

ACADEMIC INITIATIVES

A major intended outcome of the Integrated Technology Strategy (ITS) is to facilitate the use of information technology in the service of Excellence in Learning and Teaching. Of the original 11 ITS initiatives, four focus directly on the creation, collection, and distribution of technology-mediated instructional resources for use in on-campus and off-campus education. In the “first wave” of initiatives, priority for funding was given to projects thought to have a) the greatest immediate benefit to instructional programs, b) the highest likelihood of engaging CSU faculty to work collaboratively, and c) the strongest potential for demonstrating the cost-effectiveness of using advanced networking technologies to help contain growth in costs associated with expanding enrollments. The four academic initiatives are Library Resource Sharing, Multimedia Repository, Distributed Learning and Teaching, and Campus Centers for Instructional Technology Development.

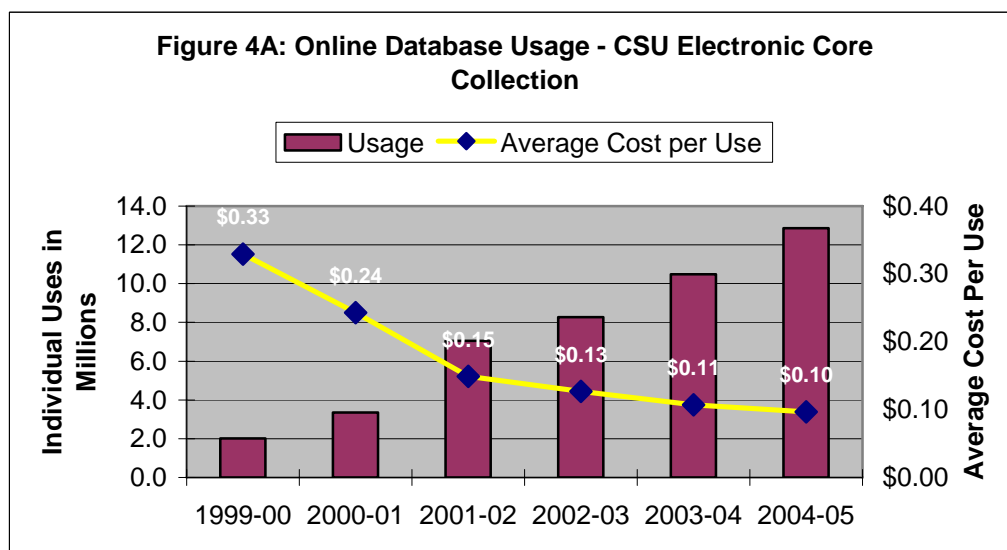
Library Resource Sharing

The upward spiral in the cost of books and periodicals had been a drain on campus resources and a threat to academic program quality maintenance for years prior to the campus presidents’ decision to adopt the CSU Integrated Technology Strategy. The theoretical benefits of distributing the purchase of books among campuses and sharing them via interlibrary loan were offset by unacceptable time delays and rising costs of handling remote borrowing requests. Moreover, students and faculty increasingly prefer electronic access to publications and data sources over print materials. The decision was made to address this common problem by exploiting emerging network technologies and cooperative resource acquisition.

Cooperative Library Resource Acquisition and Sharing

The Electronic Core Collection (ECC) serves to organize interest in collaborative acquisition of library resources. The ECC is a collection of online bibliographic and full-text information resources selected to support the common core curricula. Core curricula are defined as those offered by at least two-thirds of the 23 CSU campuses. The suite of major full-text products includes over 13,000 journals, the database collection provides access to the most heavily used resources in the social sciences, business, and economics.

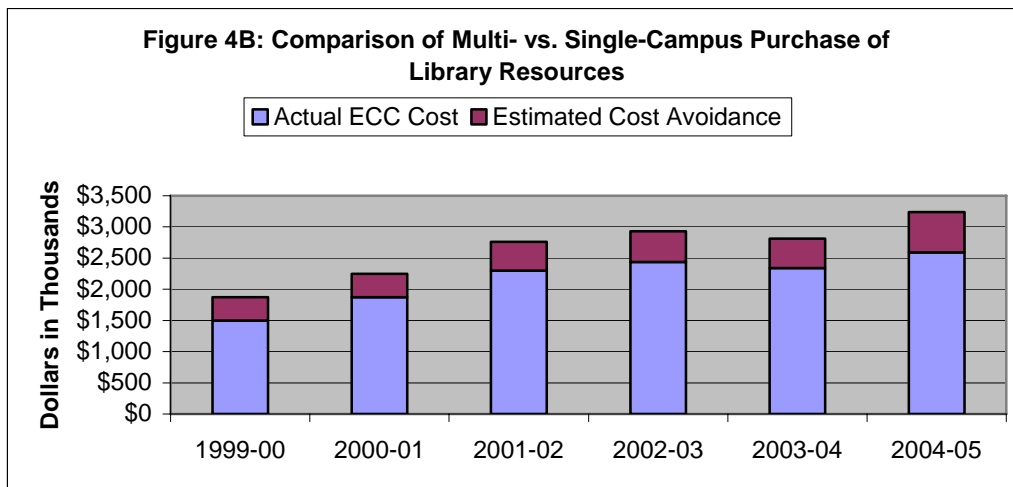
Figure 4A illustrates the benefits to CSU students and to CSU campuses that have been achieved through the collaborative purchase of electronic information resources. The dramatic growth of this program is due mainly to the rapid development of the Internet as a vehicle for content delivery and an access point for information, and to the dual economic pressures of tight library budgets and rising prices of information resources. Since the FY 1999-2000 report, the cost per usage for the ECC databases examined in this study has declined overall by more than half.



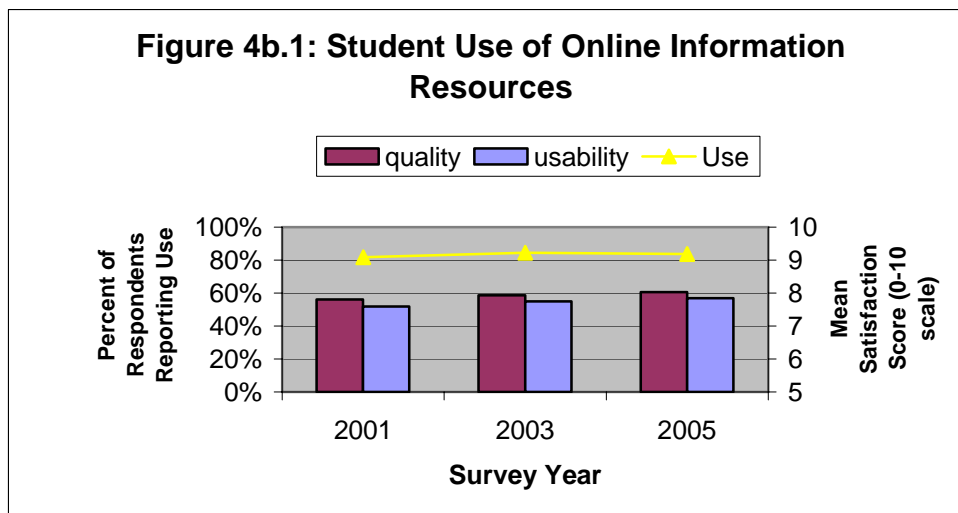
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Several factors account for the growth in usage. These include removal of physical constraints (e.g., library opening hours, client location), increased availability of library materials brought about through “anytime, anywhere” electronic access, ease of use and enhanced search capabilities, increased awareness that such resources exist, and successful training of patrons by library staff. The margin of use continues to outpace the rate of cost increase for core electronic resources. Total usage of resources available through the Electronic Core Collection rose 22.4 percent in FY 2004–2005 while cost increases grew by 10.8 percent over the previous year. The suite of business resources was expanded to include specialty content such as business images and graphs, as well as dissertations.

