instructional sites, libraries, dormitories, and open spaces.



The current status of wireless access on CSU campuses is profiled in Figure 6H. Sixteen campuses report full or almost full availability of wireless connectivity in their libraries and ten campuses provide full wireless connectivity in student centers. Eight campuses provide wireless access to all or almost all classrooms and other instructional sites. Six campuses report wireless coverage for 95 percent or more of dormitory space.



The Campus Computing Survey showed that 78 percent of CSU campuses had a strategic plan for wireless networks versus 77 percent for comparison institutions nationally. The CSU appears to be lagging somewhat behind in wireless deployment compared to the 120 public master's 1 institutions participating in the Educause Core Data Services

## MOS VIII: Information Technology Infrastructure Initiatives

survey for 2006. About 40 percent of institutions nationally reported that three-fourths to one hundred percent of their classrooms and labs had wireless coverage, compared to 26 percent in the CSU. However, the CSU was comparable to national norms in the level of coverage for libraries.

As they have expanded, wireless access campuses have also upgraded network capability and security. Seventeen campuses have adopted security provisions for all wireless campus wireless networks, and about half of the campuses have migrated to the faster 802.11g wireless standard.

### Inter-Campus Network

Funding to maintain and improve the CSU inter-campus network is outside the scope of the Technology Infrastructure Initiative. However, because inter-campus and Internet connection are vital to achieving the outcomes of the ITS, and because campus network capacity and traffic directly impact the operations of intra-campus networks, pertinent information about the inter-campus network is included in *Measures of Success*.

Prior to the 2003–04 academic year, the CSU provided inter-campus network connectivity through the operation of its statewide educational network, 4CNet. This high-speed statewide backbone connected CSU campuses to one another and also supported connectivity among the campuses of the California Community Colleges and over 30 K–12 sites. In addition, 4CNet provided network services for five CSU off-campus centers, the office of Government Affairs, and the Chancellor's Office. Tables 13.2 and 13.3 in Appendix A summarize the network performance of 4CNet from the baseline year (2000–02) through 2002–03.

During 2003–04, 4CNet operations were phased out, and connectivity was acquired through membership in the Corporation for Education Network Initiatives in California (CENIC). The CENIC statewide backbone, known as CalREN (California Research and Education Network), provided CSU sites with reliable, high-capacity service since that transitional year. Network performance metrics and the mechanisms to monitor them put in place under 4CNet have been superseded by a global measure of non-availability of network connectivity to users. For purposes of this report, CENIC defines a service interruption or downtime as a period when computers on a campus are unable to send or receive data from sources external to the campus network. If some part of CalREN goes down, but because of redundancy the user experiences no downtime, it is not counted.

During the period July 2005 through June 2006, 37 service interruptions occurred. Twenty-four of the interruptions—totaling 120 hours—were attributable to outages on campuses, 16 caused by power losses. Only three of the campus-related interruptions were caused by CalREN hardware problems. Commercial carrier disruptions accounted for ten service interruptions totaling 29 hours. Three instances amounting to almost 20 hours occurred due to CalREN downtime unrelated to routine maintenance.

### Baseline Access, Training, and Support

The TII seeks to improve personal productivity by providing CSU faculty, staff and administrators, and students with a baseline quantity and quality of computing and network technologies, and with related training and support services. This section of *Measures of Success* tracks progress in providing end-user access to baseline technology resources and services in four areas: workstations (hardware and software); network connectivity; technical support; and technology training.

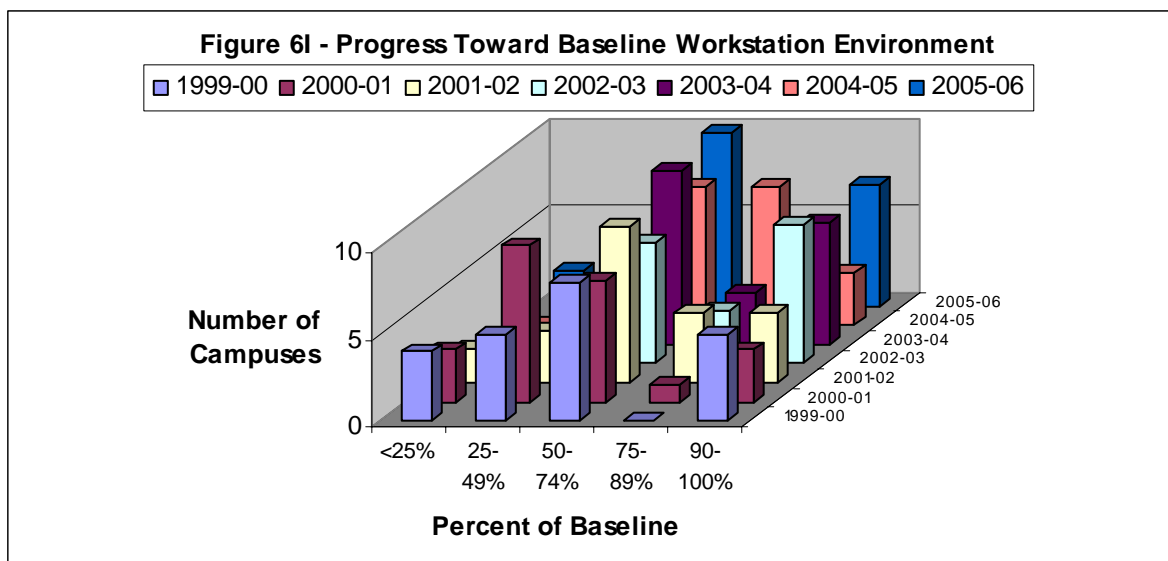
In the 2004 Campus Computing Survey, CSU campuses reported sharp decreases in spending from the previous year for hardware, software, network equipment, and training and support. The 2005 survey witnessed a dramatic turnaround for both CSU campuses and comparison institutions nationally. In 2006 the CSU is virtually identical to national norms in expenditures for IT as a percentage of total campus spending (5.8 percent versus 6.4 percent).

**Workstations**

**Access and Quality**

The indicator for hardware and software *access* (quantity) is the percentage of workstations assigned to each user group. Purchase date was selected as a surrogate measure for currency: hardware and software purchased within three years of the reporting period are deemed to meet CSU *quality* standards.

Figure 6I provides an overview of the progress campuses have made toward achieving the workstation environment described in the baseline infrastructure standards (see Appendix B). Improvements in access to computer hardware and software that meet ITS standards for currency are reflected in the greater number of campuses at baseline (90–100 percent, represented by the file of columns on the far right in the chart below) or near baseline (75–89 percent) in 2005-06 than in 1999–2000 (the baseline year). In that year, as illustrated in the first row of bars, four campuses reported that less than 25 percent of the workstations provided for the use of faculty, staff, and students met the baseline standards; five claimed to be between 25 and 49 percent compliant; eight between 50 and 74 percent; none between 75 and 89 percent; and only five campuses said that 90 percent or more of the workstations met currency standards. Over the years, workstation accessibility and quality have improved. As of 2005-2006 (the last row of bars) four campuses reported less than 50 percent of workstations below standards, and 9 campuses said three quarters or more of their workstations were at standard.



The profiles of individual campuses closely parallel the picture for the system as a whole. (See Tables 12.2–12.7 in Appendix A.) Typically, the number of workstations available to faculty, staff, and administrators equals or exceeds somewhat the total number of personnel owing in part to increasing demand of faculty and staff for laptops.

Workstation quality rather than accessibility accounts for the high number of campuses remaining in the range of 50 to 75 percent of baseline. Maintenance of workstation currency is a major challenge for campuses, particularly with respect to the computers and peripherals (referred to as “hardware”) used by faculty and staff. Although the ratio of price to computing power continues to fall, the rate at which this equipment becomes obsolete has remained constant. The same is generally true for software applications, although the updating or replacement costs are lower than for hardware. Campuses thus face the challenge of funding the replacement of computing hardware and software on a three- to four-year cycle. In any given year, therefore, the profile of workstation quality (i.e., the currency of hardware and software) across the system will vary depending on the availability of resources to “refresh” equipment and software.

Figure 6J displays the status of hardware quality for faculty and staff in 2005-06. (Almost all faculty and staff have access to a computer workstation.) Seven campuses met the baseline standard of 90 percent or higher of

workstations for both faculty and staff. On five campuses faculty workstations were at baseline, but fewer of those used by staff are current. On five campuses workstation quality falls far short of the ITS target environment.

