THE JOHN E. ANDERSON GRADUATE
SCHOOL OF MANAGEMENT AT UCLA

Sixth Annual UCLA Survey of Business School Computer Usage

September 1989

Sixth Annual UCLA Survey of Business School Computer Usage

September 1989

Jason L. Frand
Julia A. Britt

The authors wish to thank those individuals who took the time and care to complete the questionnaire. Without their efforts this survey would have been impossible. Thanks are also extended to the fifteen Business School Computing Center directors from around the country who reviewed the draft questionnaire, Research Assistants Su-Tsen Christine Kuo and Victoria Nomura for their assistance with data entry and SAS data analyses, and Steve Bandler for his assistance in preparing the final document.

Apple Computer, Incorporated, Digital Equipment Corporation, and International Business Machines sponsored this year's survey project. Their commitment has made this research possible.

Information Systems Research Program
John E. Anderson Graduate School of Management
University of California
Los Angeles, CA 90024-1481

Executive Summary

The 1989 Sixth Annual UCLA Survey of Business School Computer Usage extends the focus of the 1987 Fourth Survey, providing the most comprehensive picture to date of the business school computing, communication, and information environment. This year, 163 schools completed the twelve page questionnaire regarding hardware, software, and resource commitments. The sample is demographically similar to samples from previous surveys.

Two words best describe the results of the Sixth survey: diversity and maturing.

Diversity: Microcomputers have become ubiquitous throughout our schools. However, this year's data indicate that there is both significant variation across all schools and within a given school. Business schools are supporting a larger variety of microcomputers, with almost every school reporting a multivendor environment with several generations of microprocessor technology. In 1987, 50% of the schools reported one or two different microcomputer models, now only 7% do; that is, 93% of the schools support between three and 14 different microcomputer models.

The list of software packages being used is extensive, with as many as 60 different packages being supported within a school. Not only were more types of software reported, but more packages appeared within each category. And, within a particular software application area, some schools are supporting multiple versions of the same software.

Maturing: The rates of growth in a number of categories have showed a decrease. For example, even though the average number of microcomputers per business school has increased between the Fourth and Sixth Surveys, it was at a slower rate than experienced between the Second and Fourth Surveys (46% vs. 63%). Microcomputer densities have also decreased slightly. The student per microcomputer ratio decreased from 37 to 29 over two years, while the faculty per microcomputer ratio decreased from 1.8 to 1.3. However, in the top quartile of schools there appears to be a leveling off at approximately one student for every ten microcomputers with faculty members having about 1.2 microcomputers available.

Another indication that maturing has occurred is the slight decrease in the number of schools which owned or supported their own mini/mainframe systems. Some of these schools indicated shifting the responsibility to the campus. Others simply did not report systems which were listed previously. It is assumed that the schools are phasing out some of their older systems and replacing them with microcomputers, in particular the high-end workstations which can support multiple users.

The use of computers in the core curriculum, both at the undergraduate and graduate levels, appears to be only about ten percent higher in 1989 than in 1985. This very slow growth may reflect the difficulty of introducing additional meaningful assignments and creating software or courseware which extends students' understanding of concepts. The barriers to introducing courseware and the overall start-up costs may be higher than our schools and faculty can afford.

Growth areas: An area of significant growth and change over the past couple of years has been the availability of data in an online format. Punched cards have all but disappeared and magnetic tape is now usually reserved for backup and storage. This shift is a direct result of the significant decrease in the cost of random access storage, both discs and CD-ROM devices.

Another area of important growth has been the connectivity of systems. There is a convergence of local and wide area networks toward single transparent communications links.

The availability of extensive electronic mail capabilities provides the basis for individuals to want to communicate electronically.

Open Questions: Once again the survey has provided data and information regarding what is happening in our business schools, but serious questions still remain.

Perhaps an important question is one of cost benefit. Has the tremendous investment, both human and capital, been worth it? To answer this question requires that some set of goals be identified against which the benefits can be measured. However, it is not clear that schools have established these goals, other than that of curriculum integration (which in and of itself is unclear).

We can also ask whether the massive introduction of microcomputer technology has made any difference. Have our institutions produced better students and higher quality research? It may well be that the computer is simply the typewriter and calculator of the 21st century and that our expectations for significant curriculum revision or change in the nature of instruction simply won't happen. The rhetoric and expectations of the eighties may have been unrealistic. Or, it may simply be too soon to see the long term benefits of the technology.

Clearly our schools, as well as the corporate community, *believe* that the investment in technology is important. There is no indication that any institution will discard the technology and return to a previous state. Thus, the real question may be how to most effectively manage these resources.

The extensive diversity of hardware and software described in this year's survey leads to several pressing issues which may become the focus of our energies and attention. Coping with the vast diversity is an increasing challenge. Some academics will want the fastest processors and latest software versions with the most advanced features. Others will be reluctant to give up their well-known software and systems which adequately meet their needs. Thus, older viable generations of hardware and software will continue to be used (frequently filtering down into the administrative offices). Support and training thus become exacerbated by problems such as different key boards, monitors, disc drives, and memory capabilities, all which constrict software options and are frequently selected based on the lowest common denominator.

