

Technical Briefs

Software Trends in Higher Education: 2002-2004

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Preface

Each year Educause members contribute data about their information technology activities to Educause's "Core Data Service." Educause has published three summaries for 2002, 2003, and 2004; a summary for 2005 is expected soon. This TechBrief analyzes the summary data in these three publications for trends. Researchers can have access to the database itself under restrictions to protect the privacy of the school, colleges and universities that have contributed their data. To avoid these restrictions, only summary data from the publications were used in this analysis. A subsequent analysis when the 2005 data is available would provide additional validity and perhaps new insight.

Because summary data was used and because some of the respondents in the survey changed from year-to-year, comparisons across time may not have the statistical validity expected from the large sample size.

Executive Summary

- The average school, college, or university assigned 3.8 times more information technology staff to administration than to instruction 2002 and 4.5 times as many in 2004. Over the two years there was a small increase—less than 10%--in staff for instruction compared to a 25% increase in staff for administration. This trend is consistent with overall reallocation of institutional funds from instruction and libraries to administration over the decade 1990-91 to 2000-2001.
- 82% of staff are employed in central IT; 18% are found in other units.
- The average institution employs 66 FTE IT staff; 19 in 4-year colleges offering the bachelor's degree, 25 in colleges awarding associates degrees, and 159 in doctorate universities.
- Students working in IT account for 18% of total staffing.
- The average primary student system has been installed for 9.6 years as of 2004, and 26% of the institutions expect to replace it within three years. The average library system has been installed for 7.3 years and 10% expect to replace it within three years. The average course management system has been installed for 3.8 years and 13% expect to replace it within three years.
- Blackboard Inc. is the dominant supplier of course management systems—76% of the responding colleges and universities. No other proprietary or open source system exceeds 5% of the market represented by the respondents.
- 96% of the colleges and universities have a course management system. (This may include ASP users as well).

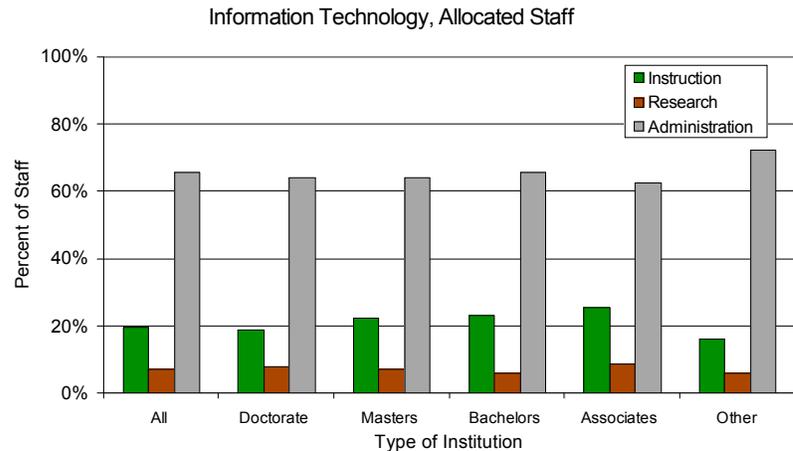
- SunGard is the largest supplier of student systems with 36% of the market. Other suppliers with more than 5% of the market include Datatel, PeopleSoft (now Oracle), and Jenzabar. 18% still use locally developed student systems.
- 38% of the responding schools, colleges and universities have implemented a Web portal. 62% license software; 12% use open source portals.
- 70% of instructional technology units report to information technology management.
- Institutions average ten instructional technologists, largely unchanged since 2002.

Colleges and Universities from the IT Perspective

1 Data for a single year is taken from Ref. 3, the 2004 summary; for time series all three summary reports Ref. 1, 2, and 3. Staffing data in full-time equivalents is given in Table A-1.

One perspective of a school, college, or university is how it allocates information technology resources. Using staffing data, higher education appears to focus its IT resources on administration.¹ With the rise of research in community colleges and the four-year liberal arts colleges, the allocation among instruction, research, and administration is not significantly different by type of institution.

Figure 1
Distribution of Information Technology Staffing by Type of Institution



Historical staffing for instruction and research as compared to administration shows continued decrease in staffing for the core mission of instruction and research as compared to administration.

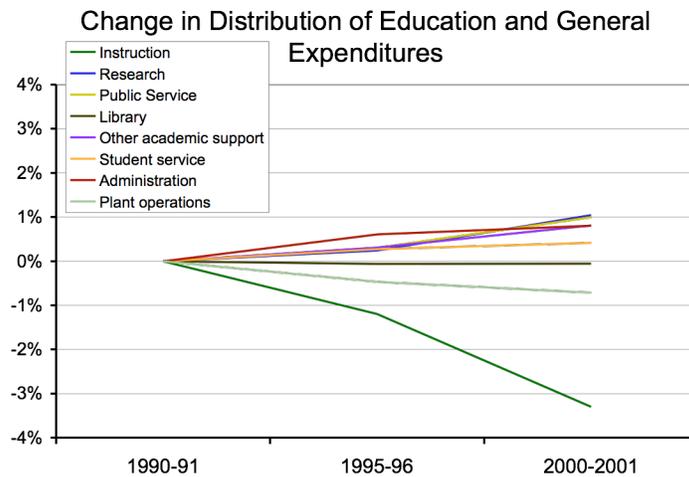
Table 1
Staffing of Instruction and Research as compared to Administration

	Compared to Administration		
	2002	2003	2004
Instruction	26%	17%	22%
Research	19%	16%	8%

2 From a presentation “Blended Learning: Pragmatic Innovation,” Georgetown University, 15 November 2006 at the JISC/CETIS Conference in Manchester UK. The next financial survey is scheduled for the 2005-2006 academic year becoming available 2008. See Reference 6, Table 342 for the data used in this graph.