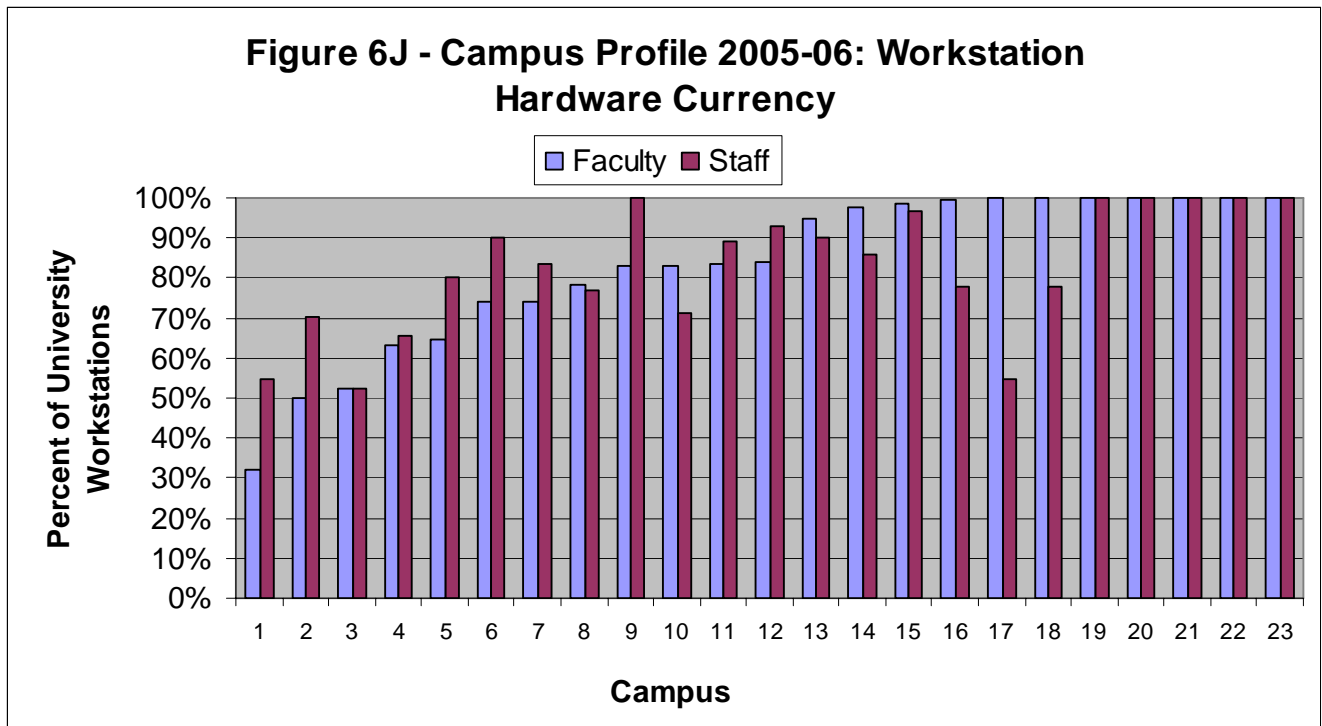
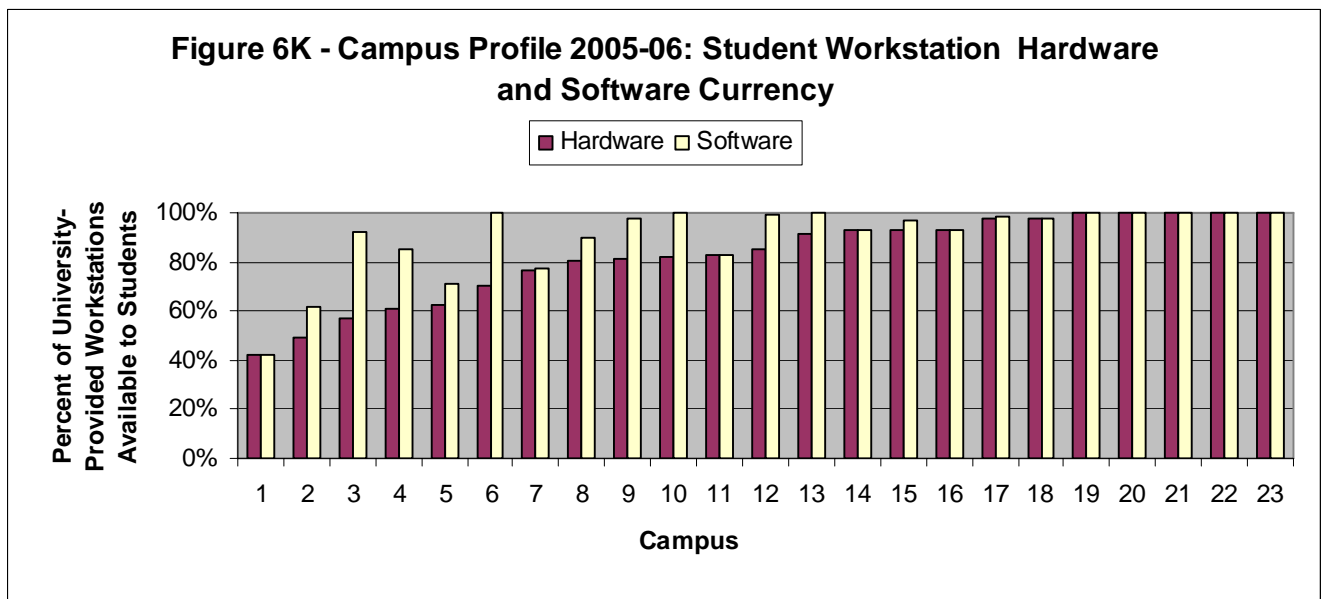


Figure 6K below shows that student workstation quality was at baseline level on about half of the campuses in 2005-06.



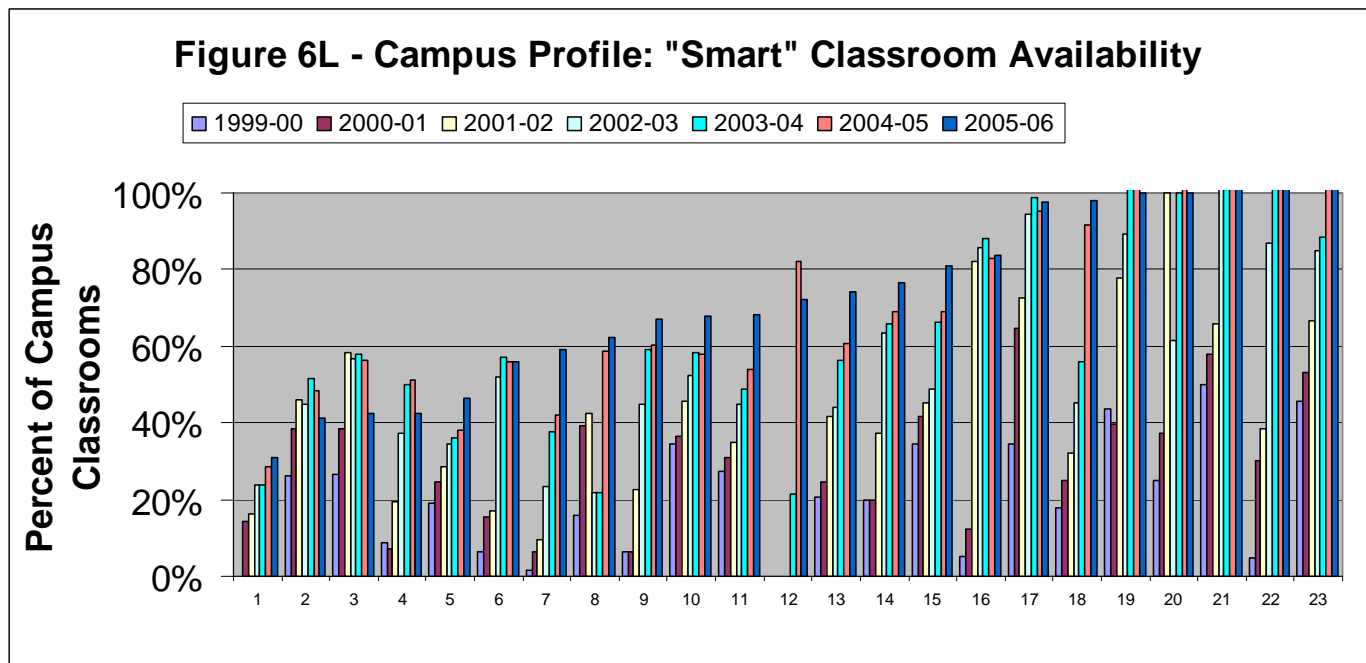
Faculty, staff and student have generally expressed a rather high level of satisfaction with the workstation hardware and software available to them. All three groups have given ratings between 7.5 and 8.5 on the zero-to-ten scale in surveys administered since 2000. These findings are reported in previous editions of *Measures of Success*.

