

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.

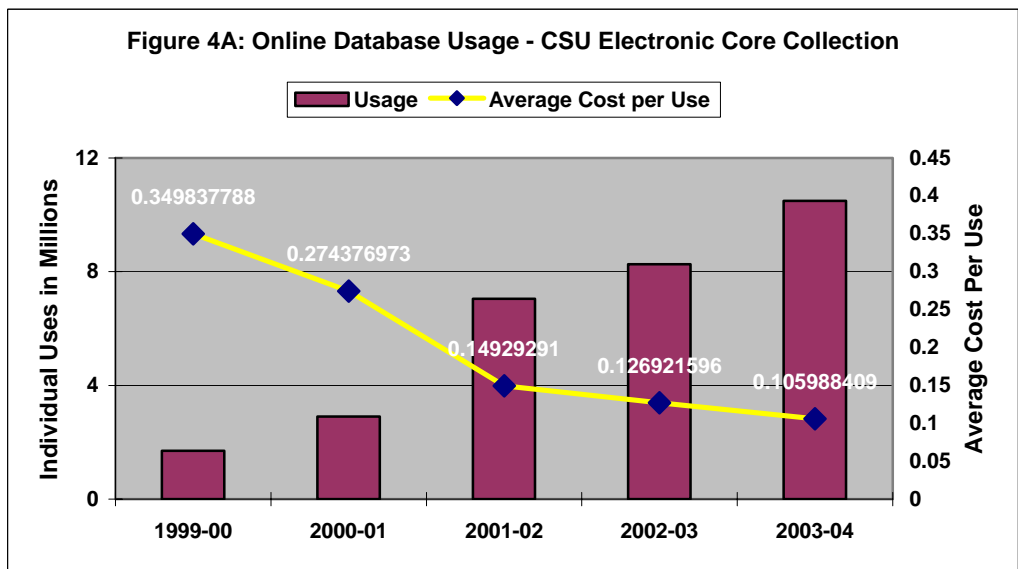
Library Resource Sharing

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. 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.

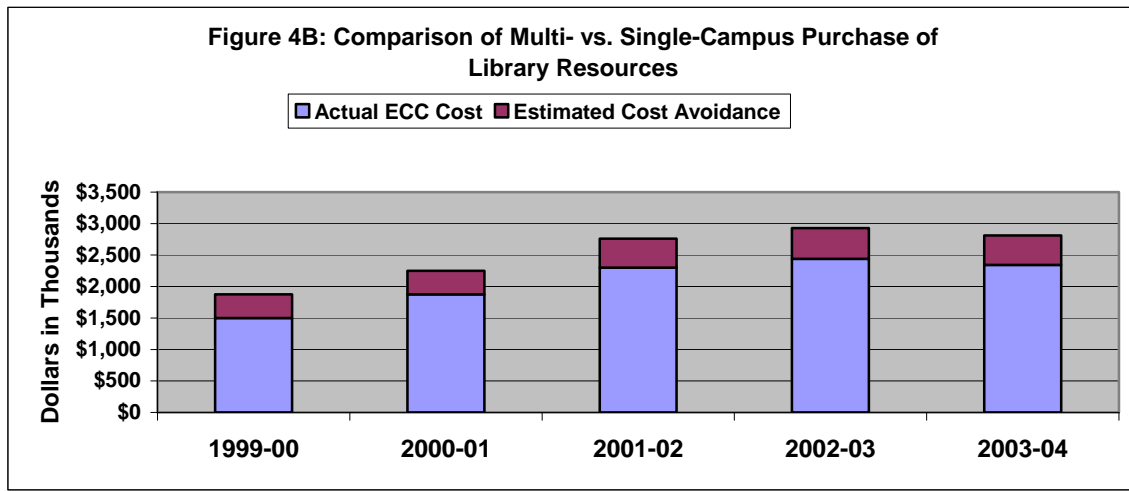
Figure 4A illustrates the benefits to CSU students and to CSU campuses that have been achieved through the collaborative purchase of electronic information resources. The dramatic growth of this program is due mainly to the rapid development of the Internet as a vehicle for content delivery and access point for information, and to the dual economic pressures of tight library budgets and rising prices of information resources.



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Several factors have affected 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. Although total expenditure for ECC resources in 2003-04 fell slightly from the previous year, the margin of use continued to outpace the rate of cost increase for the collection as a whole.

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.