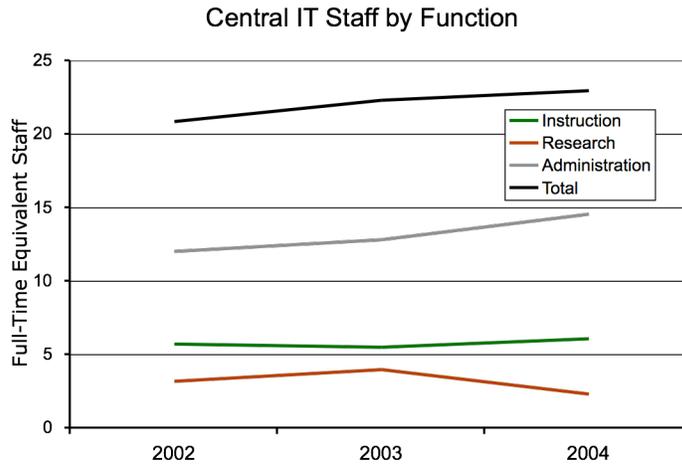
Data from the National Center for Education Statistics, U.S. Department of Education’s IPEDS surveys show a similar reallocation of funding from instruction and libraries and “savings” from deferred maintenance to administration and research during the last decade for public universities.² The conflicting trends on increased funding for research compared to the decrease in information technology staffing may come from outsourcing, perhaps in the form of grid computing, research computing, or seeking funding of computing as well as staff in research grants that would not be included in IT funding.

Figure 2
Trends in the Use of Institutional Funds.



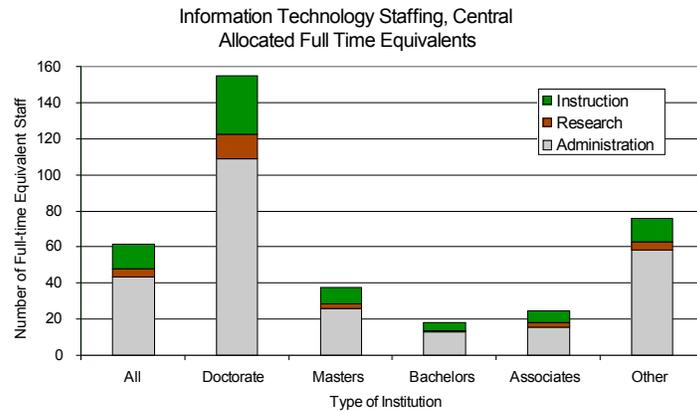
The trends in staff over the two years 2002-2004 is shown in Figure 3 for those staff directly assigned to a specific function; there are no allocations. Increase in administration, slight increase—statistically insignificant in instruction, and decrease in research.

Figure 3
Trends in Staffing for the Average College and University.



The total number of staff by type of institution is shown in Figure 4. The average teaching college or university that has about 20 full-time equivalent staff members assigned to instruction research and administration.

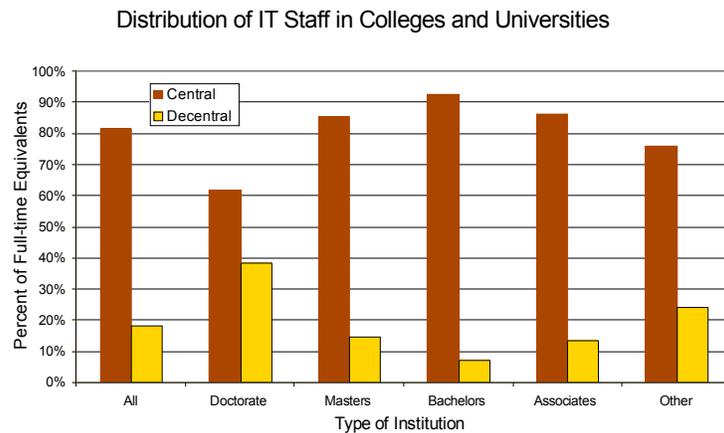
Figure 4
Total IT Staff by Type of Institution.



Organization and Information Technology Staffing

Information technology in colleges and universities is always a combination of central IT services and IT services found in schools, department, and affiliated organizations. The distribution between staff under central control and those in decentralized IT are shown in Figure 5.

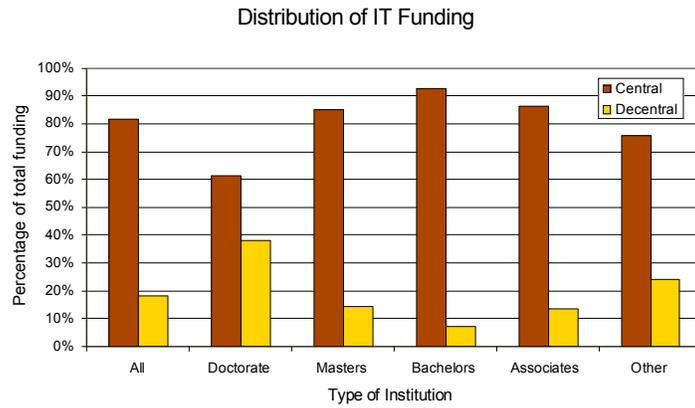
Figure 5
Distribution of Staff
Between Central and
Decentralized IT



Information technology remains a strongly centralized function in almost all schools, colleges, and universities. Likely because of research, there is more decentralized computing in doctorate institutions and some of the “other” institutions devoted to research.