A very large majority of CSU students are not dependent on the campuses they attend to provide access to a computer workstation. The 2003 student survey revealed that more than 9 out of 10 CSU students own operational computers, three-fourths of which are less than three years old. Roughly one-third owned a laptop computer, and almost half were equipped with wireless capability. Moreover, 80 percent of students in the spring 2005 survey reported having a broadband (cable or DSL) network connection from their homes, a dramatic increase from just over 50 percent who had high-speed access in 2001. These findings confirm that the intent of the CSU's policy on 24-hour student access to a computer and the network, adopted in 1995, has largely been achieved. (The policy documents can be viewed on the ITS Planning Documents website:

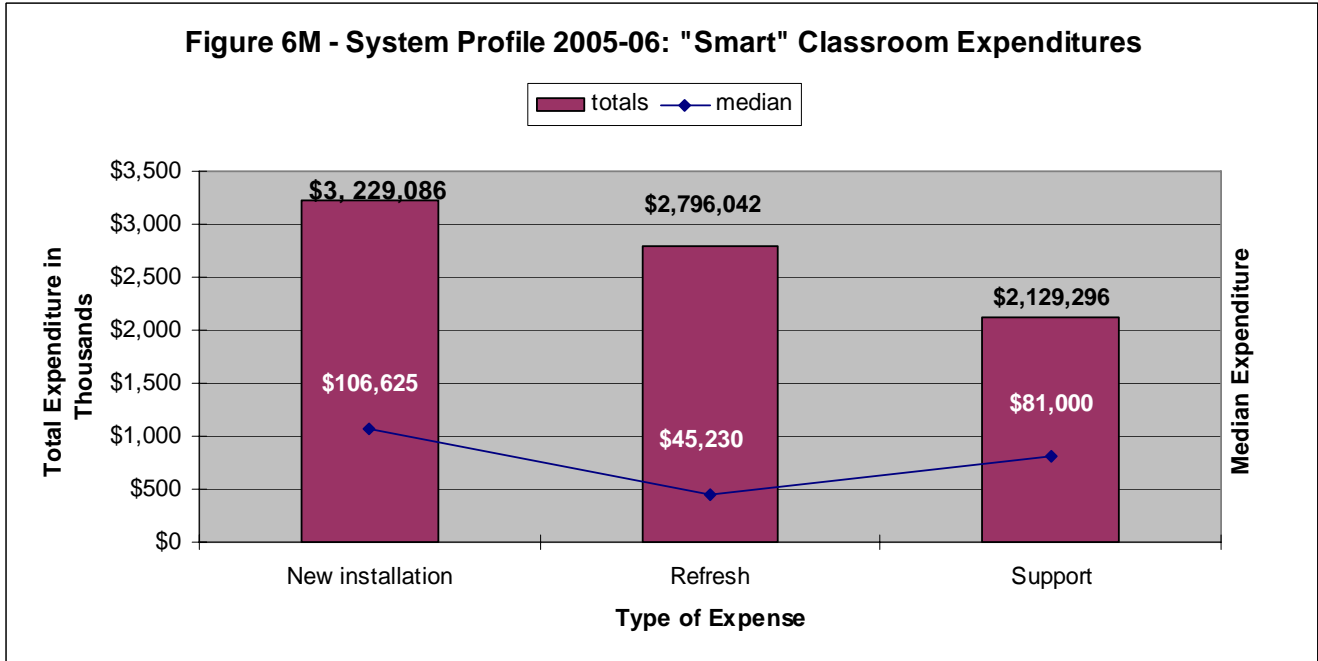
[http://its.calstate.edu/systemwide\\_it\\_resources/its\\_planning\\_documents.shtml](http://its.calstate.edu/systemwide_it_resources/its_planning_documents.shtml)

**“Smart” Classroom Access**

At the institutional level, availability of “smart” classrooms is one indicator of progress toward baseline attainment. Smart classrooms are instructional spaces permanently equipped with screen/monitor(s); projector; network connections to voice, video and data; and computer workstation(s) or provision for attachment of a laptop computer. The need to equip classrooms for instruction that employs network resources and multimedia presentations has grown with the increased availability of technology-mediated instructional materials and with greater reliance on Web-based learning activities. Figure 6L shows the increase in the number of smart classrooms that has occurred on CSU campuses in the six years since MOS reporting began. Over two-thirds of all classrooms in the CSU, as inventoried in the system Space and Facilities Data Base, are now equipped to support the use of multimedia instructional resources. All of the classrooms on five of the smaller campuses are smart; no campus reports that fewer than a quarter of its classrooms have such capability. Four campuses undergoing rapid expansion reported that more than 100 percent of their classrooms were smart, an anomaly attributable to delays in matching actual space use with space inventories.



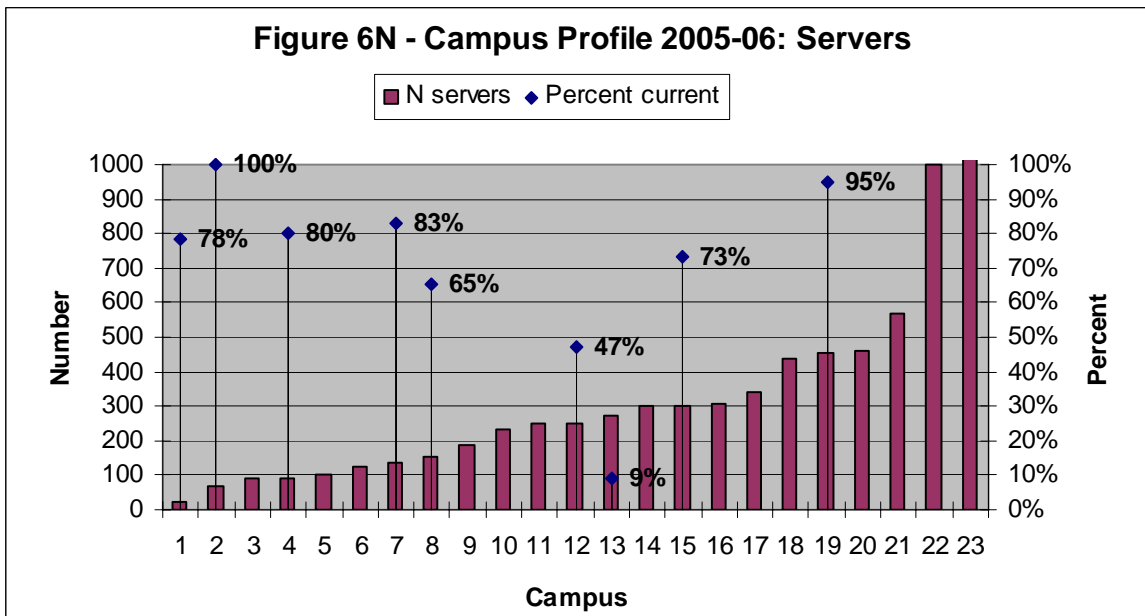
Smart classrooms stand at the intersection between online and traditional teaching and learning. Equipping and maintaining such classrooms was one of the most important unmet needs in the CSU funding gap study conducted in 2004-05. Construction, refresh cycles, and technical support needed to achieve baseline for smart classrooms ranked very high in unmet need costs, both one-time (\$9.4 million) and \$19.3 million annually. According information reported in the 2006 survey, campuses spent a combined total of \$8.1 million in 2005-06 to support the creation, updating and operation of “smart” classrooms (Figure 6M).



**Server Environment**

As noted above, applications of information technology have become essential tools in all core areas of university operations (academic programs, administration and student services). The new burden this has placed on universities to make access to information in these systems secure has been noted. Providing adequate and secure data storage and access poses a companion burden. Much of the data generated in the divisions and departments of the university is stored and/or secured on servers, rather than on mainframe systems. The cost of acquiring, updating and operating servers was identified as a significant IT funding issue in the 2005-06 funding gap study.