Providing hardware and software is only one part of the equation for successful implementation of technology into a business school. Financial support for training, on-going consulting, and equipment maintenance is essential for a school to maximize its return on the computer investment. Additional staff are required to support the growing diversity of hardware and software inventories. Another challenge is leadership, finding individuals with the vision and management skills to integrate the constantly developing computer, communication, and information technologies, and to maintain an appropriate balance between large and small systems.

How are business schools going to pay for the high cost of technology? Or, is it a high cost? For the past six surveys, schools have allocated approximately 3.5% of their total operating budget to support computer operations. This translates into a median allocation of about $80 per student. But is this a sufficient allocation? The schools in the top quartile are spending six times this amount per student, an allocation of approximately 11% of their total school's operating budget.

What are our goals and how do we measure them? What are the benefits of the investment in information technology and are we achieving them? What technological opportunities will become incorporated into our business schools? These questions will be the focus of future UCLA Surveys of Business School Computer Usage.

Table of Contents

List of Tables

List of Figures

List of Appendices

1. Introduction

The goal of this, the Sixth Annual UCLA Survey of Business School Computer Usage, is to monitor the changing nature of the business school computing environment. The purpose over the past six years has remained the same — to provide deans and other policy makers with information they can use in making allocation decisions and program plans with regards to computing. The reader is cautioned that this survey reflects *what* the schools report they are doing, and is not an endorsement of what they *should* be doing.

The First, Second, and Fourth Surveys gathered information on the hardware, software, and other computer resources of the schools, while the Third Survey addressed issues of concern to the deans. Last year's survey, the Fifth, focused on business school computerization in terms of process, recognizing that the introduction and use of technology is ongoing and that the schools may not only be approaching computerization differently, but also at different rates.[1]

This survey, the Sixth, returns to the specific focus of hardware, software, and other computer resources, allowing an update on the specifics of the business school computer environment. However, more emphasis has been given to microcomputer labs and databases, reflecting the increasing development in these areas. Additionally, the section dealing with instruction has been expanded to include specific information regarding both entrance and graduation requirements and expectations.

For several categories of the data (budget expenditures, staff support, and student and faculty microcomputer densities), the data are divided into quartiles to give a more detailed picture of the distribution across the schools. For each quartile, the median value for the variable is reported rather than the mean, to avoid the skewing problems that occur when there are extremely high or low values in the distribution. The sample size ('N' value) varies across many of the tables and figures in this report because of missing data. Additionally, throughout this report, where appropriate and available, comparable data from the Second (1985), Fourth (1987), and Fifth (1988) Surveys are also included. However, it should be pointed out that these surveys do not comprise a longitudinal study, as the same sample of schools are not being followed over a period of time. Rather, the survey samples comprise the accredited business schools which wish to add their data to the sample. Comparisons between years are therefore somewhat misleading and should not be used to conduct any trend analyses.

This report is divided into eleven sections: Introduction, Profile of Surveyed Schools, Support Resources, Mini/Mainframes, Microcomputers, Computer Labs, Communications, Software, Instruction, Databases, and Administrative Systems. Three appendices detail demographics, mini/mainframe and microcomputer systems, and computer labs by school.

2. Profile of Surveyed Schools

The population for the Sixth Survey was once again the schools currently accredited by the American Assembly of Collegiate Schools of Business (AACSB) and seven Canadian business schools which had participated in previous surveys. Of the 269 schools available for participation, 163 completed the 12 page questionnaire, a 60% response rate. The questionnaires were completed primarily by computer center directors (36%), faculty members (26%), and assistant deans (21%).

---

[1]The Second, Fourth and Fifth Surveys have been published in the Communications of the ACM, Volume 29, No 1 (1986), Volume 31, No 7 (1988), and Volume 32, No 1 (1989).

The schools that participated in this survey are identified in the appendices. In comparison to the Fourth Survey, the last specifically focused on the hardware, software, and other computer resources, this Sixth Survey sample increased 27% (35 more schools). Seventy-three percent (93) of the 128 business schools in the Fourth Survey also provided data for the Sixth Survey.[2]

Table 1 displays general demographic information about the 163 schools in this year's sample together with data from previous survey samples. For most of the categories given in Table 1, the data has been consistent over the last five years. For example, for 1985, 1987, 1988 and 1989, participation by public versus private schools has remained approximately two-thirds public and one-third private. The level of programs, reflected in the type of degrees offered, has also stayed about the same. Similarly, the mini/mainframe facilities available at the participating schools has stayed level. Student enrollments however, continue fluctuating across the time period, yet still maintain a pretty even distribution across the full range of school sizes.