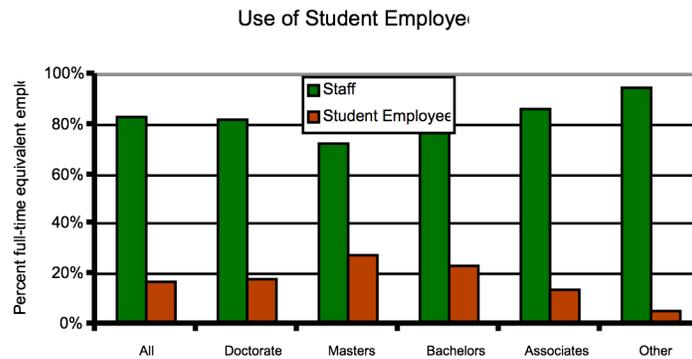
The distribution of funding, shown in Figure 6, is almost identical to the distribution of staff as expected.

Figure 6
Distribution of IT
Funding by Type of
Institution



Information technology also employs students. The division between staff and student workers is shown in Figure 7.

Figure 7
Distribution of Staff
and Student
Employees



Major Software Systems

3 Originally called course management systems, the name evolved to learning management systems to account for non-course based learning. Because of their research program, the British use the phrase virtual learning environment implying the user may have informal sources of learning as well.

There are three major systems, or aggregation of systems, in a school, college, or university: Learning systems, typically called learning management systems or course management systems in the U.S. and virtual learning environment in the UK, library systems, and administrative systems including the student information system as well as finance, human resources, and other administrative systems.³

The age of these systems are shown in Figure 8. As of 2004, the average for course management systems was 3.8, for library systems 7.3, and for administrative systems 9.6 years. Doctorate institutions have the oldest systems. A more complete list is given in Table 2. The definition of “system” here has been interpreted as different from the “major system” by including several applications in Table 2, as reported, within those shown in Figure 8.

Figure 8
Average Age of Installed System

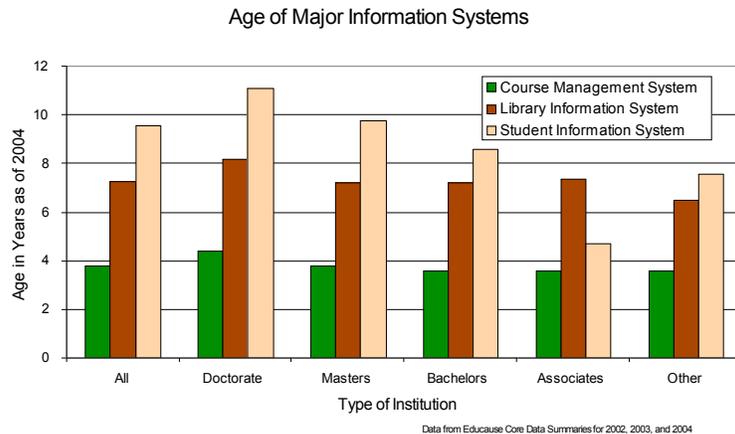
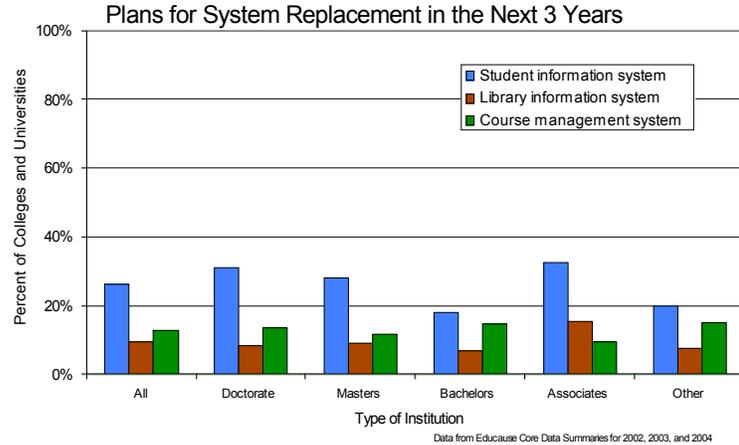


Table 2
Average Age of
Installed Systems
in Years (reported)

Systems	All	Doctorate	Masters	Bachelors	Associates	Other
Student	12	13	13	11	7	10
Financial	11	12	11	11	11	10
Human Resources	10	11	10	9	11	9
Development	9	9	10	10	8	8
Library	9	10	9	9	9	9
Course Management	6	6	6	6	6	6
Grants Management	8	9	8	7	12	7

Based on responses to the question of whether institutions would change their systems in the next three years, ten to twenty percent of the systems would be changed. Most were interested in changing their student information system, not only because of age, but perhaps because of the increasing non-traditional learning not supported by systems designs from the 1980s. The distribution by type of institution is shown in Figure 9.

Figure 9
Application Software
Replacement Plan



4 The estimated actual replacement was based on the number of changes necessary to produce the time series of data on age of systems from 2002 to 2003 and 2003 to 2004.