Figure 4B shows the total actual costs of the ECC and the cost avoidance achieved through collaborative purchasing (i.e., the difference between what campuses actually paid and what they would have paid had they purchased the resources separately). The amount of annual cost avoidance has remained stable at between one-third and one-half million dollars annually. For FY 2004–2005, the cost avoidance attributable to the ECC program is estimated to be slightly higher, just under \$650,000.



High volume use of electronic library resources is confirmed by the responses of faculty and students in surveys conducted since 2000. In surveys administered in 2000, 2002, and 2004, between 85 and 90 percent of faculty reported using online information resources such as databases, catalogs, electronic journals, and interlibrary loan. The level of satisfaction with the quality, quantity, and ease of use of those resources was fairly high (i.e., mean scores above seven). The 2005 student survey shows no significant differences in ratings of usage, or perceptions of the quality of electronic information resources, and ease of use.



The Electronic Core Collection provides anytime, anyplace access to a select group of information resources in high demand across the entire CSU system. The problem for many students and faculty is how to find the most valuable articles or data sets with a reasonable expenditure of time and effort.

Unified Information Access System (UIAS)

The Unified Information Access System [UIAS] is designed to complement the California State University libraries' collections of owned print/microfilm and licensed electronic content. Students and faculty members can discover information that may suit a need and then, when an article, paper, report or book has been identified, retrieve these information items as quickly and as easily as possible.

The UIAS simplifies the discovery and delivery of desired information using a variety of applications. *Metilib* is a user interface that enables simultaneous searching of multiple information resources. It is designed specifically for an academic environment to reduce the amount of time students and faculty spend locating journal articles, reports, papers, and books for research projects. *SFX* works with *MetaLib* and proprietary cataloging applications to identify the appropriate copy of a desired work (one that is already available from CSU library holdings).

Absent these new tools, determining whether a desired item was available electronically or in print could be frustrating, time-consuming, and often unsuccessful. *SFX* improves this situation. If it finds an appropriate electronic copy, it delivers it instantly. If the resource is available only in print and is not accessible locally, the *SFX* and the UIAS' *Resource Sharing System* facilitate borrowing these items through interlibrary loan.

Interlibrary loan is the established mechanism for acquiring temporary use of print materials not available in local libraries. Increasing demand and rising costs have made it progressively more difficult for CSU campuses to sustain these services. One goal of the UIAS project is to employ information and telecommunications technologies to reduce the cost and accelerate the speed of borrowing requests.

Figure 4C profiles changes in the number of remote borrowing transactions handled by CSU libraries over the past six years. It also shows the percentage of all transactions mediated and automated. During this period, the percentage of transactions handled by automated systems has grown from a fourth to over a third of all remote borrowing requests.

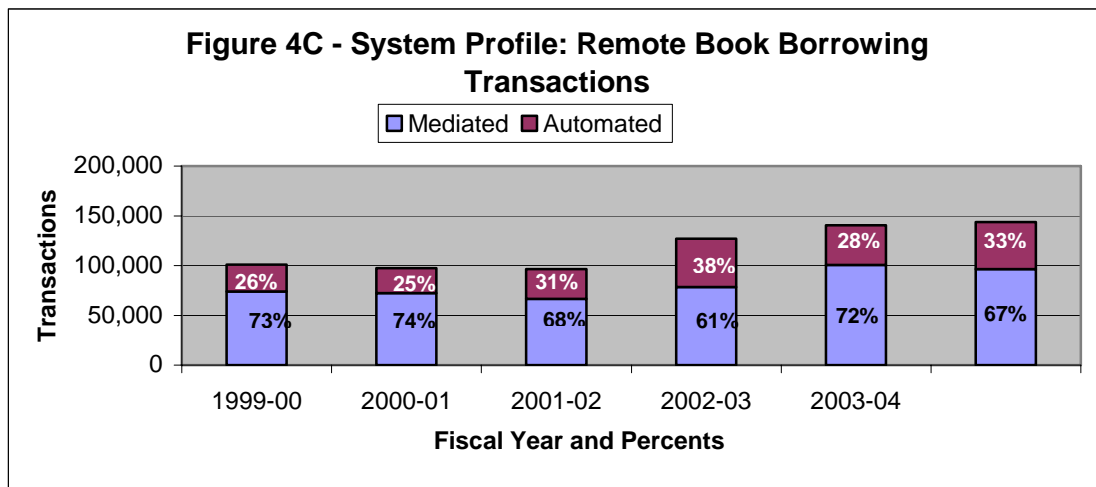
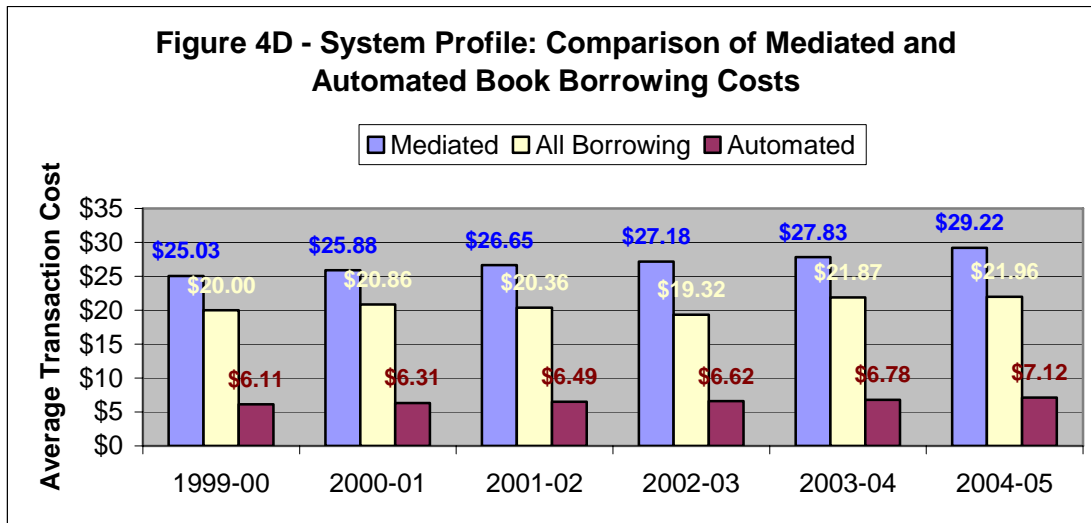
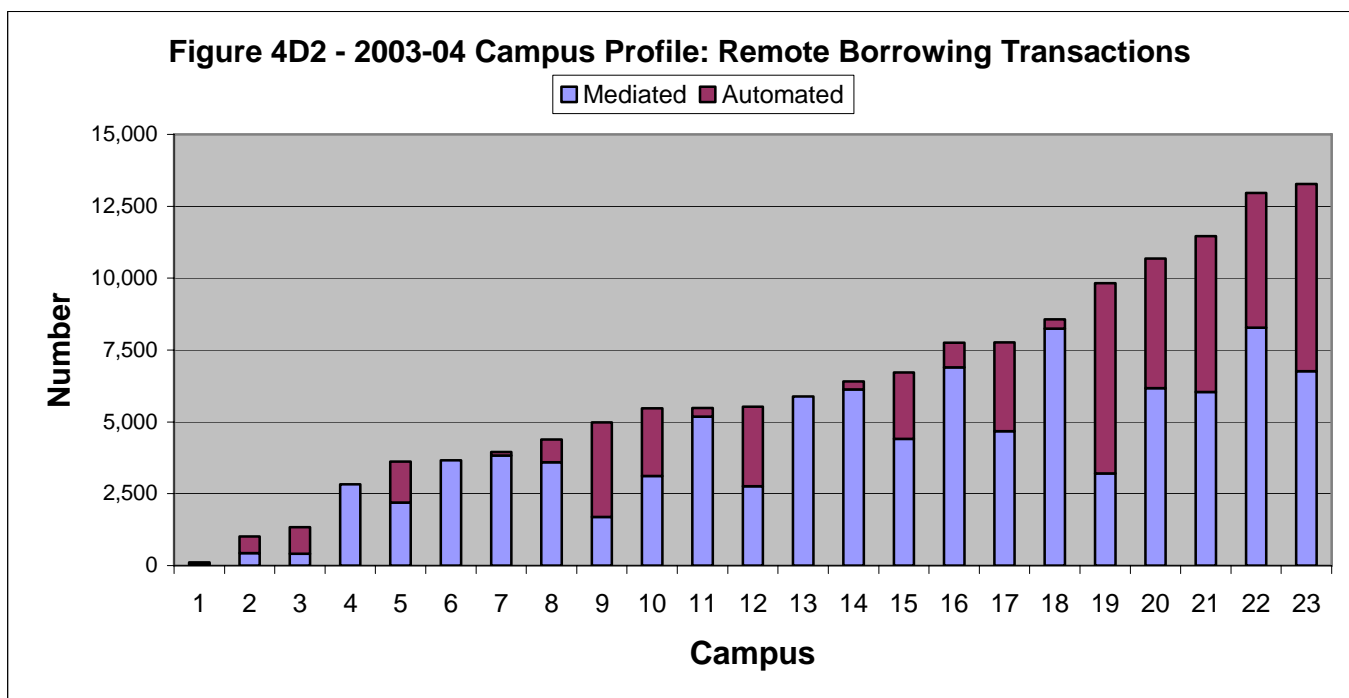