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 to 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). Comparisons to the most recent 2003 student survey show no significant differences between students and faculty in usage rates, or in how they rated the quality of electronic information resources, and only slight differences in ratings about ease of use.

Unified Information Access System (UIAS)

The Electronic Core Collection was conceived as an affordable means to provide anytime, anyplace access to a select group of information resources in high demand across the entire CSU system. This approach works well for information available in digital form. The vast majority of books and magazines important to academic programs, however, do not yet (and may never) exist in digital form. Providing affordable access to such non-digitized library resources is the goal of the Unified Information Access System (UIAS) project.

Interlibrary loan is the established mechanism for acquiring temporary use of materials not available in local libraries. Rising demand and costs have made it progressively more difficult for CSU campuses to sustain interlibrary loan services. The goal of the UIAS project is to employ information and telecommunications technologies to reduce the cost of borrowing requests while accelerating its speed.

Figure 4C profiles changes in the number of remote borrowing transactions handled by CSU libraries over the past five years. It also shows the percent of all transactions mediated and automated. During this period, the percentage of transactions handled by automated systems has fluctuated from a fourth to over a third of all remote borrowing requests. It is anticipated that the ratio of automated to mediated (or hand-processed) transactions will increase as all

functionalities of the Pharos system—an integrated, Web-based system developed under contract for the CSU—become operational on all campuses.

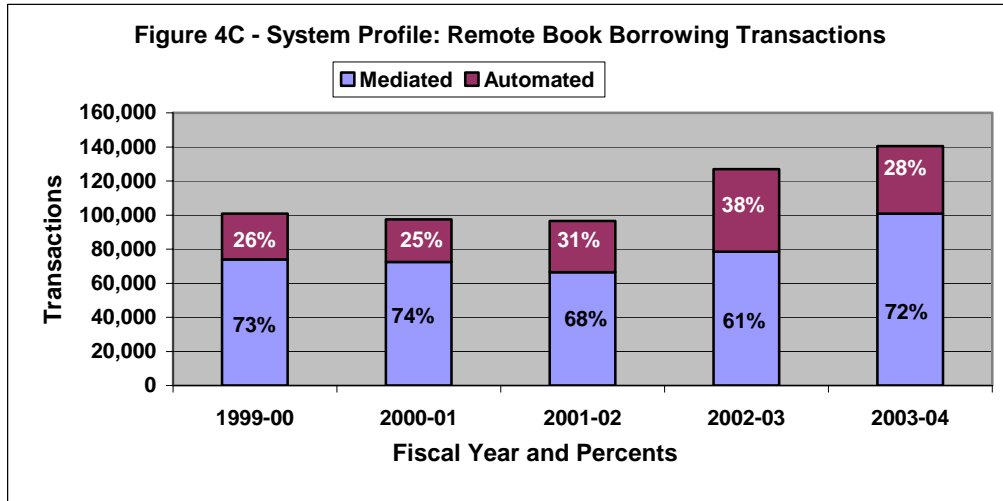
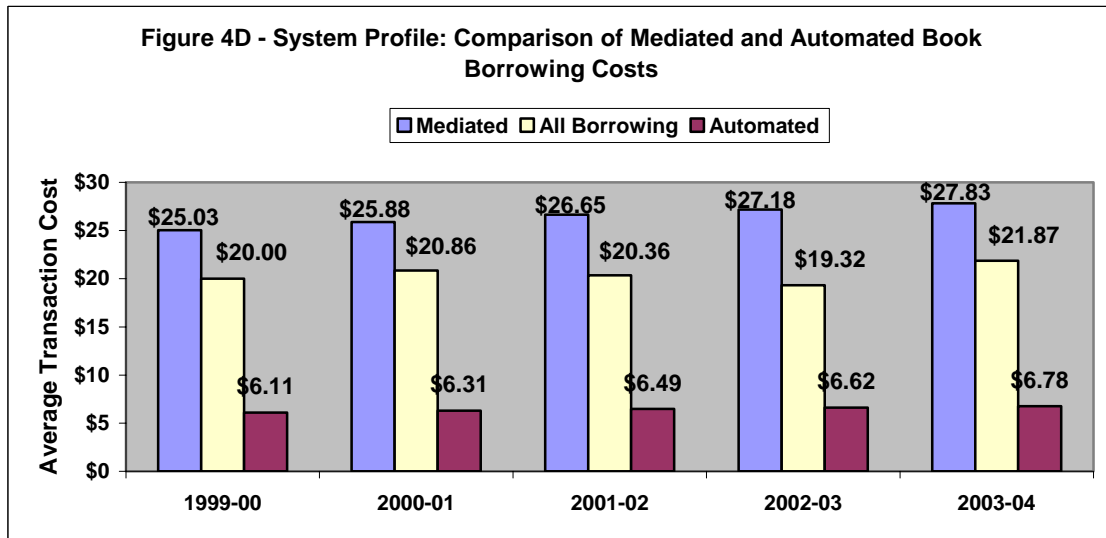