Analysis of the data shows institutions are changing their course management systems sooner than expected and library and student information systems later than expected. The plans and estimated actual replacements are shown in Table 3.⁴

Table 3
Planned and Actual Replacement

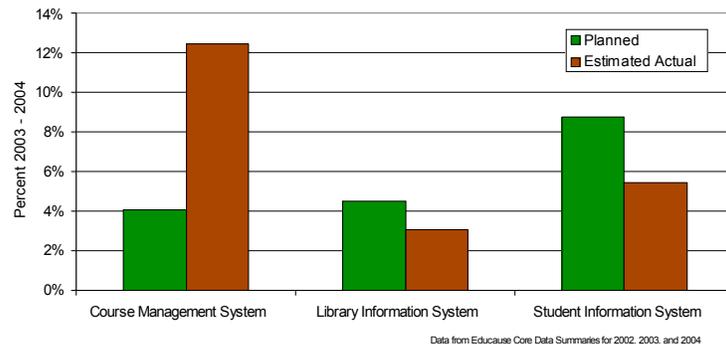
	Planned	Estimated Actual
Course Management System	4%	13%
Library Information System	5%	3%
Student Information System	9%	5%

5 The word primary is used in two senses. When describing systems, it refers to learning, library, student, and administration (collectively) systems. When used for software suppliers it refers to those that have at least 5% market share—enough to be reported by Educause in their summary reports.

This is also shown in Figure 10.⁵ The earlier replacement of course management systems may be caused by rapid consolidation of software suppliers and failure of open source to establish any significant market share.

Figure 10
Planned and Estimated Actual Replacement of Primary Software Systems

Planned and Estimated Actual Change of Application Systems

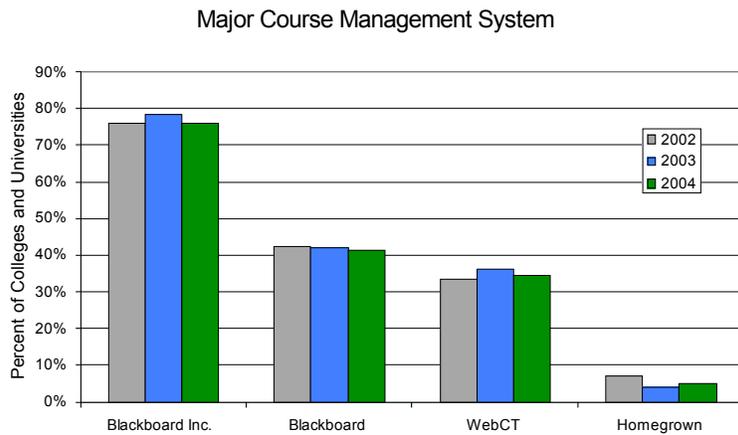


Course Management Systems

Survey participants were asked to identify their major course management system. The responses are shown in Figure 11. Educause declines to list any software supplier by name that has less than 5% of the market share as defined by the survey responses. Only two—Blackboard and WebCT—and the broad category “home grown” met this criterion.

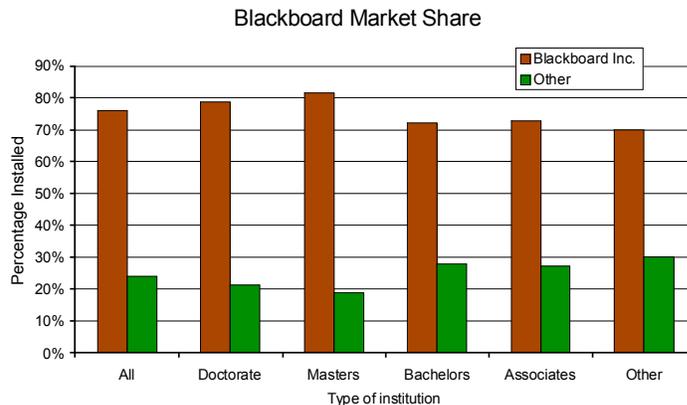
Subsequent to the survey Blackboard Inc. acquired or “merged with” WebCT; the combined market share are shown under Blackboard Inc. to differentiate it from the software product Blackboard.

Figure 11
Market Share (with 5% or more of the college and university market)



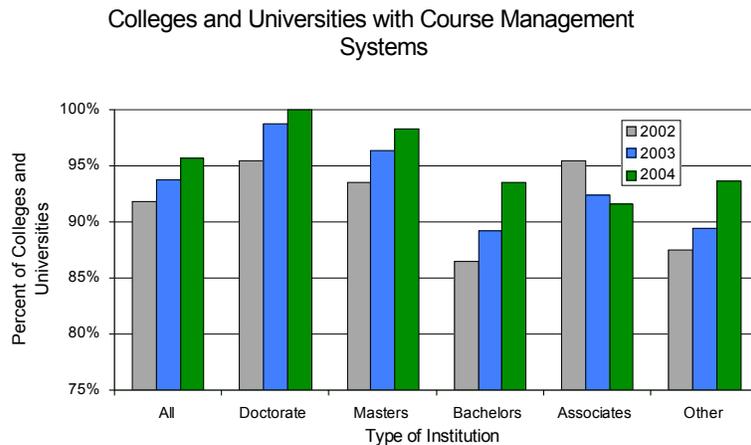
Blackboard Inc.’s market share is shown in Figure 12 by type of institution. There is little difference by type of institution.

Figure 12
Blackboard Market Share by Type of Institution



Based on market share, the course management software market is mature. This is shown in Figure 13 where almost all institutions now have a course management system. The decreasing market share for schools and colleges offering the associates degree likely comes from outsourcing on-line learning. For example, eCollege serves a number of two-year colleges. There are a number of consortia that also serve their members; some of these institutions may have reported that they did not have a course management systems “on campus.”