Figure 4D shows the impact of automating borrowing transactions on the cost of providing interlibrary loan services. The average cost of processing such requests varies with the ratio of automated to mediated transactions: the greater the proportion of automated transactions, the lower the average cost for interlibrary loans. The rise in average cost per transaction over the years reflects general inflationary trends.



Campuses vary greatly in the volume of remote borrowing that occurs and in the percentage of such requests that are handled by automated systems, as depicted in Figure 4D2.



The Student Information Competence Project

Since the mid-1990s, the CSU has sought to define and promote the development of students' ability to use digital information processing and communication tools that have become the standard means of accomplishing work in the knowledge economy. Previous editions of *Measures of Success* have highlighted steps the CSU has taken to develop instructional tools and strategies that campuses can use to measure and to develop these competencies.

In 2003–04 the CSU took the lead in forming a partnership with the Educational Testing Service (ETS) and several other colleges and universities to develop a Web-based tool that assesses information and communication technology (ICT) literacy. Participating institutions include UCLA, the University of Washington, and the University of Texas System. ICT proficiency is the ability to use digital technology, communication tools, and/or networks appropriately. It

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includes the ability to define, access, evaluate, integrate, manage, create, and communicate information ethically and responsibly.

The first large-scale administration of the assessment tool occurred in spring 2005. More than 3,300 CSU students participated, and the results, while preliminary, strongly suggest that much work needs to be done to improve skill levels for success in the university and in the workplace. The testing instrument is still being refined and the final version will be available in early 2006.

In the 2005 Campus Computing Survey respondents were asked if their campus had a computer instruction, computer competency, technology literacy, or information literacy requirement for all undergraduates. In the CSU, 46 percent of the campuses have such a requirement compared to 43 percent among public Master's I institutions nationally. However, when asked if they had a formal plan for integrating information technology into the curriculum, 48 percent of the national sample responded in the affirmative compared to only 27 percent for the CSU.

Multimedia Repository

The goal of the Multimedia Repository Initiative is to provide electronic access to instructional resources not normally available in the academic market. The initiative focuses on the conversion into digital form of images, audio, and video materials, and on the storage of interactive learning tools that use computing technologies to model complex processes.

For many years, individual CSU campuses and the CSU system have provided financial support for special projects designed to improve learning and teaching in various disciplinary fields. One consequence of these many projects is the accumulation of large collections of non-proprietary instructional materials accessible only to the faculty and students on the campuses where the project activity occurred. Impediments to shared use of these resources include the high costs of duplicating, warehousing, distributing, and (in some cases) updating them. Ignorance of the existence of the resources and the technical incompatibility of equipment and software are major barriers to resource sharing among colleagues and across campuses. Finally, even if such collections could be distributed at a reasonable cost, there would be little demand for them absent an understanding of how to use them effectively.