Table 1.
Demographics of Participating Schools
(Percent of Schools)

	Sixth 1989 N=163	Fifth 1988 N=175	Fourth 1987 N=128	Second 1985 N=125	First 1984 N=35
Type of School: Public	68%	68%	67%	69%	49%
Private	32	32	33	31	51
Degrees offered:					
Undergraduate only	3	2	2	2	
Undergraduate and Graduate	89	88	85	86	66
Graduate only	7	10	13	12	34
Student Enrollment (FTE):					
Less than 1000 students	22	24	25	22	37
Between 1000 and 2000	26	21	27	22	23
Between 2000 and 3000	20	23	24	26	20
More than 3000 students	31	32	24	30	20
Mini/mainframe Facilities:					
Both School and University	31	34	29	27	54
School only	6	6	7	4	6
University only	59	56	60	64	40
No data	4	4	4	5	

The schools which have joined the survey this year are a representative cross section of the study population in terms of type, degrees offered, size, mini/mainframe facilities, micro-computer density, and computer operating budget as a percent of the school's operating budget. Appendix 1 presents information on student enrollment, faculty counts, budgets, and staff ratios by school for the 1989 sample.

---

[2]The complete SAS files of the Second, Fourth, Fifth and Sixth raw data are available to interested researchers. Please contact the Information Systems Research Program, Anderson Graduate School of Management, University of California, Los Angeles, CA 90024-1481.

3. Support Resources

Computer hardware alone is insufficient for a successful implementation of technology — support staff, software, maintenance, and communication links are all necessary components. In this section we examine the financial and staff support allocations of the business schools toward the computerization effort.

3.1 Budgets

Two budget items were requested in this year's questionnaire: the total annual business school operating budget and the total annual business school computer operating budget for 1988-89 from all sources. The computer operating budget includes staff salaries, benefits and support, equipment maintenance and services, software and data acquisition and licenses, supplies, operating overhead, and computer recharge funds. It does not include major capital acquisitions, microcomputer purchases, and faculty salaries. One hundred twenty-three (76%) of the schools reported their total school budget, 126 (77%) reported their computer operations budget, and 110 (68%) reported both. Several schools noted some changes in the inclusion or exclusions. Some of the schools not answering this question indicated that the data was confidential, not available at this time, unknown, or controlled by the university and not the business school.

For the 123 schools providing data, the total annual business school operating budgets ranged from $51,800 to $84,100,000, with a median of $5,100,000. The total annual business school computer operating budgets for the 126 schools providing data ranged from $2,000 to $4,500,000 with a median of $150,000. For the 110 business schools providing data for both budgets, on the average, the computer operating budget was approximately 3.8% of the total school budget, up from 3.3% in the Fourth Survey (1987), and 3.0% in the Second Survey (1985). Thus, this year's sample exhibits a slight increase in the overall financial commitment to computer support.

Figure 1 shows the computer operating budget as allocated into support for undergraduate, MBA, research, and administrative computing requirements for the 126 (74%) schools providing data. The undergraduate and MBA allocations were similar in aggregated percentages of the total computer operating budget.

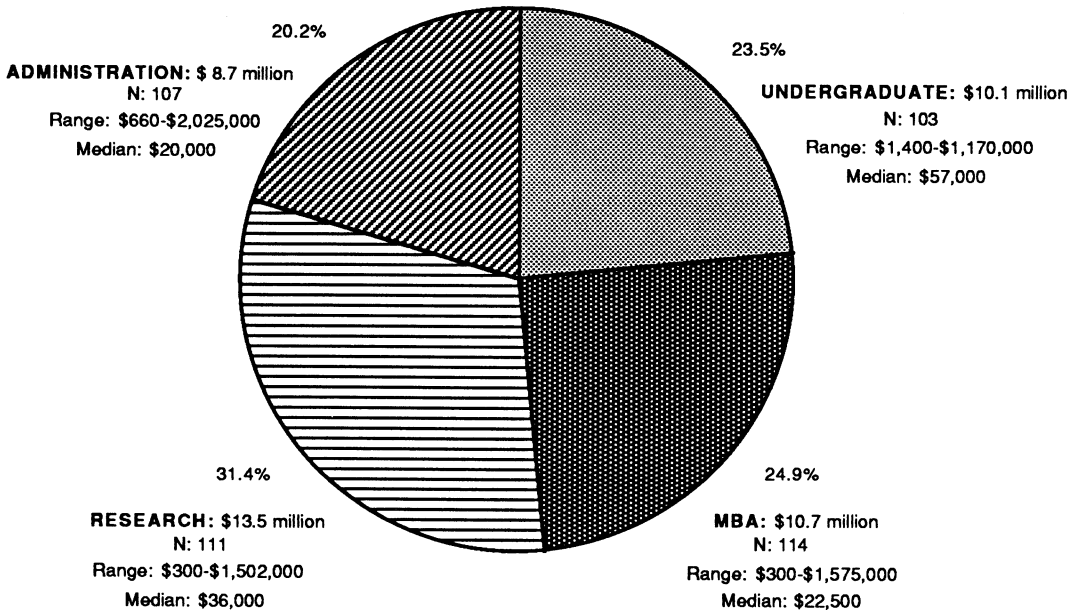
To provide another basis of comparison of the budget data across the business schools, the annual computing operating budget was converted into a per student statistic by dividing the total student FTE by the reported computer operating budget. For the 125 schools providing data, the median quartile expenditures per student were $484, $117, $40, and $14, respectively, as shown in Figure 2.