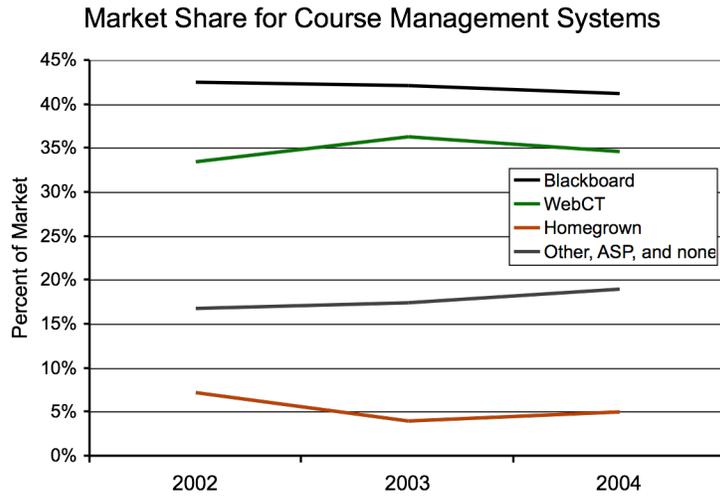
Figure 13
Colleges and Universities With a Course Management System



The trends in market share are shown in Figure 14. This suggests some of the decreases in market share were due to application service providers (ASP) such as eCollege. The Blackboard course management systems was losing insignificant market share and WebCT was gaining insignificant market share during the two years; combined no change.

The most significant reported change was in application service providers (ASP). This implies that some of the software suppliers with less than 5% market share (about 50 installations for this sample size; more than 200 for U.S. higher education) were losing market share.

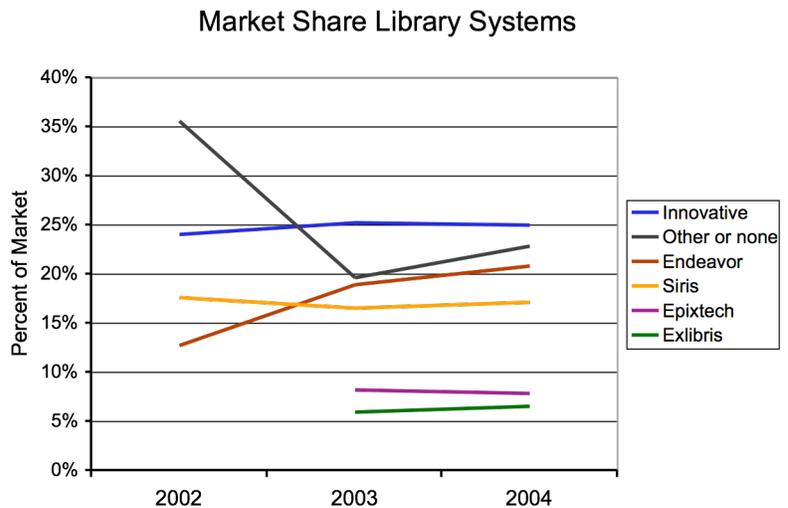
Figure 14
Trends in Market Share of Course Management Systems



Library Systems

Market share for the primary suppliers of library systems is given in Figure 15. Data was not available for Expixtech and Exlibris for 2002 either because the product was not available or had less than 5% market share—the Educause definition of “primary” supplier.

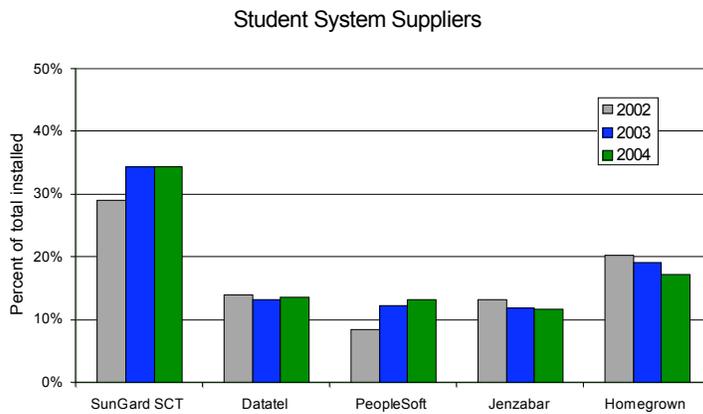
Figure 15
Market Share of Primary Library Systems Suppliers 2002-2004



Student Information Systems

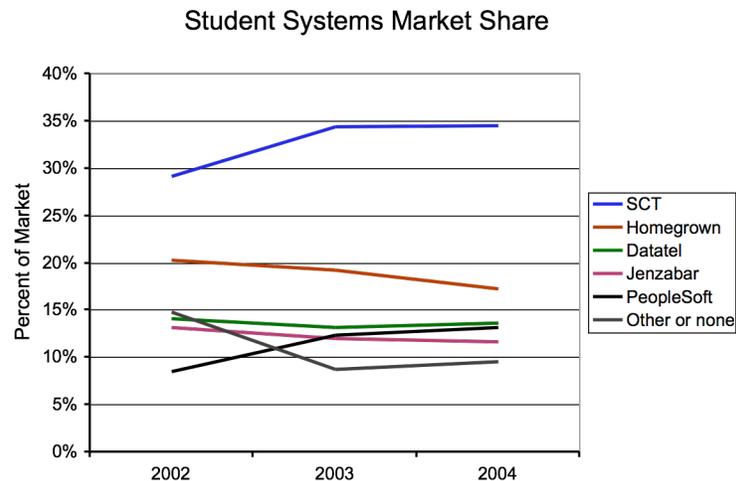
The market share of major student system suppliers is shown in Figure 16. When the survey was released, Oracle Corporation had not yet acquired PeopleSoft. The Oracle student system is not included since it had less than 5% of the market. This suggests the total for Oracle and PeopleSoft could not exceed 18%--less than half of the SunGard SCT market share. Homegrown systems have the second best market share and still—by number—a significant market for software system suppliers.