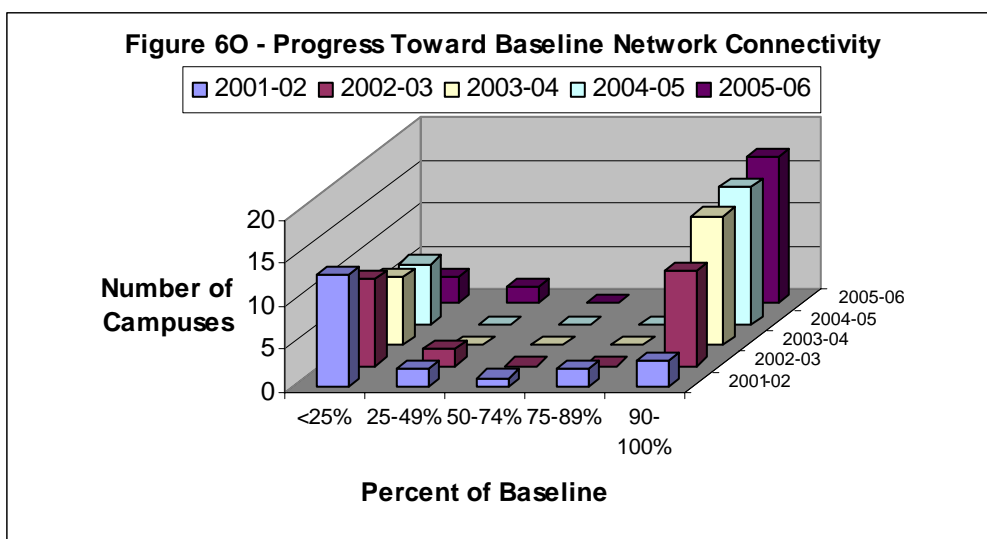
There are about 7,500 servers on CSU campuses, many of which are near the end of serviceability. Figure 6N provides an overview of campus servers. Nine campuses have adopted currency standards, usually three years, for servers. The percent of the servers meeting these standards is shown for each of these nine campuses. In 2006, CSU submitted a Budget Change Proposal for one-time funds to address server refresh systemwide.



**Workstation Network Connectivity**

The baseline workstation standards established in the ITS call for network connectivity capable of supporting full-motion video (a minimum speed of 100 to 150 Mbps). Such high bandwidth enables multimedia applications routinely used in science, visual arts, and music instruction; it also meets the high data transmission demands required for the operation of administrative information systems.

Figure 6O illustrates the dramatic progress that has been achieved in providing CSU students, faculty, and staff with network connectivity at a level consistent with current and anticipated technological demands. In 2001–02, only three campuses were able to provide connectivity at the standard defined in the CSU baseline technology infrastructure standards (see Appendix B). By the end of 2005-06, 17 campuses were doing so, a gain attributable largely to the campus backbone network improvements funded through the TII. By the end of June 2006, only six campuses—those that have not completed or not yet begun implementation of their telecommunications infrastructure—report workstation network connectivity below baseline standards.



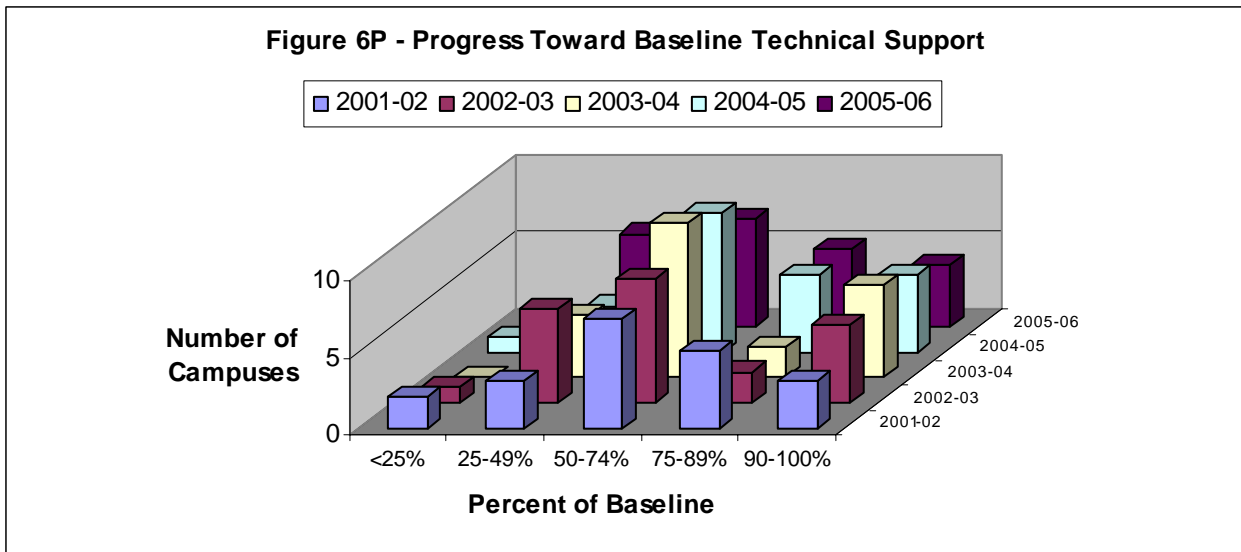
Satisfaction with on-campus network connectivity has remained generally high (mean score above 7.5 on the zero-to-ten scale) for faculty, staff and students since systematic surveying began in 2000. Findings from the biennial student survey are reported in the November 2005 *Measures of Success*. Patterns of network access, use and satisfaction were so stable for all three user groups that the decision was made to eliminate questions about on-campus network use in the 2006 and 2007 surveys. Questions about wireless and remote access, however, were retained. The appended executive summaries of the faculty and the staff technologies provide detailed summaries of responses to these questions. Generally speaking, use of wireless networks is increasing as access to them becomes available. Remote access of campus networks continues to rise as broadband connectivity becomes ubiquitous. (Well over eighty percent of faculty and staff now report that they have a broadband connection to their homes.) Not surprisingly, satisfaction ratings have also gone up for wireless and remote access. Curiously, staff satisfaction with campus email service continues to decline, from a mean score high of almost nine (on the zero-to-ten scale) in 2002 to just below eight in 2006.

**Technical Support**

Technical support is an essential component of the ITS baseline information technology infrastructure. Gains in quality and efficiency cannot be expected from the acquisition of new technologies if people cannot use them effectively. Although no dedicated funding sources for this purpose exist, all campuses provide at least basic technical support to user communities for university-provided equipment and software.

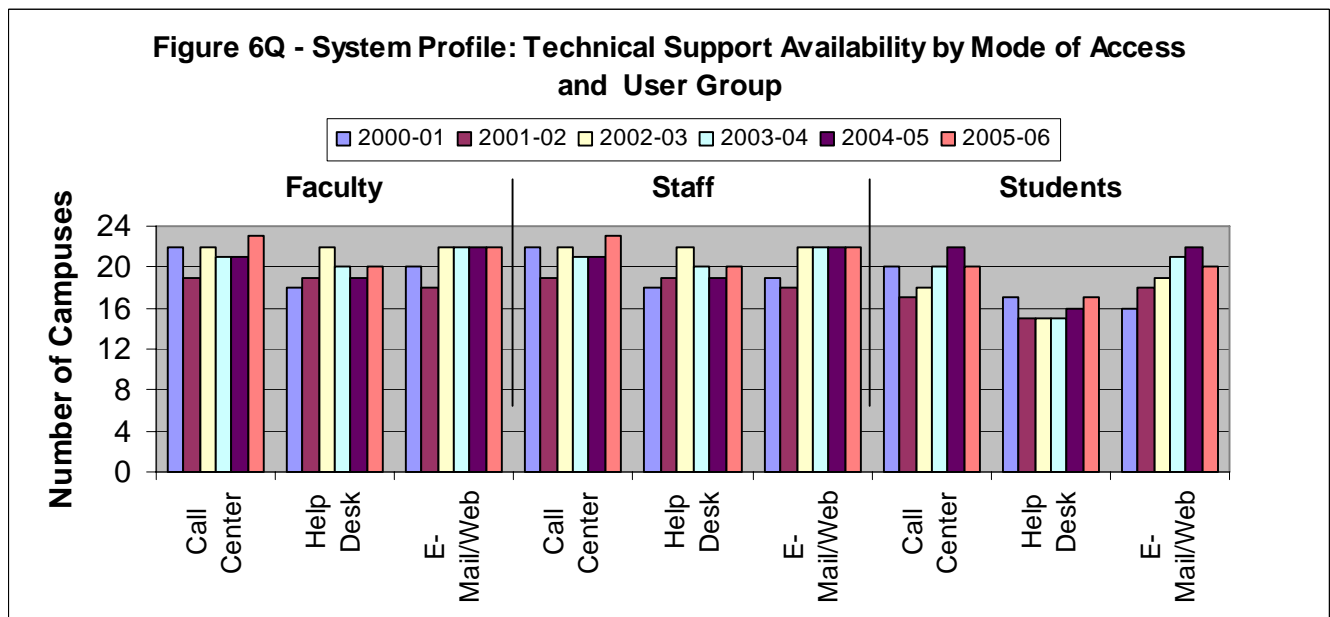
Figure 6P profiles progress toward baseline technical support for all user groups since 2001–02. The general uplift of the columns from left to right and from front to back mirrors the growth in availability of support services over the past

three years. Whereas in 2001–02 the number of campuses able to provide technical support at the baseline level resembled the classic bell curve, the distribution pattern since 2003–04 is clearly skewed toward the upper range. There was, however, mild regression in 2005-06 compared with the previous year.