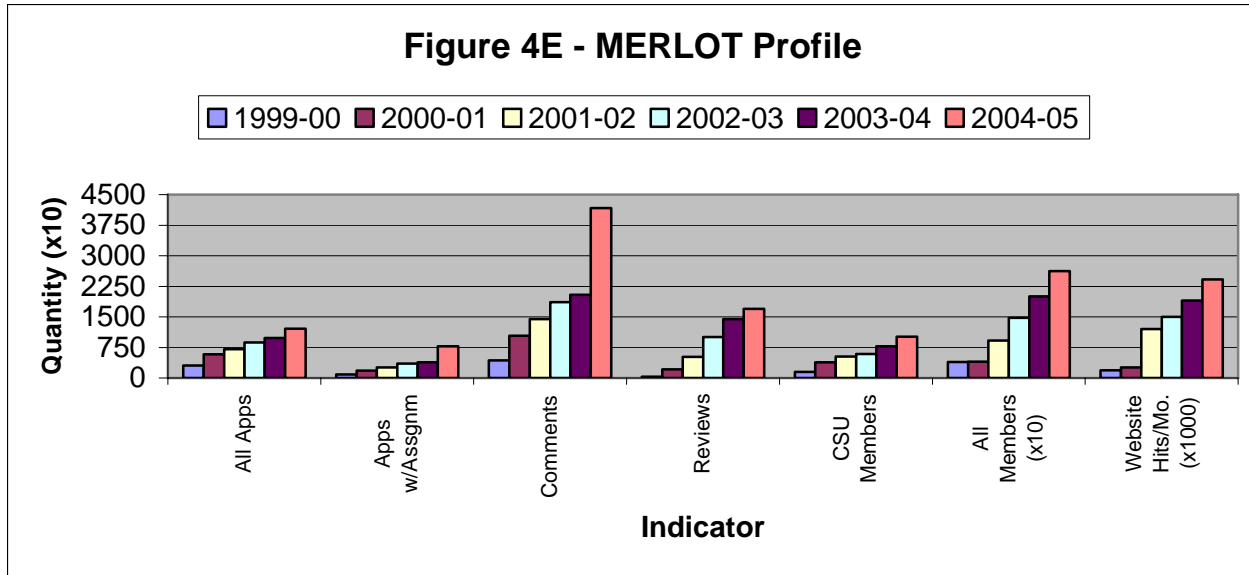
The emergence of digital technologies and the ubiquitous availability of high-speed telecommunications networks offer practical, affordable ways to remove these barriers. Once images, video, and audio recordings are converted into digital form, resources not restricted by copyright protection can be shared and used at low cost by anyone connected to a high-speed network. The ITS Multimedia Repository Initiative was launched to make non-proprietary multimedia resources available to the broader CSU community.

With ITS support, the CSU Center for Distributed Learning (CDL) was established on the Sonoma campus in March 1997. Its mission is to create, store, and distribute Web-based multimedia instructional materials and information of academic value to CSU faculty and students. The CDL has supported two projects in support of the distribution portion of its mission: the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) and the IMAGE project.

Multimedia Educational Resource for Learning and Online Teaching (MERLOT)

MERLOT has grown in quantity and quality in each of the five years since the first *Measures of Success* report was published in November 2000 (Figure 4E). The number of learning applications available by the end of FY 2004–05 was 12,108, now exceeding the 10,000 targeted for 2008. In 1999, the number of learning applications with sample student assignments was targeted to reach 500 by 2002. By the end of FY 2004–05, the number has now exceeded that target at 780. The number of user comments and faculty reviews also continues to increase. Comments and reviews provide pedagogical assistance similar to sample assignments.

Individual memberships in the MERLOT community increased to over 26,000 in 2004–05, a gain of 31.0 percent over the previous year. CSU membership growth was comparable, increasing by 27.2 percent to 1015. MERLOT Website hits, a good indicator of interest in the repository, rose to an average of just over 2.4 million per month in 2004–05.



Currently, 23 institutions and systems of higher education are paying members of the MERLOT project. Alliances established with more than a dozen professional and disciplinary organizations serve to increase the quantity and quality of materials available to faculty and students. MERLOT has established partnerships with commercial organizations to support its programs and to strengthen its financial base. Technical innovations facilitate efforts to enlarge and improve the repository. Of particular note are a pilot program to develop digital rights management technology to protect the intellectual property of authors, and the improvement of federated search capability with other leading learning object repositories.

MERLOT Faculty Development Activities

Creation of more effective and less costly means to develop faculty skills for using online curricular resources in innovative ways is a critical factor in realizing the benefits of these collections. MERLOT supports a three-tiered professional development program for faculty:

- Tier one: Campus faculty development personnel receive training on strategies for teaching faculty how to use MERLOT resources. The goal of this “train-the-trainer” approach is to produce local and sustained support for faculty development within campus cultures.
- Tier two: Professional development programs are delivered directly to faculty at national and regional conferences sponsored by discipline-based professional societies.
- Tier three: Both faculty and faculty development personnel use MERLOT’s digital library of materials on how to teach with technology to develop and deliver self-directed or formal professional development programs.

In addition to these faculty development initiatives, MERLOT sponsors a professional recognition program, the MERLOT Editor’s Choice Awards. MERLOT also maintains a Website and a set of management tools (“Personal Collections”) through which faculty can build electronic portfolios of learning objects together with information about how to use them.

The community of MERLOT users continues to expand. Formal alliances exist with nationally recognized faculty development organizations such as the EDUCAUSE Learning Initiative, the TLT (Teaching and Learning with Technology) group, the New Media Consortium, and the Carnegie Foundation for the Advancement of Teaching.

The IMAGE Project

The IMAGE project (<http://image.calstate.edu>) provides online access to digitized collections of copyright-cleared images for CSU faculty, students, and staff. With the addition of 8,000 new images this year, IMAGE provides electronic access to two collections with a combined total of over 50,000 art, architecture, and culture images from around the globe. IMAGE now draws contributions from outside the CSU, with over 4,500 images donated from other universities or individuals. Over 400 portfolios of images with accompanying data enhance access to, and the instructional value of, visual resources in fields such as geography, science and technology, history, music, dance, and commerce. Over 200 faculty have requested accounts in order to create their own portfolios and to contribute images to the collection. Use of images in the collection increased significantly again this year.

The IMAGE Project team developed training materials to assist instructors and students in selecting and using images from the collections in instructional programs. In 2003–04 and 2004–05, demonstrations and workshops were held on CSU campuses throughout the state. The training materials are Web-based and designed as self-paced learning tools. They are available via the Internet and can be used by faculty for student training.

As reported last year, the CDL initiated a library intern program and produced a Webcast for on-demand training to improve the image cataloging skills of library staff. In 2004–05 IMAGE placed library interns at six CSU campuses and presented a videoconference and an intercampus Webcast for training.

Distributed Learning and Teaching

The Distributed Learning and Teaching Initiative shares the goal of providing affordable access to high-quality instructional resources with the academic initiatives described above. It focuses on the collaborative development and use of technology-mediated teaching and learning applications that promote active learning and that can be employed in “distributed learning environments.”

The term “distributed learning” refers to instruction that connects teachers and learners, usually via the Internet, with each other and with resources physically located at multiple sites. “Distributed learning” differs from “distance education” as traditionally understood. The former places greater reliance on asynchronous interactions through use of the Internet and Web technologies, the latter emphasizes televised instruction or in-person instruction at off-campus sites.

Distributed learning techniques and technologies are currently most often employed as extensions to or partial replacements for traditional instruction (,i.e., some portion of the instructional activity for a class takes place over the Internet rather than in a classroom). In contrast to this so-called “hybrid” or “blended” model, courses taught completely online (i.e., with no or very limited face-to-face contact between students and instructors and among peers) are uncommon in the CSU. The number of wholly online courses offered by CSU campuses is growing, however, and some degree programs are now offered only in this mode. Information about the amount of online and televised learning occurring in the CSU can be found in the section of this report focusing on Master Plan Goals.