One hundred forty-three (88%) of the schools provided data regarding their sources of funding for operations and maintenance, hardware acquisition, and software acquisition. Table 2 summarizes this data, showing the percentage of schools indicating that at least 50% of funding came from a particular source. Eighty-one percent of the schools in this year's sample indicated that they were responsible for at least half of their operational budgets, a large increase over the 64% reported by the Fourth Survey (1987) sample. Private contributions have decreased as the primary source of funding for operation and maintenance, although the schools depending on funding from student charges remained about the same. This year, the sources of funding for hardware and software acquisition were separated, making comparison with the data from the 1987 survey difficult. For hardware and software acquisition, student charges

have increased slightly as the primary source of funding. Vendor donations are now shown to be mainly for hardware, rather than for software acquisition.

Figure 1.
Business School Computer Operating Budget Allocations

Total Budgets: $43 million
N: 126
Range: $2,000-$4,500,000
Median: $150,000



Student charges for computer usage were clearly not a primary source of funding for many of the business schools. One hundred six (71%) of the undergraduate schools indicated that no computer usage charges were charged for their program, and 108 (69%) of the graduate schools indicated that no computer usage charges were charged for the MBA program. However, the data from the schools which did delineate their charge structures are presented in Table 3. The computer usage charges are quite similar for the undergraduate and the MBA programs. Charges other than those specifically listed in the table included per course charges for computer majors only, a one time charge for a mandatory introductory computer course, charges per course credit, charges per semester, and hourly charges. Eleven (7%) of the business schools indicated that faculty were charged for mini/mainframe or microcomputer usage, other than university provided charge-back funds.

Figure 2.
Median Computer Operating Budget Expenditure by Quartiles

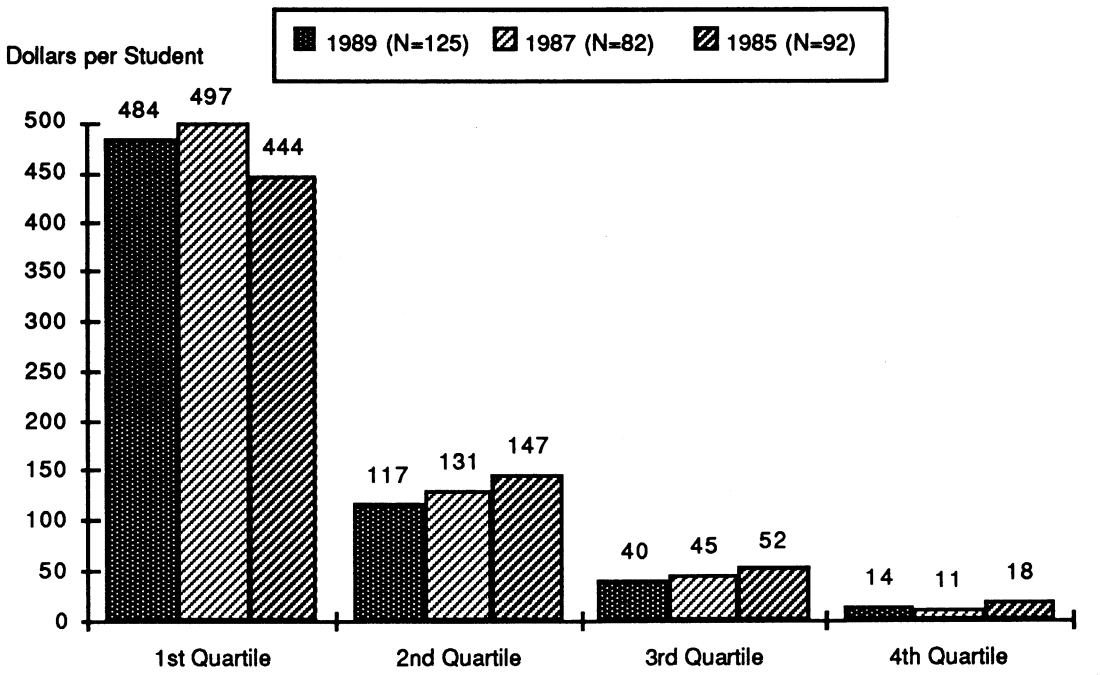


Table 2.
Primary Sources of Funding
(N =143)

	1989			1987	
	Operation & Maintenance	Software Acquisition	Hardware Acquisition	Operation & Maintenance	Hardware & Software Acquisition
At least 50% from:					
B-school or Univ	81%	71%	59%	64%	48%
State/Government	17	19	19	14	17
Vendor		3	10	2	9
Private Contribution	1	6	7	4	14
Student Charges	4	6	4	5	2