**Access**

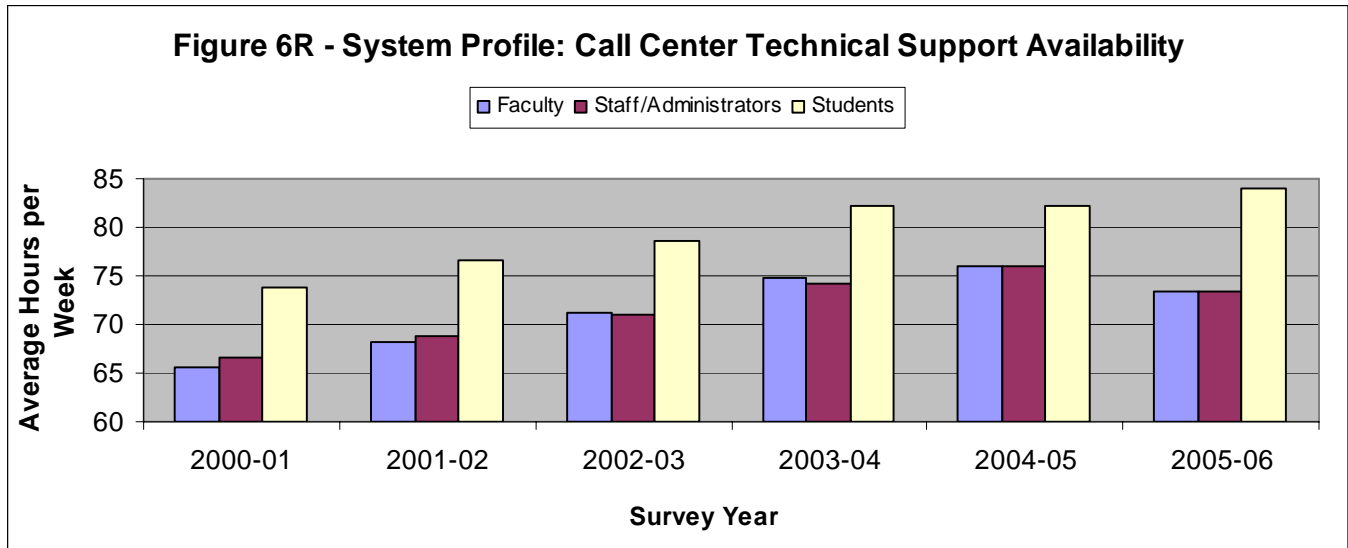
On most campuses, faculty, staff/administrators, and students have a choice in the way they request help. Figure 6Q depicts the options available to each principal user group over the past five years. These include telephoning a central campus call center, visiting a central or a divisional help desk, or using e-mail/Web.



In addition to the modes or sources of assistance listed above, students often receive help from staff in computer laboratories or the library. Faculty, staff, and administrators on some campuses can receive support from technicians in their own divisions or departments.

Call centers are a widely available means of dealing with computing and network problems. There has been a steady increase in the average hours per week that call-center help is available to faculty, staff/administrators, and students

(Figure 6R). No campus reports providing less than 40 hours per week of access to call-center support for all user groups. Two campuses make call center support accessible 24/7.



### Quality of Service

In 2001–02, metrics for gauging the quality of support services were incorporated into *Measures of Success*. These metrics are a set of institutional policies and practices that, when adhered to in total, suggest the campus is providing support services of the quality envisioned in the Integrated Technology Strategy.\* Baseline capability in the area of end-user technical support is attained when a campus meets all five policy/practice standards for all three user groups.

Figure 6S profiles the progress campuses have made toward meeting quality-of-service goals for the three user groups in the area of technical support. For the first time since adopting the quality-of-service metrics in 2001, three campuses have achieved full baseline expectations.

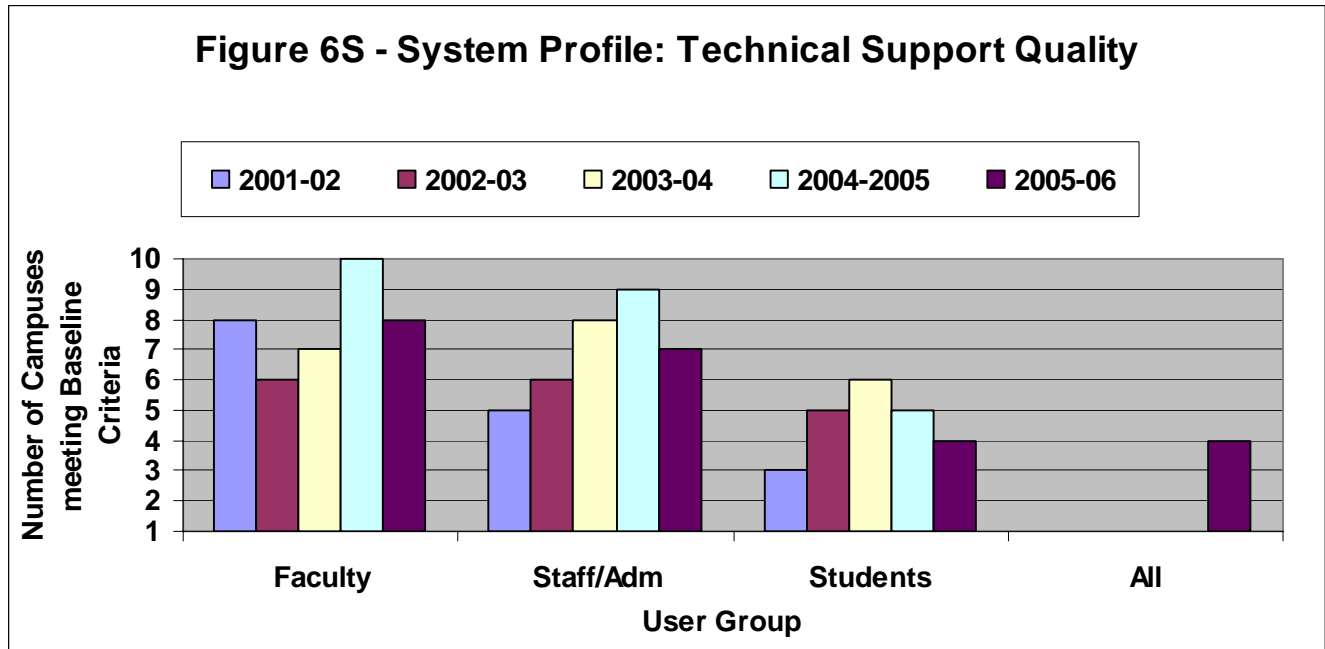
\* The five support standards are:

The campus has policy or guidelines defining the kind and level of end-user technical support to which members of each user group are entitled. The campus has, and periodically employs, a mechanism for assessing the baseline technical support needs of faculty, staff/administrators, and students.

The campus communicates effectively to members of each user group comprehensive information about the technical support services available to them.

The campus has, and periodically employs, a mechanism for measuring the satisfaction of user group members with the technical support they receive from the campus.

The campus tracks the use of technical support services by members of each user group.