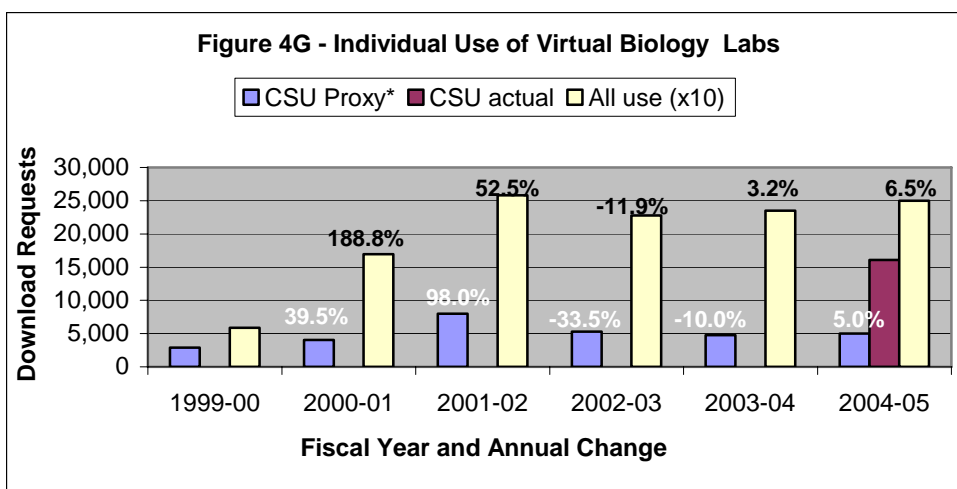
Effective application of distributed learning techniques is strategically important to the CSU because of its potential to expand the capacity of existing physical instructional facilities. If a class that normally uses a classroom three times a week meets in the room only two times, or not at all, that space can be reassigned for other uses.

Distributed Learning and Teaching was incorporated into the first wave of ITS initiatives to create precisely the kind of enriching, engaging learning activities that are needed to build faculty support for online instruction. Responsibility for implementing the initiative was assigned to the CSU Center for Distributed Learning (CDL). The main focus is on the development of computer-based applications that require the active engagement of students of the kind that occurs in laboratory settings. In addition to producing virtual laboratory simulations, the CDL supports programs and activities to expand the community of simulation users and to build local campus capacity for developing technology-mediated instructional materials.

Web-Based Laboratory Simulations

To date, CSU faculty working together with CDL support have produced seventeen Web-based virtual laboratory simulations applicable for instructional use in 18 curricular fields. No new simulation development activities occurred in 2005 due to a refocusing of resources in support of the CSU Foundational Skills Initiative. As part of this initiative, CDL developed the Math and English Success Websites to support the CSU Early Assessment Program (EAP). Experiments using these online laboratories are similar to those conducted in physical laboratories in an essential respect: the outcome of the experiment depends entirely upon the input of the person conducting it. These simulations enable the user to visualize consequences—generational changes, for example—in a way not often possible in traditional laboratories. The complexity of the modeling employed in the CDL laboratory simulations is powerful enough to support experiments ranging from the introductory to the graduate level. Detailed information about applications as well as other programs and activities sponsored by the CDL can be viewed on the CDL Website: <http://www.cdl.edu>.

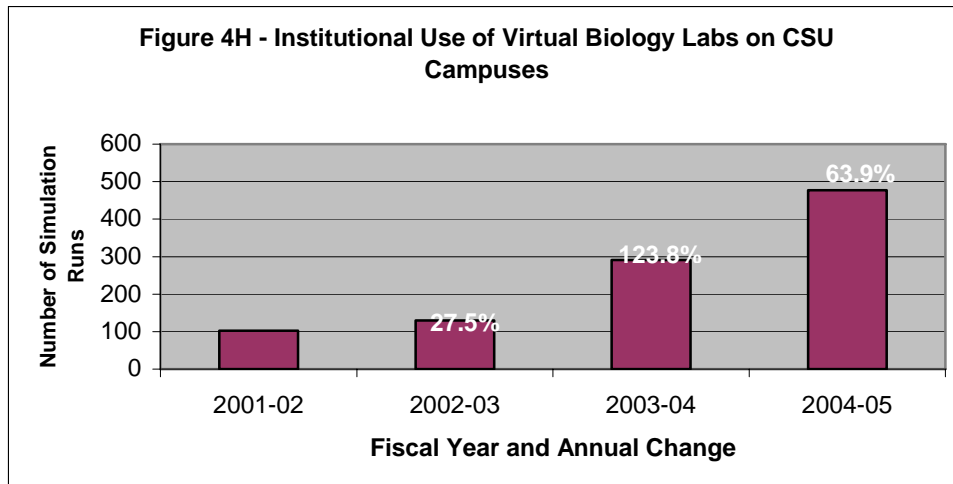
Figure 4G summarizes changes in the volume of individual use of a sample set of laboratory simulations. The frequency of individual virtual laboratory uses appears to have declined from the level reported for 2001–2002. The volume of actual use is masked, however, by institutional subscriptions (for entire series of applications) or site licenses (for multiple application use), which permit multiple uses not monitored by the tracking system. In addition, the availability of broadband network connection to the home enables students to run simulations from off campus, thus contributing to reductions in the number of uses associated with specific campuses.



In previous editions of *Measures of Success*, use of the Biology Lab On Line by CSU students and faculty was reported by reference to a proxy sample of five campuses whose identity could be reliably tracked*. Last year the vendor made changes in the way user requests are processed and logged. These changes make it possible to monitor actual use by CSU faculty and students from on-campus and off-campus locations. Beginning with this year, statistics on actual CSU use replace proxy figures. As noted in Figure 4G, individual uses of the virtual biology lab by CSU students and faculty in 2004–05 was more than triple the number reported for the proxy group.

Figure 4H shows changes in the institutional use of a sample laboratory simulation on CSU campuses. Increases in the purchase of institutional licenses indicate growing recognition of the pedagogical effectiveness, as well as the cost effectiveness, of Web-based computer simulations. The increase in the purchase of institutional licenses is a strong indicator of growing acceptance of virtual laboratories as a stable curricular component.

* In 2001, *Measures of Success* began to report use of one web-based simulation, Biology Lab On Line, to give a representative picture of the acceptance of this innovative technology. At the time, no reliable mechanism existed to identify the institutional affiliation of most requests to run the simulation. Because requests from about one fourth of the CSU campuses could be identified, that group of campuses was adopted as a proxy for tracking trends in virtual laboratory use on all campuses in the CSU system.