Table 3.
Computer Usage Charges at Business Schools

	Undergraduate N = 149	MBA N = 157
No computer charges	71%	69%
Charges per course	10% Range: $1-50 Median: $15	8% Range: $1-50 Median: $15
Charges per year	7% Range: $10-300 Median: $60	10% Range: $10-345 Median: $90
Charge for output (most schools indicated for laser output only)	10% Range: $.04-.50 Median: $.14	11% Range: $.04-.50 Median: $.15

3.2 Computing Staff

An extremely important dimension of a business school's computing environment is its support staff. One hundred thirty-one (80%) of the schools indicated that they had their own computing support staff, autonomous from other campus facilities and supported out of the business school computer operating budget. The total number of staff ranged from .25 to 47.5 FTE. By category, the staffs ranged from .1 to 21 FTE for technical, hardware and network staff, from .1 to 21.75 FTE for academic user support staff, from .25 to 12.75 FTE for administrative user support staff, and from .25 to 11 FTE for computer facilities management staff.

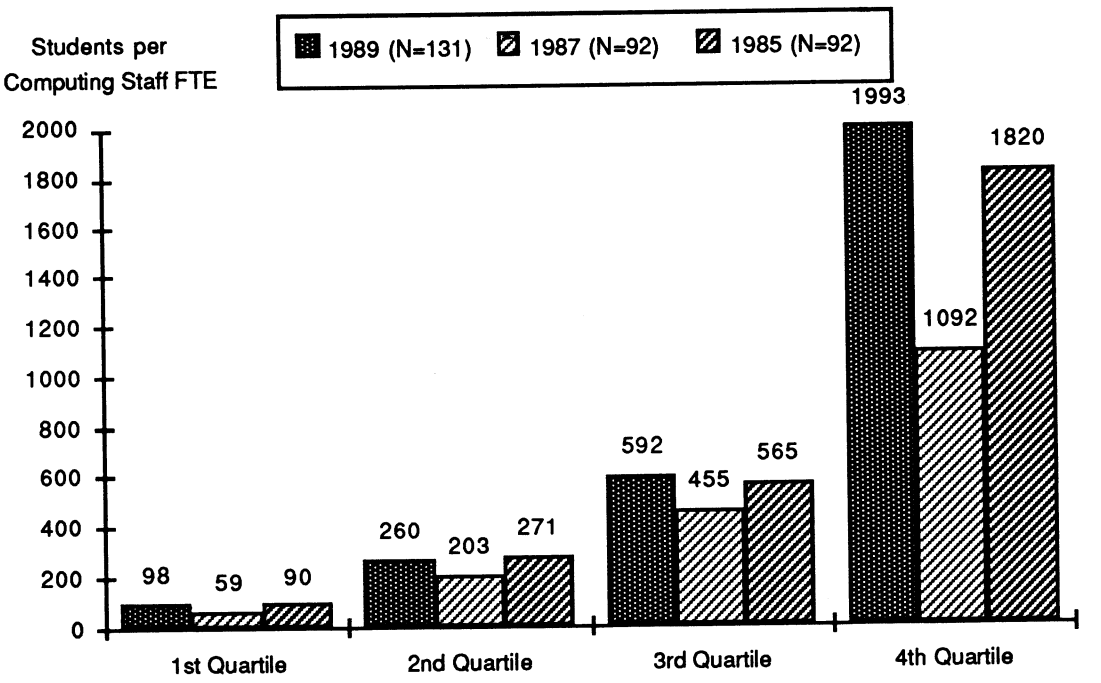
Table 4 details the business schools' staff allocations among four categories, technical (hardware and network), academic user support, administrative user support, and computer facilities management. Based on quartile medians, schools in all quartiles appear to employ approximately twice as many academic user support personnel as technical staff. Administrative support levels seem to match computing service management levels.

To provide further comparison of the computing support staff across the business schools, the ratio of student FTE to total staff FTE was calculated. Figure 3 displays this ratio by quartile for the 131 responding schools, the median ratios for each quartile being 98, 260, 592, and 1993, respectively. Compared with the previous year's data, computing staff support has decreased in all of the quartiles. In the fourth quartile, for example, each staff member now supports 1993 students, as compared to 1820 students in the 1985 data. The disparity in student computing support between the first and fourth quartiles remains dramatic.

Table 4.
Median Computing Staff Support by Category

	Quartile			
	1st	2nd	3rd	4th
Technical Support	5.5	2	1	.5
Academic Users	10	4.5	2	.5
Administrative Users	3	1	1	.5
Management	3	2	1	.5
Total Staff FTE	21.5	9.5	5	2

Figure 3.
Median Staff Support of Computing by Quartiles



4. Mini/Mainframe Computer Systems

One hundred fifty-six (96%) of the business schools indicated that their users had access to mini/mainframe systems. Ten of these schools indicated they used only their own mini/mainframe systems, 50 schools accessed both their own and university-wide systems, and the

Table 5.
Mini/Mainframe Systems Installed by Model
(Number of Systems)