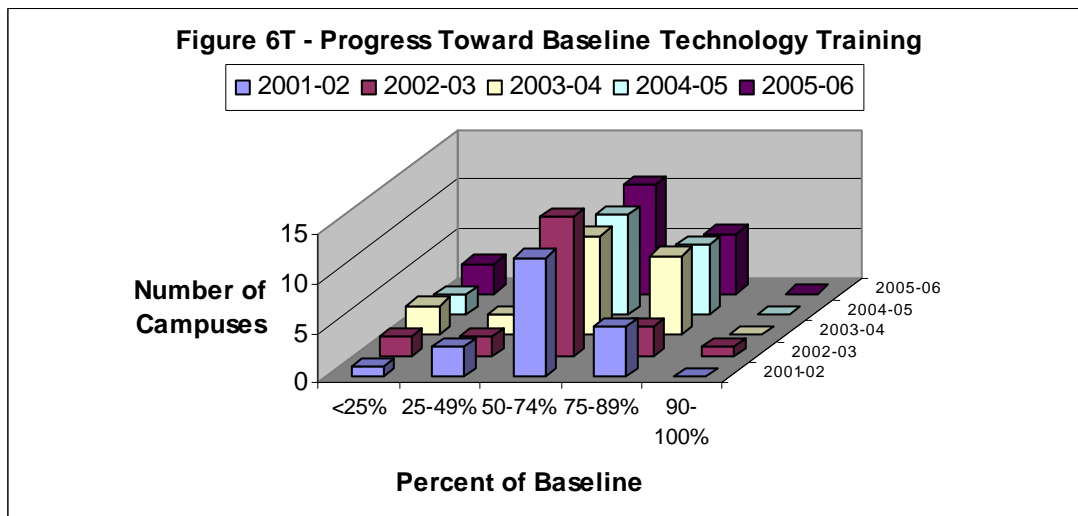


In all four of the surveys conducted since 2000, a strong majority of faculty and staff report having access to technical support for resolving problems with university-provided computers or software and express a rather high level of satisfaction with the support they have received. Detailed summaries of these survey results are presented in the appended reports.

### Technology Training

Availability of end-user training in the use of computer workstations, common personal productivity software, and basic network applications is an integral component of the ITS baseline technology infrastructure. Included in the scope of the initiative is training to upgrade and maintain the knowledge and skills currency needed by the information technology staff who support end users.

There has been essentially no progress since 2001-02 in terms of meeting baseline expectations for training (Figure 6T). Training opportunities offered to faculty, staff and students have fluctuated modestly from year to year on individual campuses, as have participation and support levels, depending on the fluctuation of training needs and resource availability.



**Access**

Figure 6U shows that there has been only modest change in the training opportunities campuses have made available to all user groups since 2000-01.

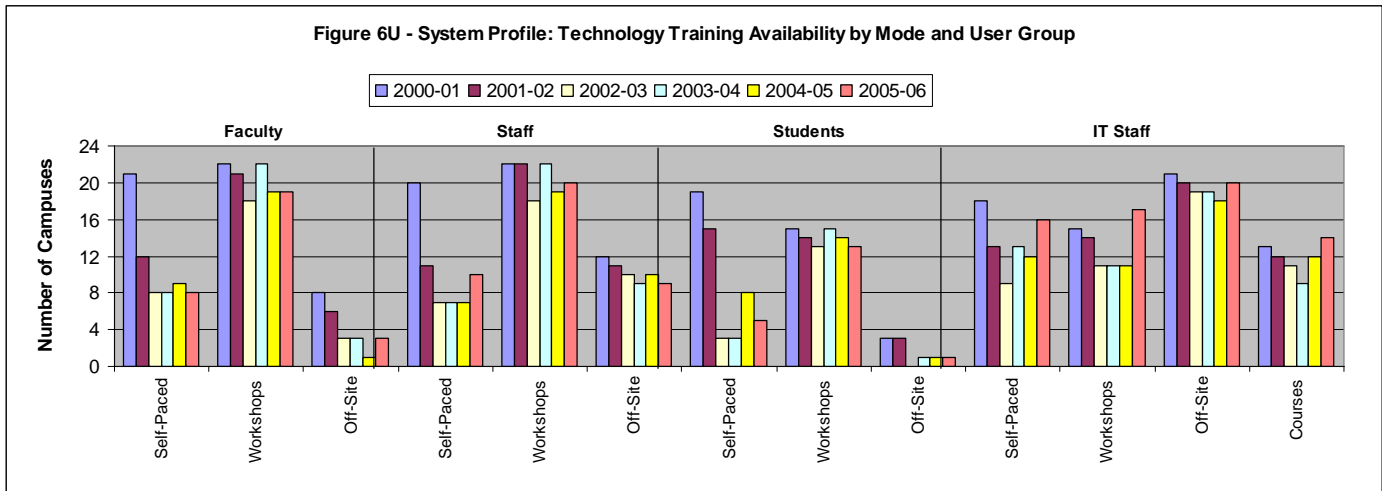
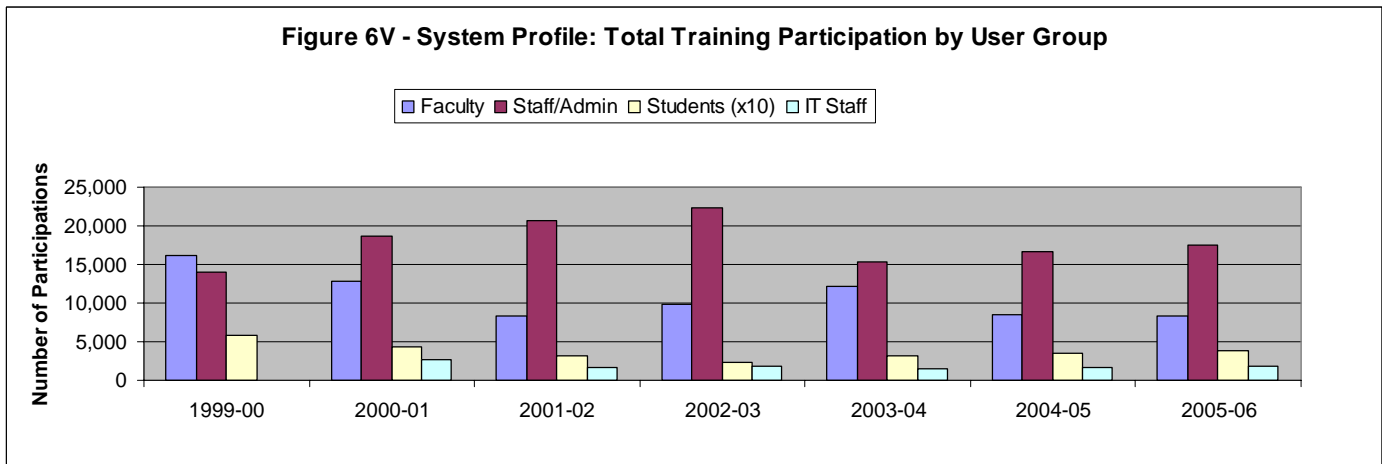


Figure 6V traces changes in participation in technology training activities by members of the three user groups and IT staff over the past six years. (The number of participations does not equate to the number of participants since individuals may engage in multiple activities.) Demand for technology training varies based on the changing needs of each constituency group, and on campuses' ability to provide support. In 2005-06, training to use learning management system applications accounted on average for 34 percent of funds budgeted for faculty training, 10 percent of IT staff training support, and just under five percent of the funds used for student training. Training on CMS/PeopleSoft applications absorbed an average 55 percent of resources for staff training, and one-third of the training budget for IT professionals.



Campuses support technology training in two principal ways: through the allocation of personnel positions and through the direct purchase of materials and services. In 2005-06, average campus spending to provide training increased modestly for all three user groups and for IT staff following three successive years of decline. Personnel positions assigned to support training also rose slightly, continuing the upward trend of the previous year.

Figure 6W summarizes the changes in direct support and personnel positions described above. The bar graphs trace total annual training expenditures for all campuses; system average expenditures appear as lines. Note that the actual dollar amounts in Figure 6W have been adjusted for purposes of display: total expenditures are 1,000 times the values on the chart; average expenditures are 10 times the graphed values.