Web-Based Tools for Authoring

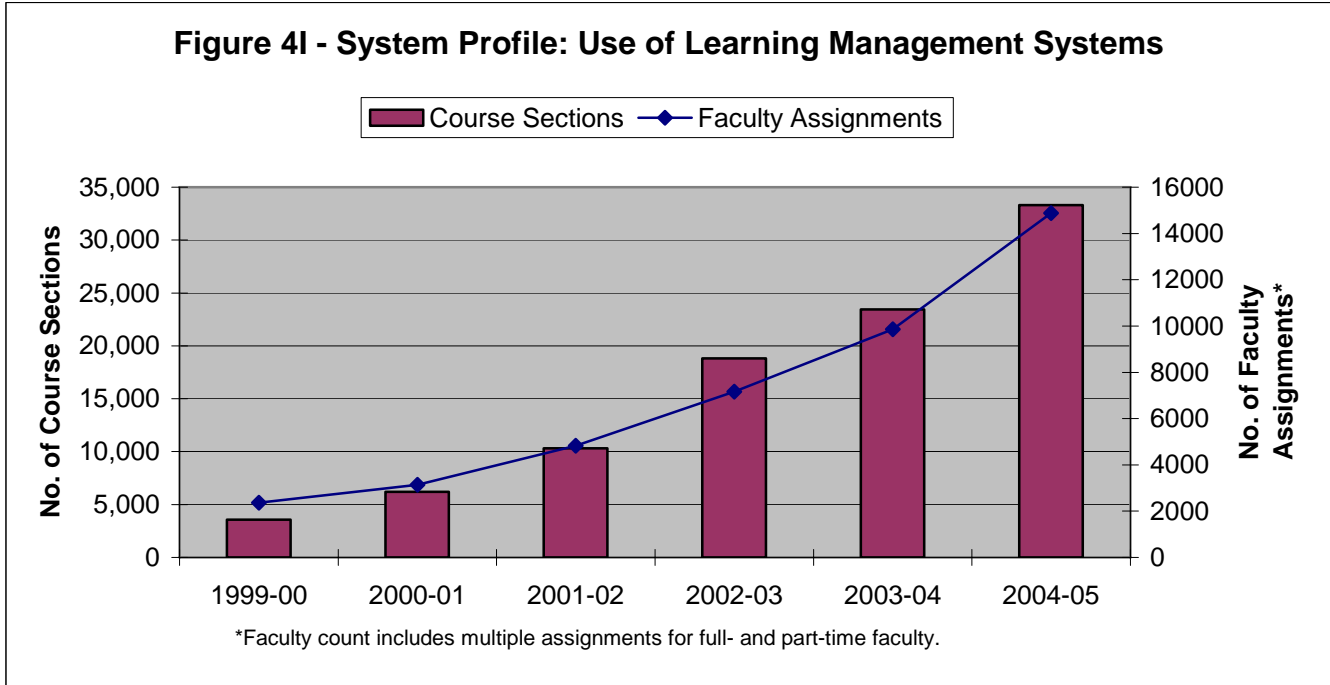
As an additional strategy for making Web-based learning content available, CDL has undertaken development of Web-based authoring tools to support faculty in creating media-rich, interactive learning materials that are delivered over the Web. The Video Oriented Instructional Lesson Authoring tool (VOILA) was developed for the LightBridge teacher education project: <http://lightbridge.sonoma.edu>. It has been used to develop over 40 Web-accessible examples of classroom practice. Next year CDL expects to make VOILA available for faculty in other disciplines.

Web-Based and Web-Assisted Instruction in the CSU

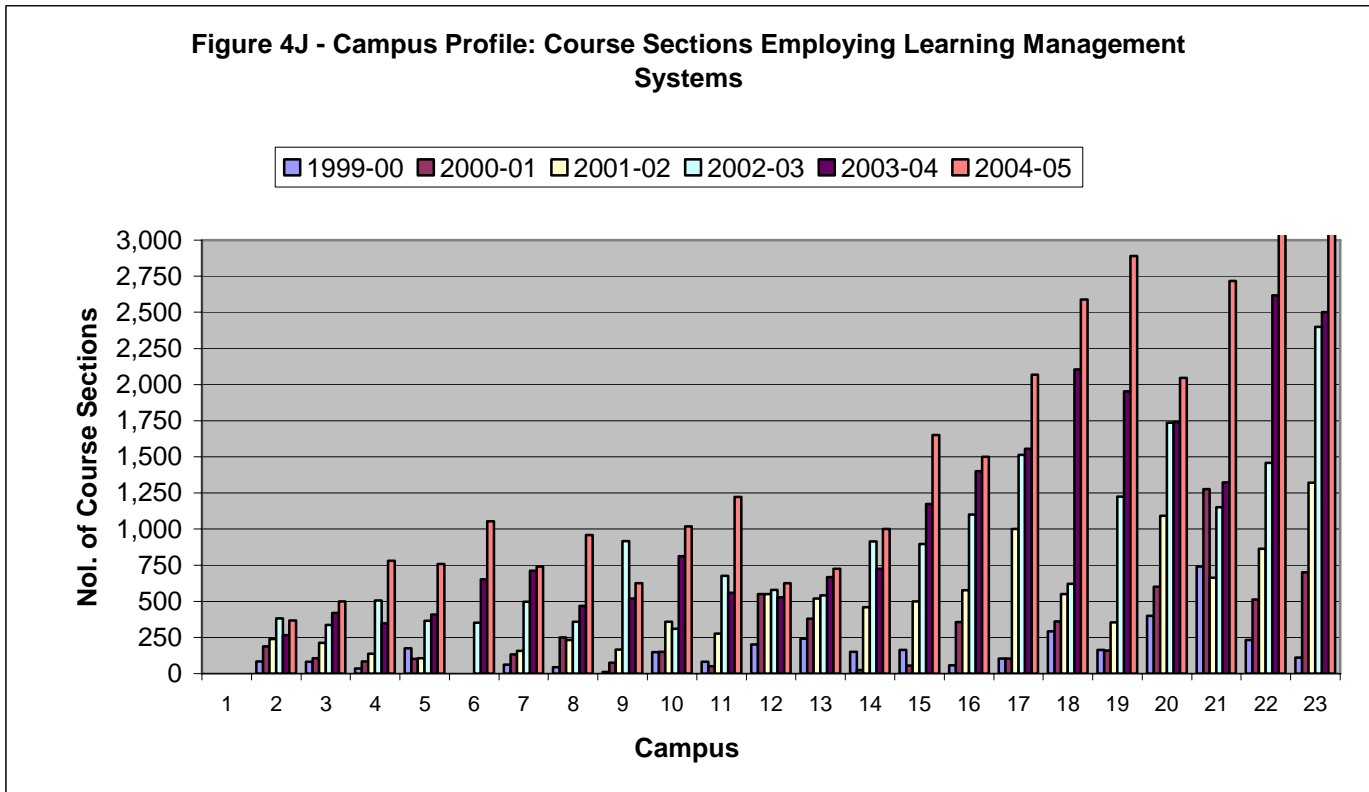
Interactive laboratory simulations provide content and a student-centered approach to learning. They represent the cutting edge of instructional technology, although their use constitutes a small fraction of Web-based learning activity in general. The most commonly used application is learning management software (LMS) designed to facilitate conventional teaching and learning in the Web environment.

Learning management applications provide Web tools for connecting students to content sources of various kinds, supporting communication between members of a class, delivering and publishing student work (in various media), and testing and counseling purposes. Such tools make it easier for faculty to undertake the transition from classroom to online teaching.

Figure 4I depicts the frequency of use of LMS. Employment of this Web technology serves as a barometer of movement toward distributed learning and teaching. The number of classes (course sections) supported by Web-based LMS in the CSU grew from 2.8 percent of all course sections offered in 1999–2000 to over 25 percent in 2004–2005. Enrollments in courses incorporating LMS increased six fold over the same period, from under 10,000 to more than 60,000.