Figure 4D shows the impact of automating borrowing transactions on the cost of providing interlibrary loan services. The average cost of processing such requests varies with the ratio of automated to mediated transactions: the greater the proportion of automated transactions, the lower the average cost for interlibrary loans. The higher average cost per transaction in 2003-04 compared with the previous year reflects the reversal in the ratio reported in the above chart.



The Student Information Competency 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 campuses can use to measure and to develop these competencies.

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In 2003-04 the CSU took the lead in forming a partnership with the Educational Testing Service (ETS) and six other colleges and universities to develop a Web-based tool to assess information and communication technology literacy. Participating institutions include UCLA, the University of Washington, and the University of Texas System. Proficiency in information and communication technology (ICT) is the ability to use digital technology, communication tools, and/or networks appropriately. ICT proficiency includes the ability to define, access, evaluate, integrate, manage, create, and communicate information ethically and responsibly.

The timetable for the project calls for beta testing of the assessment tool on selected CSU campuses beginning in the summer of 2004. The goal is to make affordable large-scale assessment of ICT proficiency available for general use in 2006.

Student opinion about the importance of technology mirrors faculty responses to surveys in 2000, 2002, and 2004. In all three surveys, CSU faculty gave mean importance ratings of 8.0 or above to requiring information competency of all undergraduates. In addition, faculty consistently gave importance ratings above 7.0 for having a departmental plan to integrate technology into the curriculum. Indeed, faculty themselves believe that computing and network resources are very important for carrying out tasks related to their work. They assigned an average importance rating of 9.20 to these resources, the highest rating given to any item in the 2004 survey. On balance, faculty assign very high importance ratings to almost all forms of student use of computing and network resources and, in some cases, high percentages of faculty require their use by students in their classes.

Students rated the importance of computer literacy for their future employment the highest of any item in system surveys conducted in 2001 (mean score of 9.12) and 2003 (mean score of 9.08). However, when asked how well they thought their institutions were preparing them for the technology skills they will need upon graduation, students responded with a mean rating of only 6.60 in 2003. When asked how well their department prepares students to use technology skills in their careers, faculty responded with a relatively low rating of 6.86.

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.

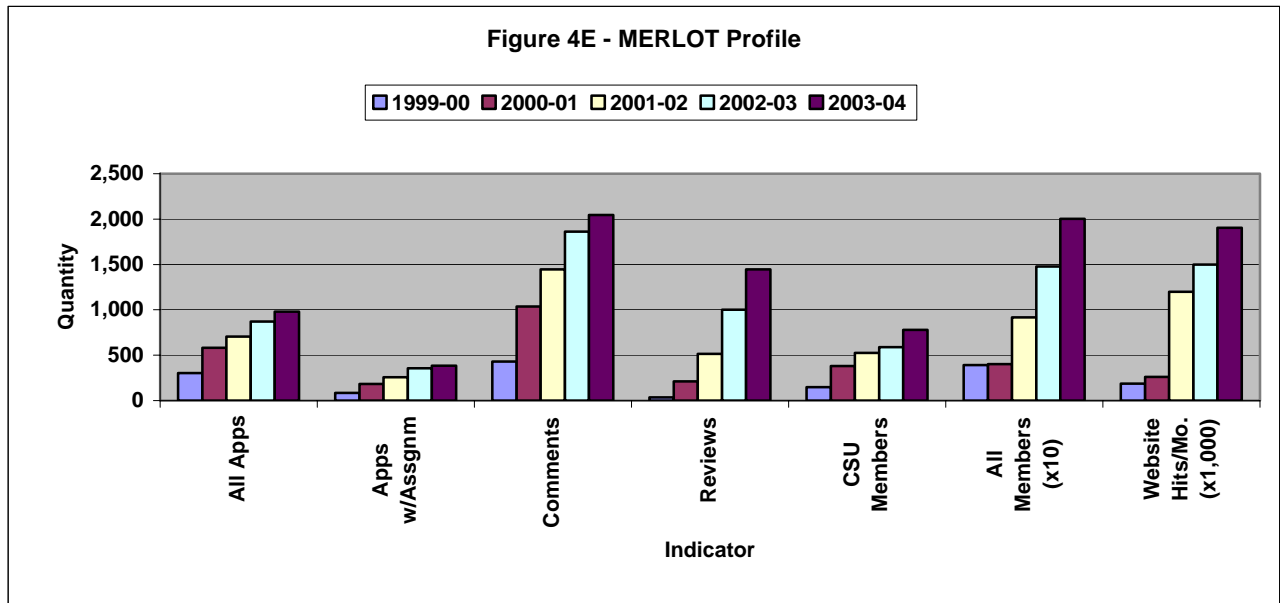
The emergence of digital technologies and the ubiquitous availability of high-speed telecommunications networks offer practical, affordable ways to remove these barriers. Once images, video, and audio recordings are converted into digital form, resources not restricted by copyright protection can be 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 four 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 fiscal year 2003-04 was 9,806, very close to the 10,000 targeted for 2008. In 1999, the number of learning applications with assignments was targeted to reach 500 by 2002. By the end of fiscal year 2003-04, the number stood at 385. The number of user comments and faculty reviews continue to increase, however. Comments and reviews provide pedagogical assistance similar to sample assignments.