Figure 16
Primary Student System Software Suppliers



The trends for each primary supplier is shown in Figure 17. The relatively small changes in 2004 may have come from the funding and staffing reductions at institutions shown in earlier data.

Figure 17
Student Systems Market Share 2002-2004



Campus Portals

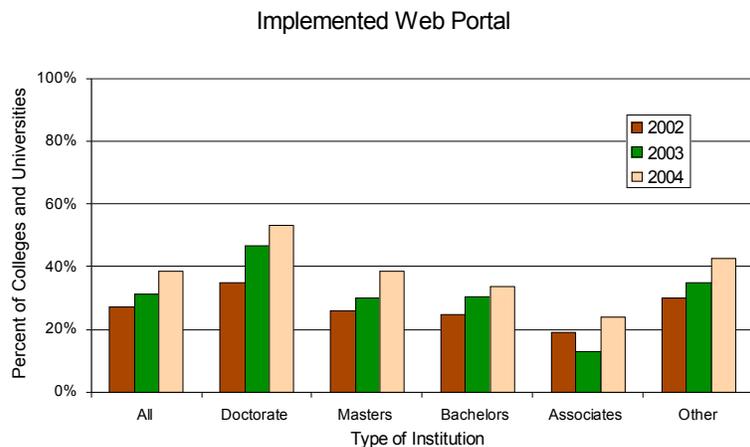
Portals are poorly defined and relatively new. Often any web application that shows several sources of data on the user's screen is called a "portal." George Mason University defines a portal for their students as "A Web site "gateway" that provides multiple services, which could include Web searching capability, news, free-email, discussion groups, online shopping, references and other services. A more recent trend is to use the same term for sites that offer services to customers of particular industries, such as a Web-based bank "portal," on which customers can access their checking, savings and investment accounts."⁶ As used here the term "portal server" may be more appropriate. It is defined as "An application that is used to develop, deliver and maintain a Web portal. It includes a variety of tools and functions, including user authentication, identity management, a search facility and content aggregation capabilities. User personalization may also be a feature, which lets people customize their own Web pages."⁷ The portal software most frequently used in higher education is SunGard's Luminus product, Oracle portal, open source uPortal, Sun portal, and IBM's Websphere, and Microsoft's SharePoint. SharePoint has different functionality from the others and does not, as the others do, support the JSR 168 portlet specification.

⁶ From "Introduction to Internet Terminology" at mason.gmu.edu/~montecini/netterms.htm, 24 November 2006.

⁷ This definition of portal server is from the TechEncyclopedia at www.techweb.com/encyclopedia/defineterm.jhtml?term=portal+server, 24 November 2006.

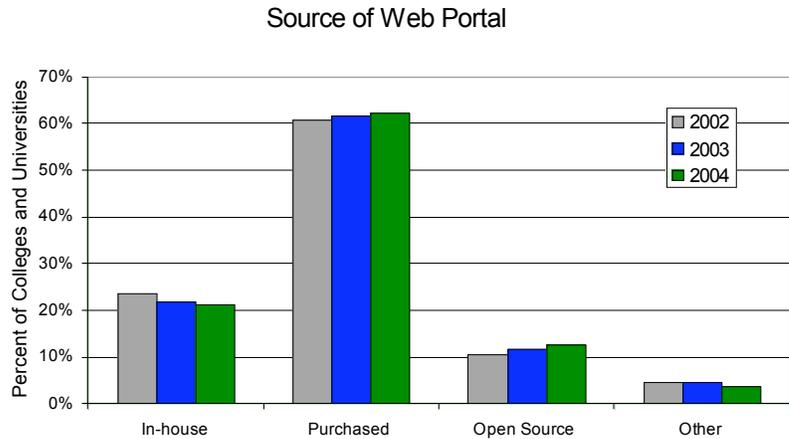
Now more than 40% of the colleges and universities would report an implemented "portal." Implementation data of the three years is shown in Figure 18 for type of institution.

Figure 18
Portal Implementation at Colleges and Universities



Portal implementation was increasing at 18% per year and accelerating. The source of the web portal software is shown in Figure 19. Because the Luminus product is based on the open source uPortal, the “purchased” portal software may include open source software provided with integration services and technical support.

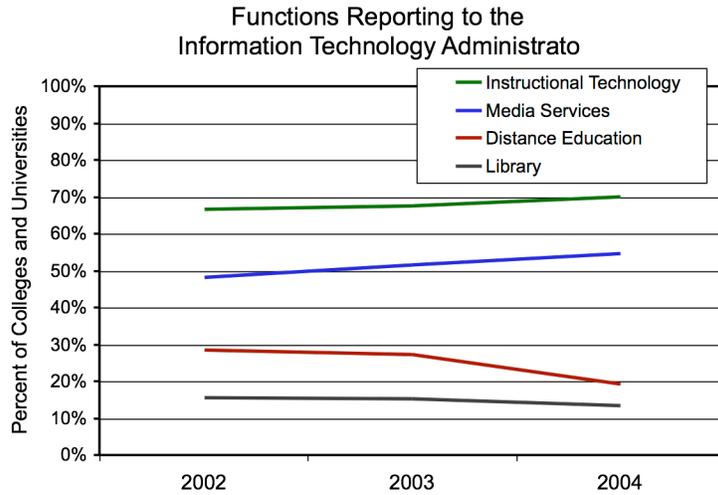
Figure 19
Type or Source of Portal Software



Instructional Technology

Instruction is a core mission of schools, colleges, and universities. Yet instructional technology and distance learning often report to information technology management. This is shown in Figure 20. More than 70% of instructional technology departments or unit now report to information technology management. Though decreasing, about one-fifth of the distance learning departments or units still are components of the information technology organization. While instructional technology may have been implemented by information technology during its early development, here mission critical instructional units are reporting to an enterprise service organization focusing on administration.