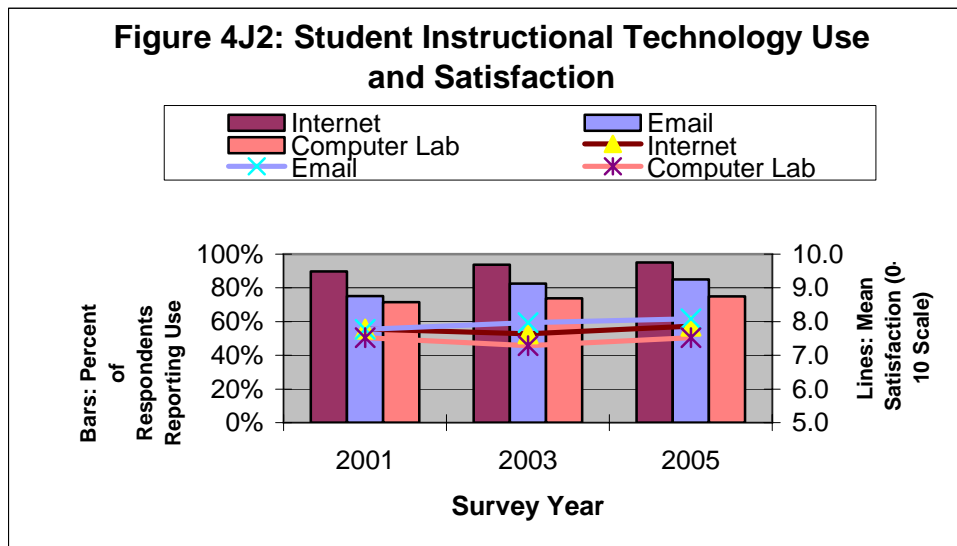


On some CSU campuses, a learning management system is employed for every course section. Figure 4J illustrates changes in the number of course sections offered by the individual campuses that employ learning management systems. Individual campus patterns closely parallel the system trend displayed above.



LMS license and support was identified in the CSU funding gap study as one of the core academic technology needs. The study found that the CSU has a one-time shortfall of \$1.4 million and an annual gap of \$2.7 million in this important category.

The growing adoption of learning management systems is an indicator of faculty interest in Web and Internet technologies. According to the 2004 biennial faculty survey, between two-thirds and three-fourths of faculty require students to use the campus computer network and the Internet in their classes. Almost all students use the Web or other Internet resources, and they appear to like them as well, as measured by the generally high satisfaction ratings for such technologies in 2001, 2003, and 2005. Moreover, faculty satisfaction ratings of the pedagogical effectiveness of learning materials on the Web, e-mail, and the Internet generally all show significant increases in the past four years. For example, mean satisfaction ratings for use of the Web increased from 6.89 in 2000 to 7.99 in 2004.



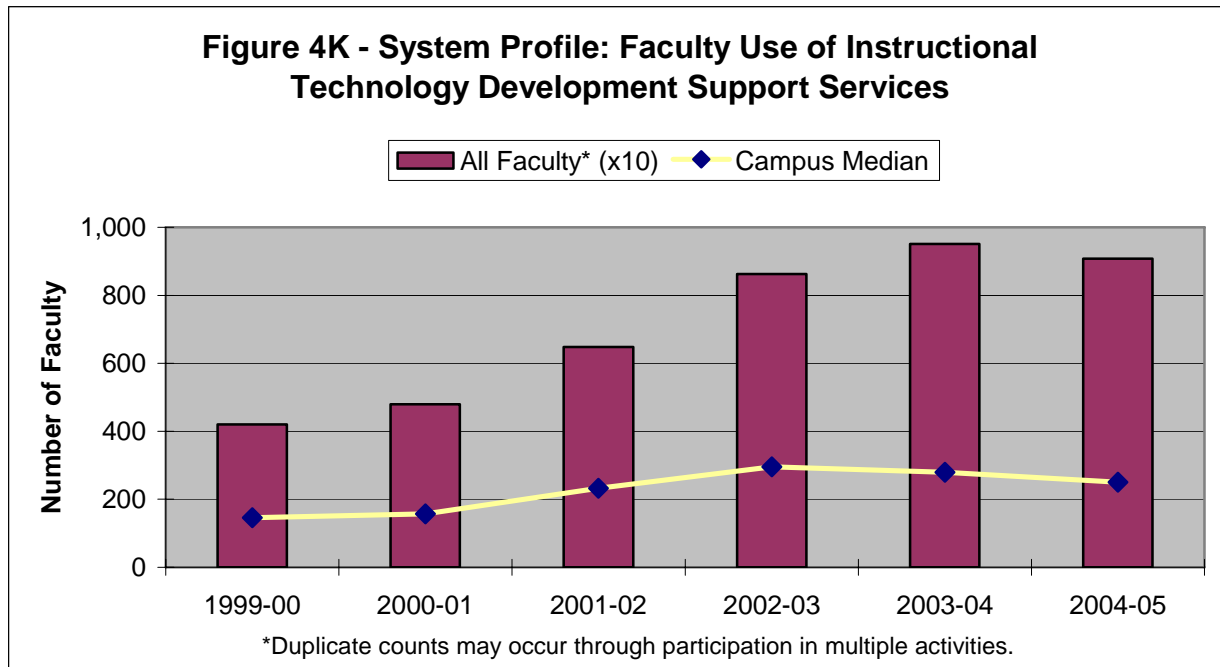
Student and faculty views are strongly at variance, however, regarding the importance of “anytime, anyplace” access to instruction. In 2001, 2003, and 2005 students agreed strongly that access to online instruction was very important (mean scores over 8.00). Three faculty surveys since 2000 produced importance ratings of only 5.80, 5.07, and 5.67, the lowest average ratings of any item in the surveys. On the other hand, students reported taking very few online courses (few are actually offered) and found them only marginally satisfactory when compared to traditional classroom learning.

Campus Centers for Instructional Technology Development

Decisions about what to teach and how to teach it are the prerogative of faculty members. Acceptance of distributed learning technologies depends on their adoption by faculty. The Integrated Technology Strategy encouraged each campus to establish a service or center where faculty can learn about the latest uses of instructional technology in their fields and work together with their colleagues and technical staff to produce learning materials for local use. The systemwide Center for Distributed Learning was charged with supporting this effort by demonstrating best practices in the use of new technologies and by serving as a professional development resource for all of the campuses in the system.

Twenty-one CSU campuses reported that they have central instructional technology development centers to assist faculty in creating and using technology-mediated teaching and learning resources. In 1999–2000, only five campuses had such centers. Thirteen campuses had both a campus-wide center and one or more divisional centers in 2004-05. Almost all of the campuses continue to provide incentives to individual faculty in the form of release time or compensation for time spent in excess of their normal workload, and five campuses provide additional assistance in a variety of ways, such as the purchase of equipment, software, or training.

Figure 4K shows continuing strong faculty interest in the instructional technology services available through these centers. Demand for instructional technology development services varies greatly across the campuses, from approximately 100 participants (or participations, allowing for duplicative counts) per year at the low end to over 500 at the high end.



Campus investments in the development of technology-mediated instructional materials are of two types: personnel support, as reflected in the number of full-time equivalent positions for faculty and staff, and direct support, or dollars expended to purchase materials and services.