Individual memberships in the MERLOT community increased to over 20,000 in 2003-04, a gain of 35 percent over the previous year. CSU membership growth was comparable, increasing by 32 percent to 780. MERLOT website visits, a good indicator of interest in the repository, rose to an average of just under 2 million per month in 2003-04.



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 begun to develop partnerships with commercial organizations to support its programs and to add to its financial base. Recent technical innovations also 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.

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- 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 last year established a professional recognition program, the MERLOT Editor's Choice Awards. MERLOT also created 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.

To expand the community of users, MERLOT has developed formal alliances with nationally recognized faculty development organizations such as the National Learning Infrastructure Initiative of EDUCAUSE, the TLT (Teaching and Learning with Technology) group, the New Media Consortium, and the POD (Professional and Organizational Development) organization.

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 6,000 new images this year, IMAGE now provides electronic access to two collections with a combined total of over 38,000 art, architecture, and culture images from around the globe. 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 this year and averages 35,318 website hits per day.

Training materials have also been developed to assist instructors and students in selecting and using images from the collections. In 2003-04, demonstrations and workshops were held on CSU campuses throughout the state and at the systemwide Teacher Scholar Summer Institute. The CDL initiated a library intern program and produced a webcast for on-demand training to improve the image cataloging skills of library staff.

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" has gained currency over the past decade to describe 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." 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.

On CSU campuses, 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 model," courses taught completely online—with no (or very limited) face-to-face contact between students and instructors and among peers—are uncommon in the CSU. The number of 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. Teacher and learner interest in distributed learning derives from other considerations: convenience and flexibility in the use of time, and diversity of content and approach that permits better adaptation of content to the readiness and learning style of individual students. Unless the technology-mediated learning activity is at least as pedagogically effective and engaging as the classroom experience it displaces, sheer convenience will not suffice to move students or faculty to

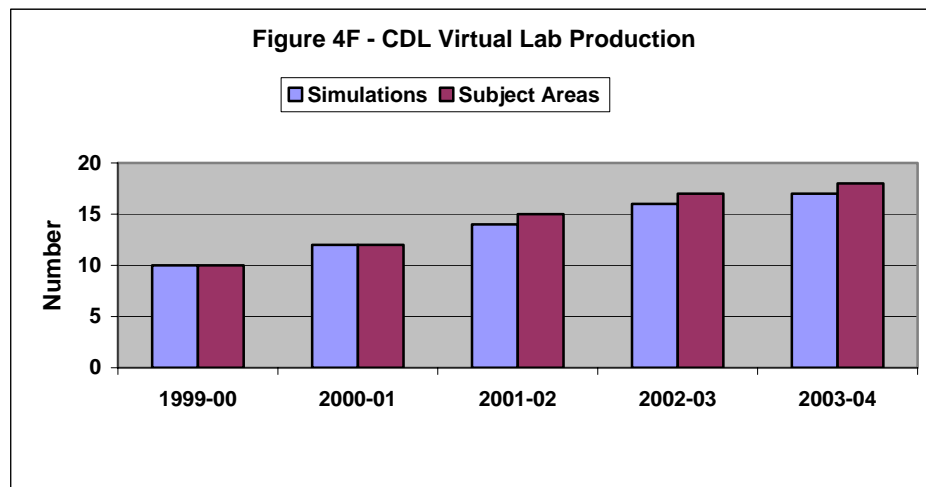
its fuller acceptance, and institutions will not achieve any useful reduction in demands for space. If, however, the tradeoff is educationally beneficial for learners while permitting faculty to make more productive use of their time, the potential gain for all parties is significant.