Figure 20
Instruction-related
Units Reporting to
Information
Technology
Management



Considering how important instruction technology should be to a college or university, the instructional technology units are small compared to other information technology staffing, especially for teaching institutions. This is shown in Figure 21 for the different types of institutions. The trend in staffing 2002 to 2004 is given in Figure 22.

Figure 21
Instructional
Technology Staff

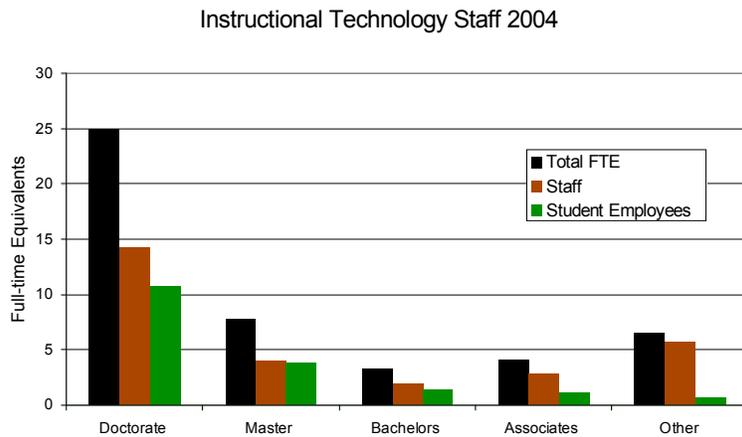
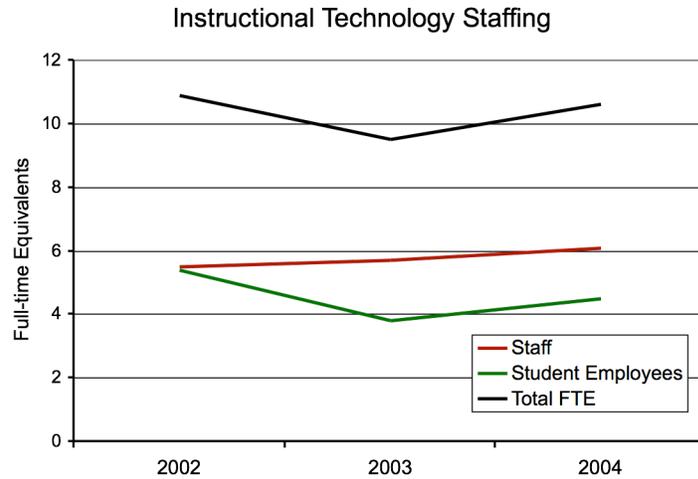


Figure 22
Trends in Instruction
Technology Staffing:
Average for All
Institutions



The relative small number of instructional technology staff available to more than half of the colleges and universities and representing more than one-half of all students in higher education may be the reason that instructional technology is relatively little used and why faculty are turning to publishers for technology support. The use of publisher-provided learning materials is summarized in Figure 23. Only the most frequently used materials are listed. The use of supplementary learning materials by faculty has increased 7% since an earlier survey two years ago. There are a number of “cartridges” available for the market-dominant Blackboard learning system, yet few were reported used at a time even though interoperability had been established for several years. Blackboard's Jan Poston Day commented:⁸

⁸ From a personal communication, email Jan Poston Day to Jim Farmer, "Use of publisher's supplementary materials," 2 December 2006. Her observation, made after the report was drafted, was added to the text before publication.

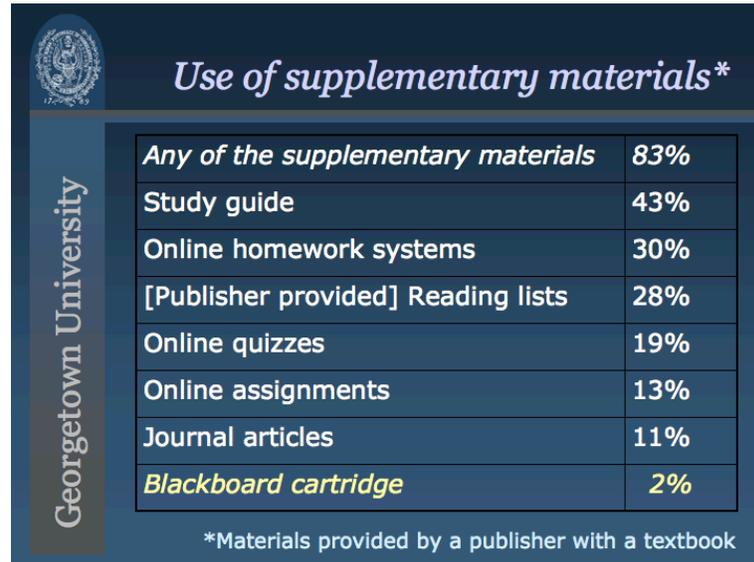
“The study did not ask how many of the surveyed instructors use online course management systems, and if so which one. Without that information it is impossible to know whether the rate of use of Blackboard Course Cartridges is high or low.

"I also suspect that many people even if they use a Blackboard Course Cartridge or WebCT ePack don't think of it as 'Blackboard' or 'WebCT' material because it isn't branded as such. Instead they think of it as their 'electronic textbook materials' and associate it with the publisher who provided it. Both of these factors would lead me to think they would be less likely to report it in a survey as 'Blackboard' Cartridge."