Figure 4L profiles the level of campus support for instructional technology development as reflected in the assignment of personnel positions.

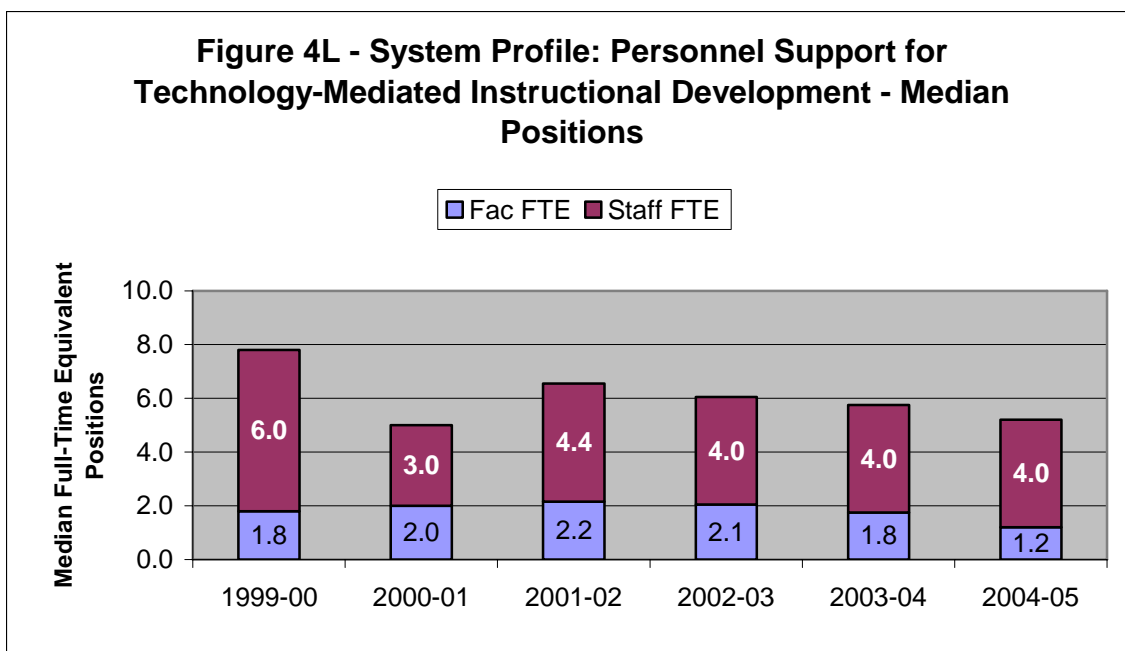
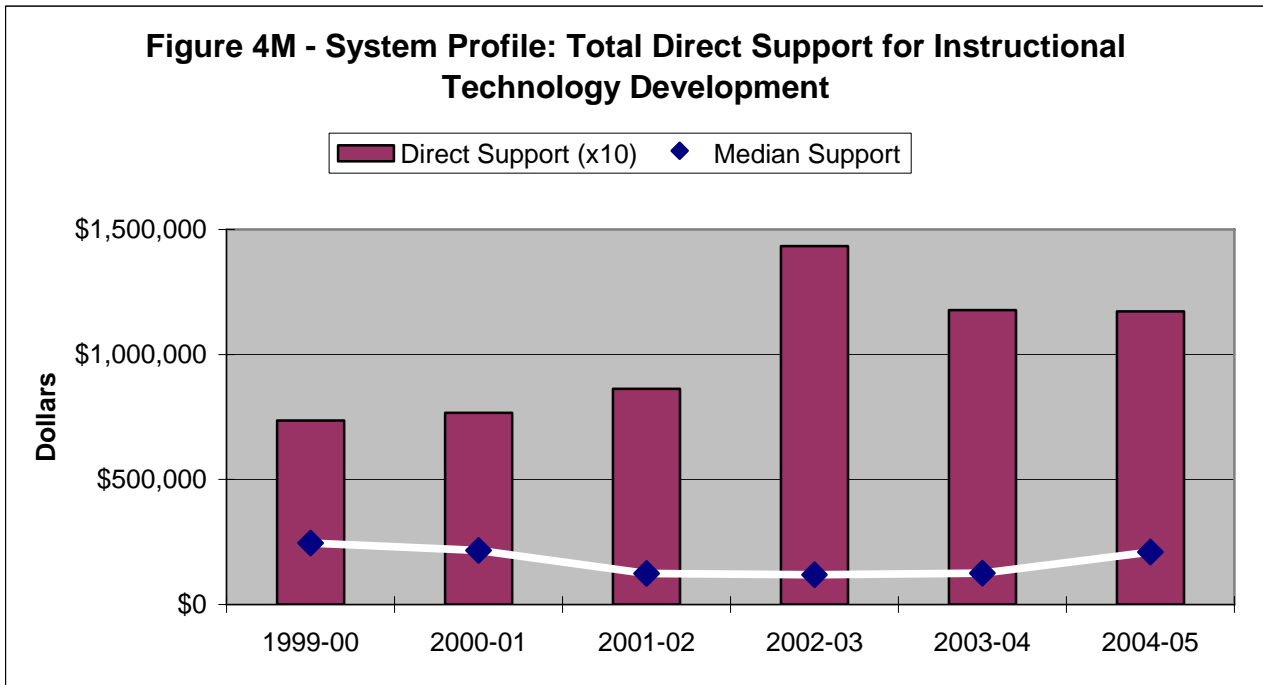


Figure 4M shows changes in the level of direct support for instructional technology development. Strategies vary greatly among campuses. Some rely extensively on services provided by staff and/or student assistants. Others focus on enabling faculty to devote more time to such activities. Dollars received from non-state sources are a major factor governing the total level of center support. The jump in 2002–03, for example, is attributable to the receipt by one campus of a \$6.75 million grant of non-state funds. Grants of such magnitude mask the actual downward trend represented by campus median expenditures.



The Educause Core Data Service survey asked participating institutions to describe the nature of campus support for faculty use of technology in teaching and learning. The CSU appears to be at or above national averages for a wide range of faculty support services: the availability of instructional technology centers and designers, faculty training, faculty grants and awards to support technology, and the integration of technology center with information technology services.

Other comparative evidence on these issues can be found in the annual Campus Computing Survey. The CSU and comparison institution data are shown in Table 4A.

Table 4A – Percent of Institutions with:

	CSU	Public Master's I
One or more formal projects for developing instructional software/courseware	77	79
A policy or program for rewarding courseware development or providing incentives for faculty to develop instructional software/courseware	46	52
A formal program to recognize and reward the use of information technology as part of the routine faculty review and promotion process	14	24
A formal policy regarding ownership of Web-based curriculum resources and intellectual property developed by faculty	64	73
A technology resource center that focuses on the instructional use of information technology	96	91

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While CSU compares favorably with national institutions, there is still an annual shortfall of approximately \$12.9 million in instructional design staff to assist faculty in developing disciplinary course materials according to the CSU funding gap study. In addition, there is about an \$8.3 million gap annually in providing disciplinary (as opposed to core) electronic content (databases, subscriptions, digital libraries, and multimedia learning objects) for teaching and learning, including training and support.