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

Figure 4F traces the number of Web-based laboratory simulations produced by faculty working together with CDL support and the number of curricular subject fields in which they can be used.

It is important to understand the difference between laboratory simulations and less sophisticated applications of computer technology. Performing experiments using these online laboratories is 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/>.

Biology Labs on Line (BLOL) were the first CDL simulations to become operational, and their use has served *Measures of Success* as an indicator for simulation use in general. The flexibility of access to these applications via the Internet makes it extremely difficult to trace the institutional affiliation of individuals using them. Faculty report that

¹For example, at Kansas State University an introductory psychology course was restructured using distributed learning technologies. The number of large lecture sessions for two sections of the course was reduced from four to one through the use of CD ROM, online assignments, exams and quizzes, and streaming video presentations. The number of graduate assistants employed to support the course was reduced from seven to one, and miscellaneous costs (duplicating, etc.) fell from \$10,000 per academic year to under \$1,000. Student learning, as measured by performance on traditional course exams, improved, and student evaluations of the course have been extremely positive. (Source: Carol A. Twigg. "The Learning MarketSpace," July 2003.)

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their students increasingly prefer to do their BLOL work at home or other off-campus locations rather than from on-campus computers recognized by the CDL servers.

Figure 4G summarizes changes in the volume of individual use of a sample set of laboratory simulations. Based on a proxy indicator*, the frequency of individual BLOL application use by faculty and students on CSU campuses appears to have declined significantly over the past two years. This inference is contradicted, however, by significant growth in institutional demand, and by increased use of simulations from off-campus. The volume of individual use is masked when campuses purchase subscriptions (for entire series of applications) or site licenses (for multiple application use), which permit multiple uses not monitored by the tracking system. The decline in campus-based requests to run simulations corresponds with growing availability of broadband network connection to the home.

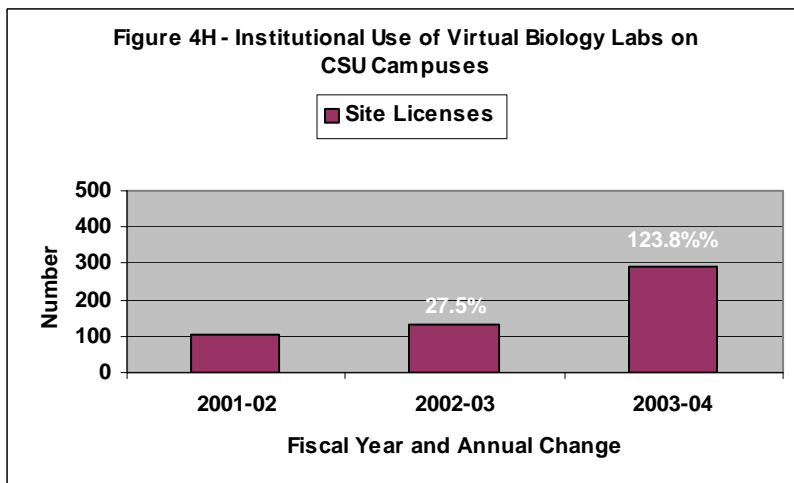
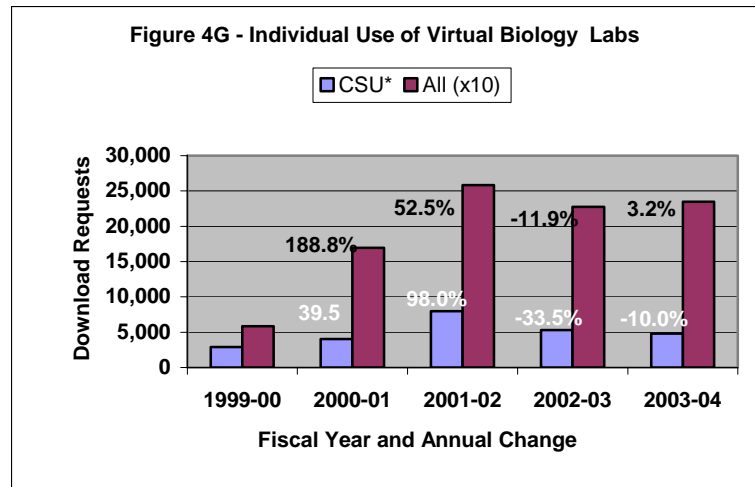