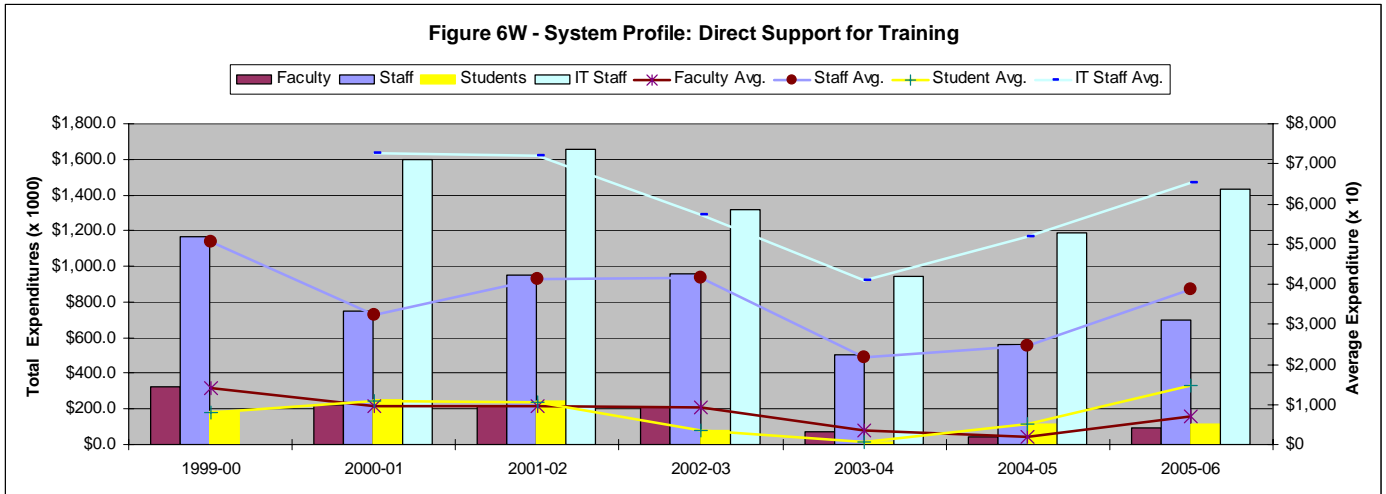
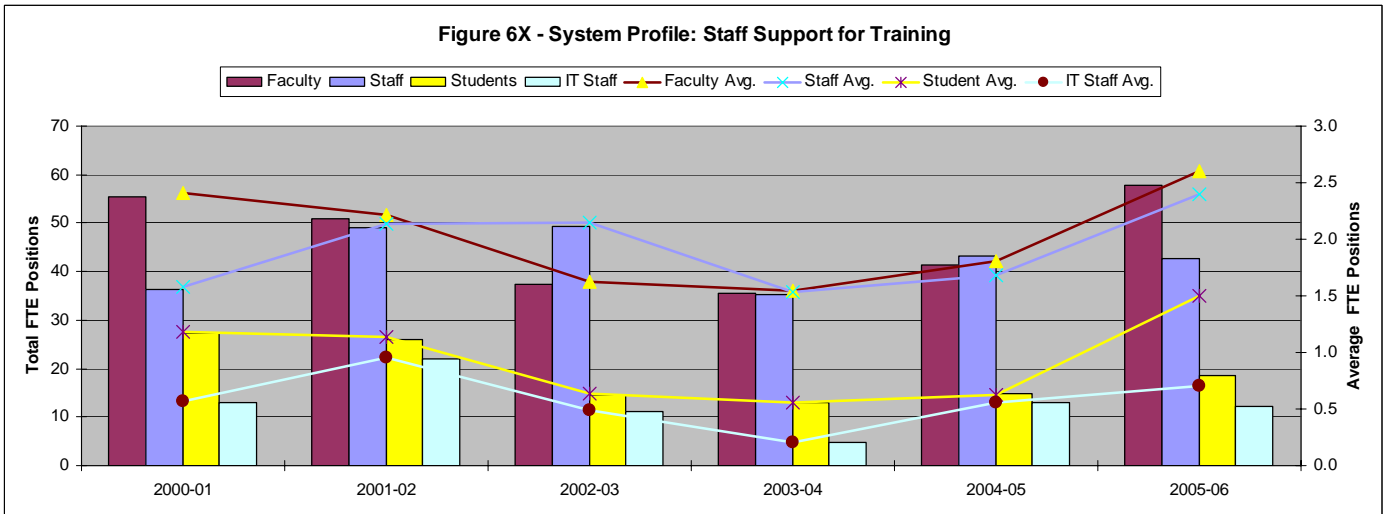


Figure 6X outlines changes in the level of staff support for training. The bar graphs show the total number of full-time equivalency positions allocated to support training for each constituency. The lines show the average allocations.



Disparities among campuses are greater in the area of training than in any other component of the technology infrastructure. Large differences exist between the kinds and quantity of training opportunities available to members of the principal user groups on individual campuses and between like user groups across campuses.

### Quality of Service

In 2001–02, metrics for gauging the quality of technology training were incorporated into *Measures of Success*. These metrics are a set of institutional policies and practices that, when adhered to in total, suggest the campus is providing end-user training services of the quality envisioned in the Integrated Technology Strategy. \* Baseline capability in end-user training is attained when a campus meets all five policy/practice standards for all groups.

\* The five training standards are:

The campus has policy or guidelines defining “baseline” end-user technology training for faculty, staff/administrators, students, and IT professionals who provide end-user technical support.

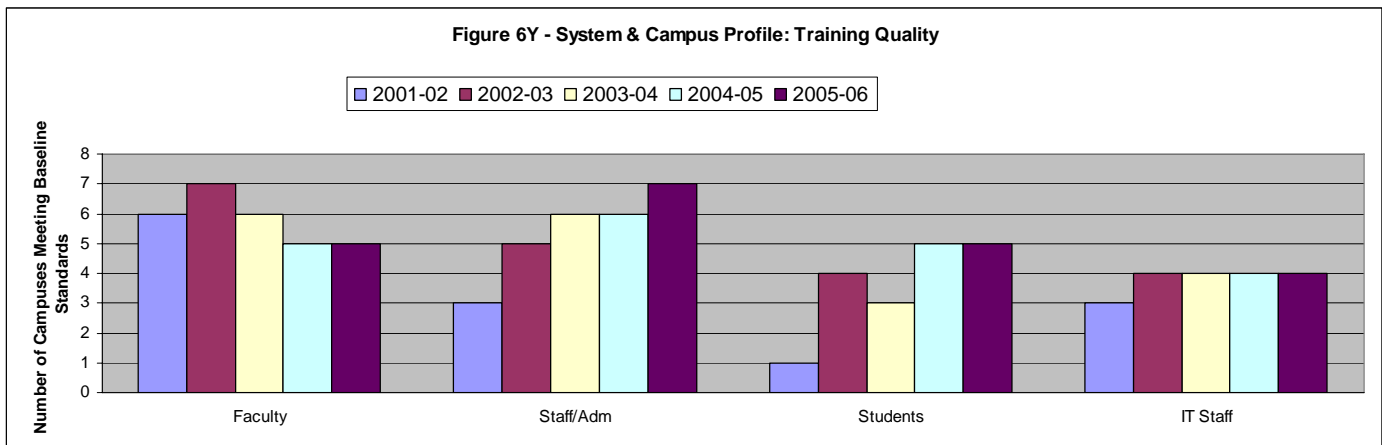
The campus has, and periodically employs, a mechanism for assessing the baseline technology training needs for each user group.

The campus communicates effectively to members of each user group comprehensive information about technology training opportunities available to them.

The campus has, and periodically employs, a mechanism for measuring user satisfaction with the baseline technology training programs and activities provided by the campus.

The campus tracks participation by members of each user group in baseline technology training programs and activities.

Figure 6Y depicts the status of campus progress toward meeting the quality-of-service goals for faculty, students, and IT staff.



In surveys administered biennially since 2000 both faculty and students gave high ratings to the importance of campus-based training programs (mean rating above 8.00 on the zero-to-ten scale). The few students who actually did participate in training activities (between 10 to 15 percent) expressed high satisfaction with the experience. A majority of faculty said they had used training resources or attended training workshops.