Make (at least three systems)	1989 N=61	1988 N=70	1987 N=46	1985 N=39	1984 N=33
AT&T					
3Bx	15	14	3		
Data General					
MV xxx	3	4	2		
Digital					
VAX 11/7xx	18	23	17	10	7
VAX 8xxx	8	7	4		
MicroVAX	16	11	5		
Hewlett Packard					
HP3000s	12	12	11	8	6
IBM					
4300s	17	16	13	9	2
S36,38	7	6	3	1	
NCR					
8750, 9300, Tower	3	4	3	3	
PRIME					
7xx, 8xx, 9xxx	3	5	3	4	2
WANG					
VS, OISs	4	7	5	3	6
Others (1 or 2 each)	16	18	11	21	14
TOTAL	**122**	**127**	**80**	**59**	**37**

remaining 96 schools relied exclusively on access to the university-wide systems. Appendix 2 provides detailed information on the make and models of the mini/mainframes available as reported by each school.

The 61 business schools (37%) which maintained their own mini/mainframe systems listed 122 separate computers. Table 5 displays the make, model, and number of these systems supported by at least three or more of the schools. Although 16 different vendors were represented, Digital Equipment Corporation had the largest number of systems installed, with 42 (34%) of the total 122. The VAX 11/7xx was shown to be the most installed system (18), followed closely by the IBM 4300s (17), the Digital MicroVaxs (16), the AT&T 3Bxs (15), and the Hewlett Packard HP3000s (12).

Data provided by 35 of these business schools which maintained their own mini/mainframes indicated several distinct patterns of usage, as shown in Table 6. Twenty-five of the mini/mainframes were used only for a single purpose, either for coursework (12 schools), for research (8 schools), or for administration activities (5 schools). In contrast, 17 of these larger systems were shared in all three categories of use. The combination of research and administration use was the least popular.

Twenty-seven business schools indicated they had plans for acquiring a new mini/mainframe system, usually within a one year time frame.

Table 6.
Mini/Mainframe Systems Usage Patterns
N=35 Business schools
(using 61 mini/mainframes)

	Usage Categories				
	Course		Research		Administration
12 used only for	X				
8 used only for			X		
5 used only for					X
17 used for all	X	and	X	and	X
14 used for	X	and	X		
4 used for	X			and	X
1 used for			X	and	X

5. Microcomputers

The most significant area of computer growth in recent years has been in the introduction of microcomputers. Ninety-nine percent of the schools in this Sixth Survey (1989) provided microcomputer data. The total number of microcomputers at these business schools ranged from 11 to 793, with quartile median values of 54, 114, 194, and 314. Appendix 2 presents microcomputer information detailed by school.

5.1 Models and Market Penetration

Table 7 displays the variety of microcomputers reported by the schools owning four or more of the same systems. In total, at least 31 different microcomputer manufacturers were represented, and 48 different microcomputer models. Eighty-six percent of the schools again reported having four or more IBM PCs or PC/XTs, 49% IBM PS/2s, 35% Macintosh Pluses or SEs, 34% IBM PC/ATs, and 29% Zeniths or Zenith 150s. All of the other models were reported by less than 20% of the schools.

Table 7.
Microcomputer Systems by Model
(Percent of Schools with Systems)

Participating Schools	1989 N=161	1988 N=175	1987 N=128	1985 N=119
Model (at least 4 systems)				
IBM PC, PC/XT	86%	86%	86%	82%
IBM PS/2	49	31		
Macintosh Plus/SE	35	29	26	13
XT Clone	35			
IBM PC/AT	34	35	35	5
Zenith	29	42	30	10
Macintosh II	17			
AT Clone	17			
HP Vectra 286	13	11	9	3
AT&T 286	12	14	6	0
386 Clone	8			
HP Vectra 386	7			
HP 150s	6	7	10	4
Unisys	6	7	8	4
DEC Rainbow	6	6	6	13
Apple II series	5	7	10	16
Leading Edge	4			
AT&T 386	3			
Tandy	2	4	2	10
NCR	2			
Other	33	35	31	19

In general, the number of leading vendors has remained about the same, yet the diversity of separate models supported by the business schools has greatly increased. Table 8 documents this change. For example, in 1987 about 50% of the respondent schools were supporting one or two different microcomputer models, yet in 1989, only 7% of the schools supported one or two models. In other words, 93% of the schools are now supporting at least three models, in many cases extending across two or three generations of microprocessor chips. For example, a single vendor school may have IBM PCs with 8086 chips, PC/ATs with 80286 chips and PS/2s with 80386 chips.

One hundred sixty-one schools reported owning a total of 30,740 microcomputers. Table 9 details these microcomputers for the models for which at least 300 systems were reported. The total number of systems continues to grow, but at a much slower rate, 13% over the past year, in contrast to 62% and 75% between 1987-1988 and 1985-1987 respectively. The rate of growth in the average number of systems per school, however, has increased slightly, 23% compared to 18% between 1987 and 1988. The early IBM PC and PC/XT together with the XT clones remain dominant, representing 39% of the microcomputer systems, while the other contending models, except for Zenith, are very close together at just under 10%.