Figure 4H shows changes in the institutional use of a sample set of laboratory simulations on CSU campuses. As of June 2003, one or more CDL virtual laboratory simulations had been incorporated into at least one course at some 600 institutions of higher education, double the number reported for the previous year. Among this number were over 60 California colleges and universities. In 2003-04, CSU campuses purchased more than double the number of site licenses over the previous year. Such adoptions suggest that virtual laboratories are beginning to find acceptance as a stable curricular component.

Technology Integration Grants for Educational Resource Sharing (TIGERS)

The TIGERS program was initiated in 1999 to encourage collaboration among CSU academic technology staff. These personnel support faculty in the creation of technical tools and other instructional resources that can be shared throughout the system. Projects completed in 2003-04 include creation of: 1) training materials on the use of the Blackboard course management system, 2) a CSU policy repository, and 3) the design for a Shared E-Text database for visually impaired students. Additional information about these and other TIGERS projects can be found at: <http://cats.cdl.edu/programs#grants>.

Community of Academic Technology Staff (CATS)

CATS was established to help academic technology staff members increase their knowledge, productivity, and professional effectiveness in the service of their institution's academic technology goals. CATS provides

* In 2001, *Measures of Success* began to report use of the simulations produced by the CDL. At the time, no reliable mechanism existed to identify the institutional origin of most requests for downloading and use. Requests from a subset of about one-fourth of the CSU campuses could be reliably identified. This group of campuses was adopted as a proxy for all campuses in the system for the purpose of estimating simulation use by CSU faculty and students.

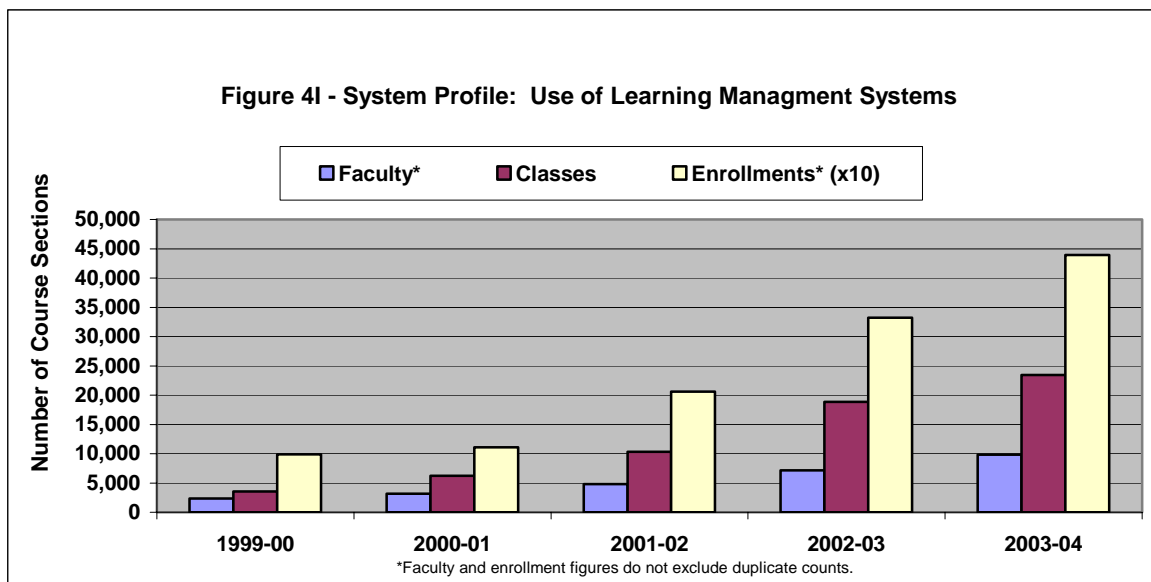
communication and technological infrastructures, resources and tools, and strategic opportunities for its members to collaborate. CATS online seminars include rubrics for online instruction, and the use and design of websites. All programs support the objectives of the CSU Integrated Technology Strategy (ITS). In 2003-04, a professional recognition program and a mentoring program were piloted at the annual CATS conference.