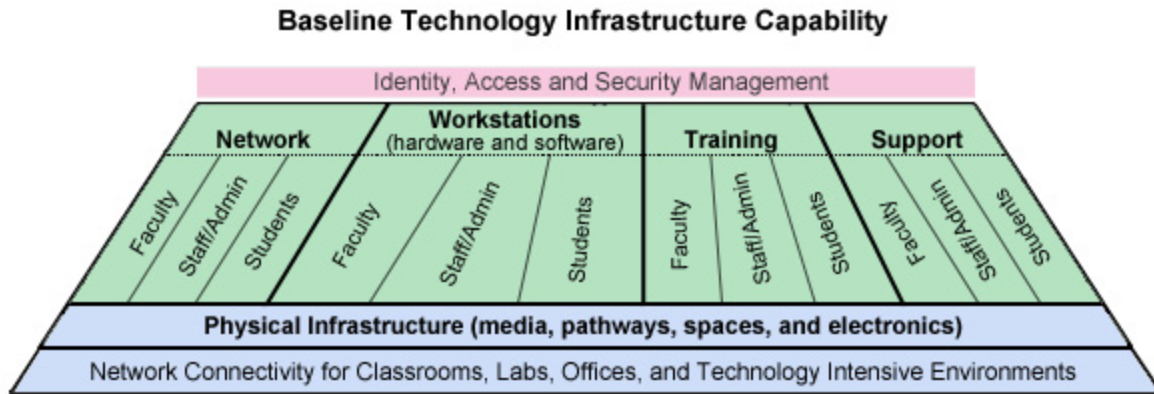
Staff and administrators said training was “very important” in both the 2004 and 2006 surveys (mean scores above 9.0 on the zero-to-ten scale). Satisfaction ratings for training in which staff participated was quite positive with mean score ratings at or above 7.60 in the last three surveys. As noted above, training to use CMS/PeopleSoft applications was a major focus of attention on many CSU campuses in 2005-06. Systemwide, the average amount of training was fifteen and one half hours per person. About four out of ten survey respondents said they had participated in formal training of some kind. Almost as many (some of whom may have also participated in formal training) said they had received informal help, often from a colleague. They rated the usefulness of formal training quite high (mean score 7.28), but found the informal help even more useful (mean score 8.11). See the appended summary of the 2006 staff technology survey provides more detailed information.

**Institutional Progress Toward Baseline Capability**

**Baseline Information Technology Infrastructure**

The baseline technology infrastructure is the prerequisite for achieving all of the outcomes of the ITS. The system’s overall progress in achieving that baseline on each campus is, therefore, an important benchmark for measuring success.

The essential components of the baseline technology infrastructure are the physical telecommunications infrastructure (pathways, spaces, media, outlets, and network electronics), workstations (hardware and software), network access, training, and support, *all* of which must meet established baseline standards for access and quality. These components are represented by bolded sections in the base of the following ITS pyramid. (Pictured in full on page two of the Introduction.)

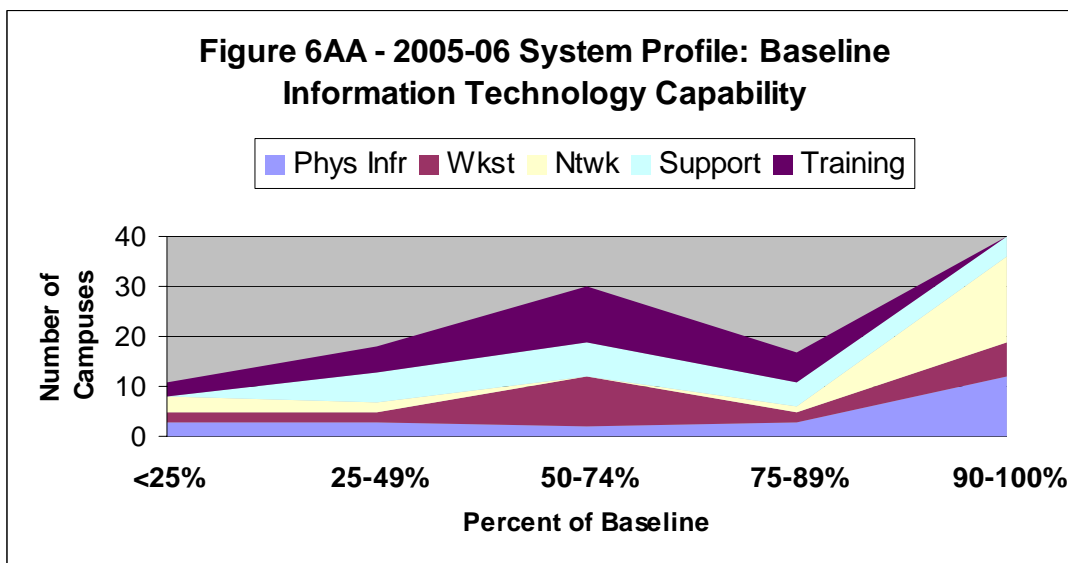
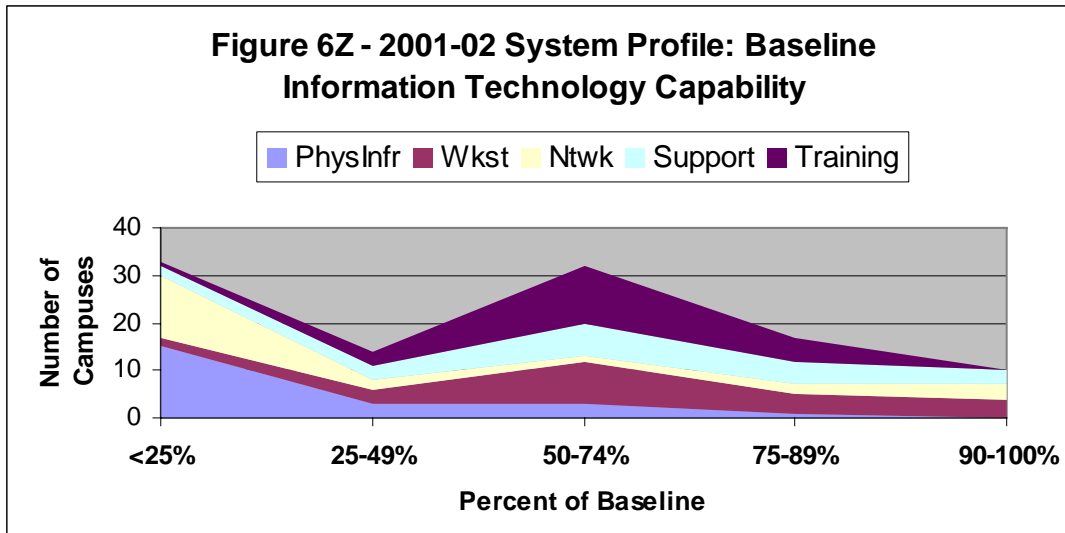


For purposes of conveying an overall sense of the progress the CSU is making toward baseline, *Measures of Success* has adopted a model based on the percentage of standards achieved on each campus in each of the five infrastructure components. For each component, “baseline capability” is defined as meeting standards at the level of 90 percent or higher. Progress toward baseline capability from 2001 to 2006 is illustrated by a comparison of two charts: the first, Figure 6Z, representing the status of the system with respect to baseline capability in 2001-02; the second, Figure 6AA showing the status in 2005-06.

These figures portray the overall progress that has been made toward providing all CSU campuses with the baseline IT infrastructure envisioned in the ITS. Information presented above in the three-dimensional bar graphs for each component is combined in the charts below. The percentage range (x-axis) represents the level of capability as measured by the baseline metrics for the respective infrastructure components. The width of each band depicts the number of campuses at the respective level. Figure 6U, for example, shows that on 15 campuses the physical infrastructure was at 25 percent or less of baseline standards and no campus was at baseline. Only two campuses were at the 25 percent or lower level with respect to the standards for workstation access and quality, while four had achieved the target environment. Since the status of all 23 campuses is tracked for each of the five components, the total “number of campuses” (y-axis) is, therefore, 23 x 5 or 115.

Figures 6Z and 6AA profile the status of the five technology infrastructure components as of FY 2001–02 and 2000–06. It is strikingly apparent at a glance that the situation with respect to the telecommunications infrastructure and network connectivity in 2005-06 is the mirror image of the situation five years earlier. In 2001-02, no campus met the standards for the campus physical telecommunications infrastructure, and only three campuses had baseline network connectivity. In 2005-06, the telecommunications infrastructures on 12 campuses met or exceeded baseline capability, and 17 campuses were at or above baseline for high speed network connectivity. In contrast to the dramatic improvement in these two components, there has been essentially no improvement in workstation environment, technical support and training, all of which have remained at approximately the same levels over the entire period.

The lack of progress in the workstation environment is a function of both the pace of technological change and fiscal constraints. There has historically been no designated funding source for technology training and support. The Technology Steering Committee of the CSU Executive Council and the campus Chief Information Officers (CIOs) are aware of this situation and are working to develop alternative funding mechanisms for both problems.



The system will have achieved a baseline technology infrastructure when all 23 campuses have reached 90–100 percent capability in all five TII components (23x5 = 115).