Table 8.
Different Microcomputer Models Supported by School
(N = 161)

Number of different microcomputer models	1989	1987
1	1%	17%
2	6	35
3	11	24
4	15	12
5	18	7
6	14	3
7	10	
8	7	
9	8	
10	5	1
11-14	4	

Table 9.
Microcomputer Systems by Model
(Number of Systems)

Participating Schools	1989 N=161		1988 N=175		1987 N=128		1985 N=119	
Model (>300 systems)	n	%	n	%	n	%	n	%
IBM PC,PC/XT	9,286	30	10,149	37	7,509	45	5,120	54
Zenith	3,923	13	3,274	12	1,791	11	411	4
XT Clones	2,714	9						
IBM PS/2	2,393	8	1,305	5				
Macintosh	2,165	7	1,893	7	925	5	457	5
IBM PC/AT	1,827	6	2,110	8	1,194	7	259	3
HP Vectra 286	1,194	4	538	2	349	2	40	0
AT Clones	1,055	3						
AT&T	1,043	3	1,172	4				
Unisys	881	3	765	3	593	4	544	6
HP Vectra 386	632	2						
Mac II	444	2						
DEC Rainbow	409	1	557	2	585	4	855	9
Leading Edge	403	1						
ITT	351	1						
Others	2,020	7	5,447	20	3,779	22	1,870	19
Total	**30,740**	**100%**	**27,210**	**100%**	**16,725**	**100%**	**9,556**	**100%**
Average systems per school	191		155		131		80	

5.2 Microcomputer Densities

Two ratios were calculated to provide further understanding of the penetration of microcomputers in the business school computer environment. The first, a student-per-microcomputer ratio, was calculated by dividing the total student FTE by the number of the school's microcomputers available for student use. This density measure thus reflects the number of students who share access to a single microcomputer. For example, a student microcomputer density of 28 is interpreted as 28 students sharing access to the microcomputer system. The second ratio, faculty-per-micro, was calculated by dividing the faculty FTE by the number of the school's microcomputers available exclusively for faculty use. As these ratios do not take into consideration any microcomputer systems that might be owned by the students or the faculty, the ratio denominators are probably understated. Thus, the actual number of students or faculty who share access to microcomputer systems is probably lower (i.e., better) than reported.

Of the 154 schools who provided the necessary data, the median student-per-micro density, by quartiles, are 10, 22, 36, and 65, respectively, as shown in Figure 4. Of the 158 business schools providing the necessary data, the median faculty-per-micro densities are 0.8, 1.1, 1.5, and 2.6, as shown in Figure 5. These figures reflect the continuing, but slowing, growth of microcomputers into the business school computer environment.