Web-Based and Web-Assisted Instruction in the CSU

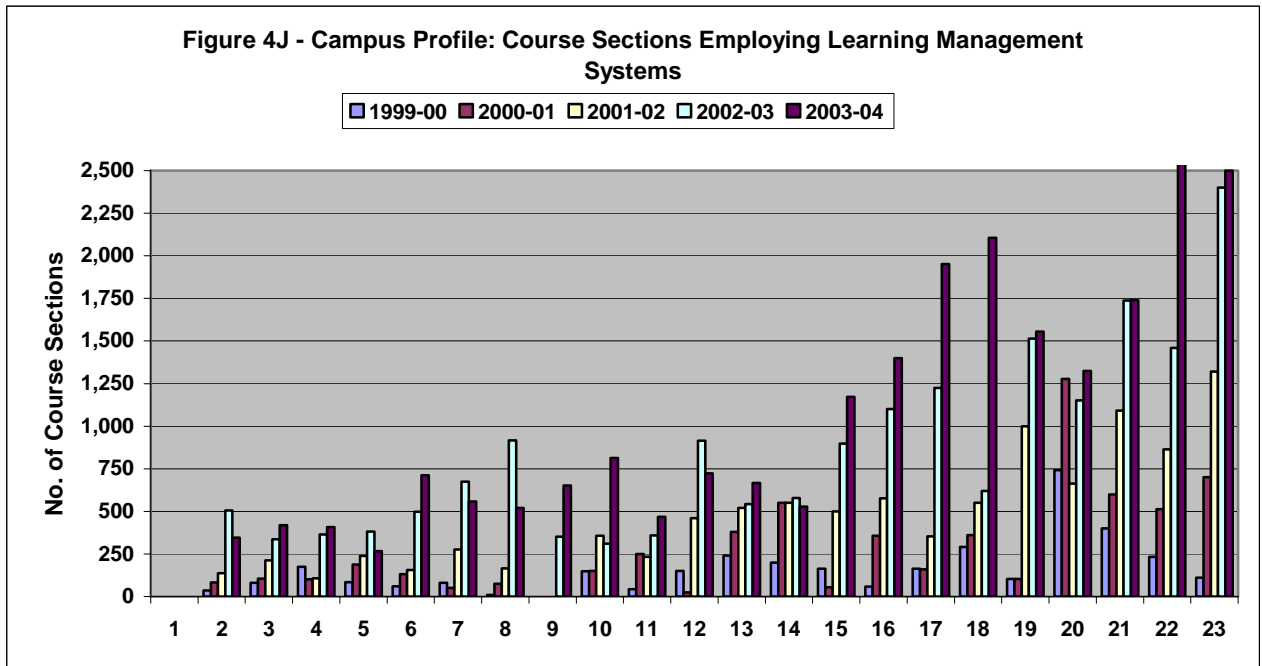
Interactive laboratory simulations provide content and a student-centered approach to learning. They represent the cutting edge of instructional technology, although their use constitutes a small fraction of Web-based learning activity, in general. The most commonly used Web-based application is learning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

Figure 4I depicts the frequency of use of learning management software. Use of this Web technology serves as a useful barometer of movement in movement toward distributed learning and teaching. Use of learning management applications in the CSU has increased over the five years since MOS tracking began in 1999-2000. The number of classes (course sections) supported by Web-based course management systems grew from 2.8 percent of all course sections offered to 18.2 percent, an increase of over 500 percent.



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. The patterns closely parallel the system trend displayed above.



The rapid increase in the use of learning management systems is an indicator of faculty interest in using Web and Internet technologies in their teaching. Between two-thirds and three-fourths of faculty report that they require the use of the campus computer network and the Internet in their classes. Students appear to like them as well, as measured by the generally high satisfaction ratings for such technologies in 2001 and 2003. 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.