Though this is the most likely explanation, faculty use of publisher's online services in lieu of "cartridges" in the institution's course management system may come from under-staffing instructional technology. In economic terms, the Zogby survey suggests current instructional technology units are not fully meeting faculty demand.

Figure 23
Use of Materials
Supplementing
Textbooks.⁹

⁹ The slide is from a presentation to the JISC/CETIS Conference, 15 January 2008 in Manchester, England. The table is based on data from the Zogby Survey, Ref. 7. The press release Ref. 1, reports 75% of the faculty used supplemental materials in 2004; Ref 6 reports 83% with a 7% increase (because of rounding).



Observations

Some of the trends were influenced by available funding as schools, colleges, and universities adapted to lower funding. When the Educause 2005 survey data becomes available, the trends may become more clear. The role, organization form, and funding of instructional technology may show some significant differences, though these were not yet evident from the Educause data.

Further statistical analysis of the database itself could lead to increased accuracy, primarily by weighting the responses by the use of national data from the Institute of Education Statistics, U.S. Department of Education.

These data show information technology is following the general trend of colleges and universities to increase the funding of administration at the cost of instruction and libraries. This presents a challenge to Chief Information Officers who must provide service to instruction, research, and administration serving faculty, students, public, and administration.

References

1. “College Professors Overwhelmingly Favor New Texts; Prefer Texts with Print and Digital Packages, New Zogby Poll Reveals,” Zogby International, Utica, New York USA, 18 January 2005.
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3. Hawkins, Brian L., Julia A. Rudy, and Joshua W. Madsen, “Educause Core Data Service: Fiscal Year 2003 Summary Report,” Educause, Boulder Colorado USA, 27 September 2004.
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5. Snyder, Thomas, Alexandra Tan, and Charlene Hoffman, “Digest of Education Statistics 2003,” NCES 2006-025 National Center for Education Statistics, U.S. Department of Education, Washington, District of Columbia USA, December 2004.
6. Snyder, Thomas, Alexandra Tan, and Charlene Hoffman, “Digest of Education Statistics 2005,” NCES 2006-020 National Center for Education Statistics, U.S. Department of Education, Washington, District of Columbia USA, 31 July 2006.
7. Wittman, Rebecca and Christian Peck, “Survey of College Instructors Regarding the Use of Supplemental Materials in the Classroom, Zogby International, Utica, New York USA, 5 September 2006 (for the Association of American Publishers).

Appendix A – Data Tables
 Table A1 – Staff in Full-Time Equivalents

	All	Doctorate	Masters	Bachelors	Associates	Other
Reported Data (full-time equivalents)						
Enterprise Infrastructure	2.5	6.9	1.2	0.5	0.7	3.7
Network infrastructure	5.6	15.9	3.3	1.9	1.8	6.0
Operations	5.1	15.8	2.5	0.9	1.3	5.7
Web support services	2.4	5.4	1.7	1.0	1.1	3.1
Help Desk	3.4	7.7	2.4	1.1	1.6	4.6
Instructional Technology	6.1	15.7	4.4	2.3	2.9	5.6
Research computing	2.3	6.7	1.4	0.6	1.0	2.1
Administrative systems	12.1	34.4	6.9	3.3	3.4	14.1
User support services	8.1	18.1	5.6	3.2	3.7	10.9
Telephony	4.5	14.6	2.3	0.9	0.8	4.2
IT Policy	0.4	0.9	0.3	0.2	0.2	0.7
IT Security	1.1	2.8	0.6	0.3	0.4	1.5
Clerical support	4.8	12.6	3.1	1.9	1.6	5.3
Other	7.6	12.5	4.2	1.2	4.7	12.9
Total	66.0	170.0	39.9	19.3	25.2	80.4
Classified by function						
Enterprise	19.0	51.7	11.1	5.4	6.5	23.1
Instruction	6.1	15.7	4.4	2.3	2.9	5.6
Research	2.3	6.7	1.4	0.6	1.0	2.1
Administration	20.2	52.5	12.5	6.5	7.1	25.0
Other Indirect	13.9	28.8	8.2	3.6	6.9	20.4
Telephony	4.5	14.6	2.3	0.9	0.8	4.2
Total	66.0	170.0	39.9	19.3	25.2	80.4
Allocation of indirect FTE staff						
Instruction	13.1	32.6	9.0	4.5	6.4	13.0
Research	4.9	13.9	2.9	1.2	2.2	4.9
Administration	43.4	108.9	25.7	12.7	15.7	58.3
Total	66.0	170.0	39.9	19.3	25.2	80.4
Student employees	13.8	37.1	15.2	6.0	4.0	4.5
Central % of Total IT Personnel	81.6%	61.7%	85.4%	92.6%	86.5%	75.9%

Appendix B

Survey Sample

The number of institutions responding to the survey is given in Table B1 for the last year of the data used - 2004. The Carnegie Classification represents the classification at the time of the survey. A new Carnegie Classification has been issued and could be used in subsequent surveys. This may make comparisons with future data more difficult, but perhaps better represent the emerging types of institutions. As used here, the term “other” included art colleges, faith-based institutions, health, law and medicine if reported separately, tribal, other and those not classified, primarily non-North American institutions.

Table B1
Survey Sample

Carnegie Class	2004
AA	172
ART	9
BA AA	6
BA GEN	80
BA LA	90
BUS	2
DR EXT	122
DR INT	61
ENGR	6
FAITH	6
HEALTH	6
LAW	1
MA I	213
MA II	35
MED	13
N/A	93
OTHER	8
TRIBAL	5
Grand Total	928