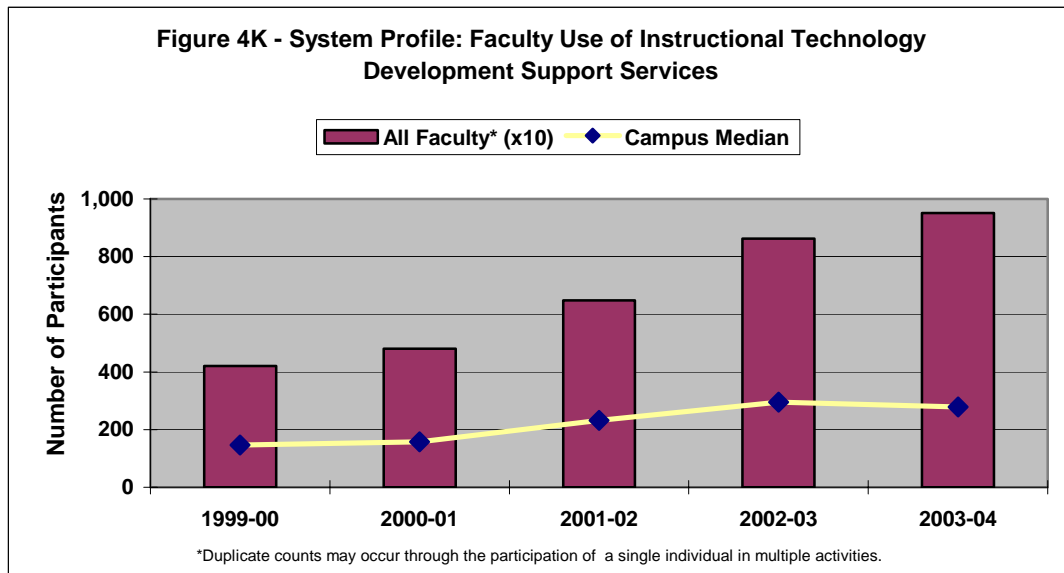
Student and faculty views are strongly at variance, however, regarding the importance of “anytime, anyplace” access to instruction. In both 2001 and 2003, students agreed strongly that access to online instruction was very important (mean scores over 8.00). Three faculty surveys since 2000 produced importance 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.

In 2003-04, 21 CSU campuses reported that they had 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. Fourteen campuses had both a campuswide center and one or more divisional centers in 2003-04. 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.

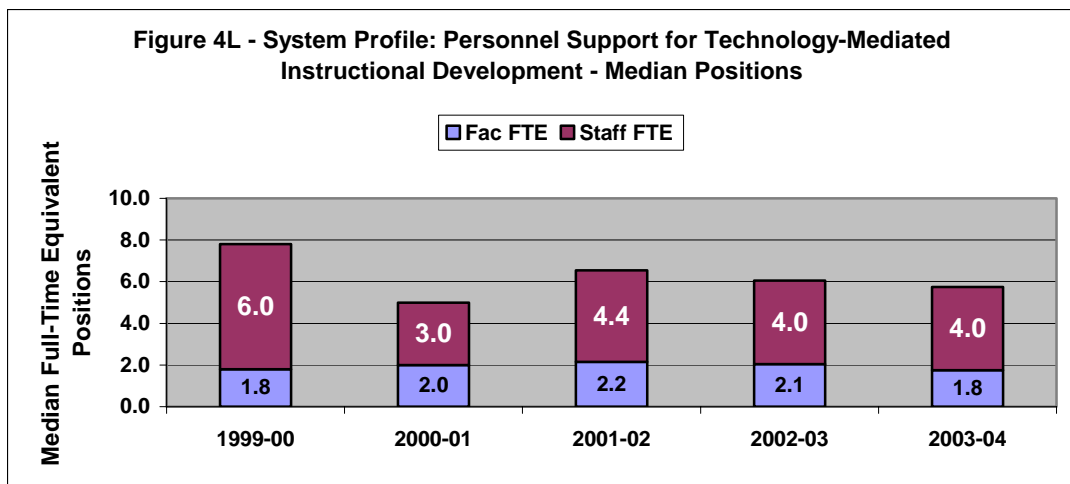
Figure 4K shows that the number of faculty who use these instructional technology services continues to increase for the system as a whole. (Campuses count faculty utilization of center services in different ways; duplicate counts are, therefore, not excluded.)



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. (This variation accounts for the modest gain in median participation shown in the above figure.)

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. Despite increased demand for services (see the figure above) and increased competition for fiscal resources, campuses have maintained a generally strong commitment to supporting faculty involvement in this arena.



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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. (Median expenditures have been adjusted to exclude the impact of very large grants of non-state funds to a single or a few campuses.)