Figure 4.
Student Microcomputer Density by Quartiles

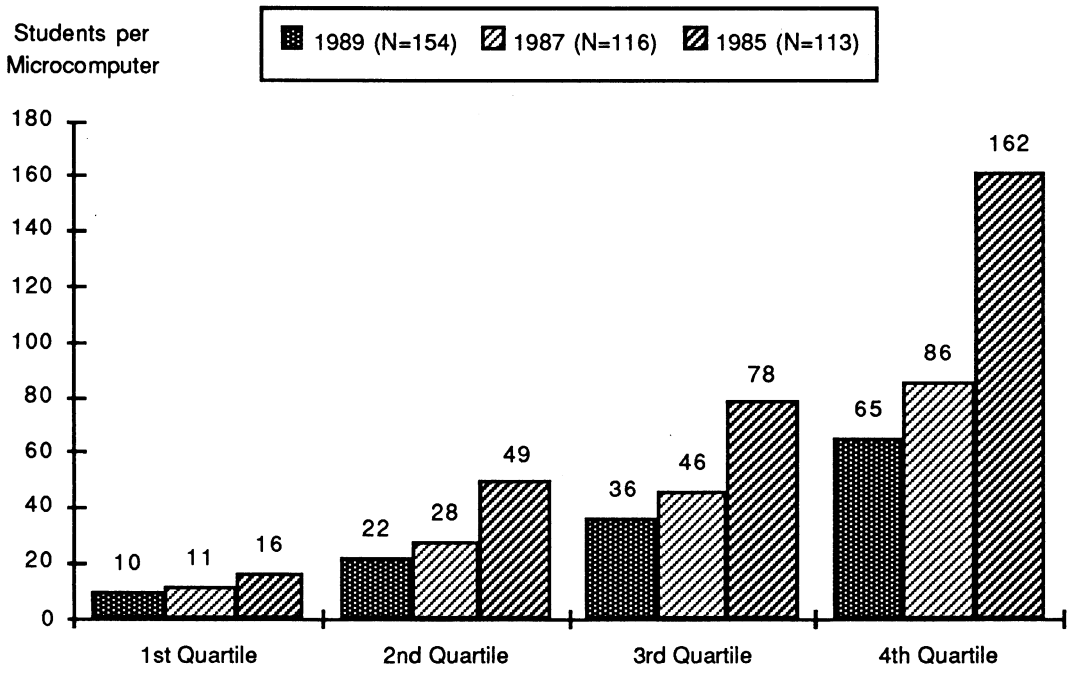
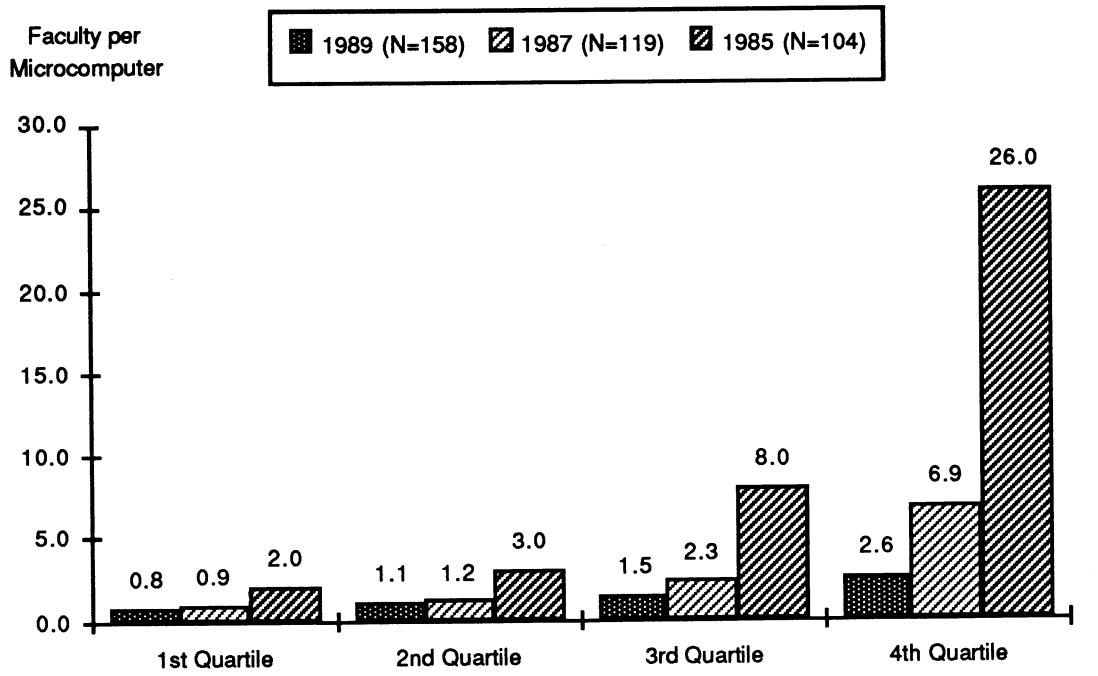


Figure 5.
Faculty Microcomputer Density by Quartiles



5.3 Acquisition and Ownership

All of the business schools offering graduate programs provided data regarding their requirements for MBAs to purchase their own microcomputers for the 1988-89 academic year. Eighty-two percent (130) responded that MBAs were not required to purchase a microcomputer. Four percent (6) of the schools indicated that purchase was required for some students, usually for the Executive MBA programs. The remaining fourteen percent responded either that purchase was not required, but recommended, or that required purchase was being planned for the coming year. The makes specified in these instances were IBM or a compatible, Macintosh, or a Zenith portable system.

5.4 Maintenance

One hundred fifty-four (95%) responded to the school-owned microcomputer maintenance question. Only three of these schools responded that they had no maintenance program, or that they hadn't dealt with this issue yet. Several schools employed more than one of the maintenance options provided. Seventy-eight (51%) of the schools responded that they used their own staff for maintenance, 49 (32%) contract with outside vendors, and 91 (59%) contract with university services. Fifteen (10%) of the schools provided other responses to the maintenance question, usually indicating that maintenance was provided by the university as required, without formal contract arrangements, or that the equipment was returned to the vendor directly.

With regard to maintenance and support of faculty-owned microcomputers, 57 of the total 163 responding schools (35%) indicated that their business school provided the maintenance, whereas 100 (62%) did not. Five schools provided support for faculty-owned software.

5.5 Portable Systems

Portable microcomputer systems are considered to be an area of potential growth and expansion. This year's data showed that the average number of portables per school doubled, from 17.2 in 1988 to 34.8 as reported for 1989. Tables 10 and 11 present different aspects of the portable system data. Table 10 presents information on the portable systems installed by the

Table 10.
Portable Systems by Schools
(Percent of Schools)

Participating Schools	1989 N=163	1988 N=175	1987 N=128
Model			
Zenith	47%	43%	23%
Compaq	28	39	23
IBM Convertible	26	33	27
Toshiba	17	16	-
HP 110, 110 Plus	14	15	11
NEC	6	5	2
Tandy	3	4	-
Other	-	14	16

Table 11.
Portable Systems Supported by Vendor
(Number of Systems)

Participating Schools	1989 N=135		1988 N=135		1987 N=82	
Model	**n**	**%**	**n**	**%**	**n**	**%**
Hewlett-Packard	3,226	69	990	43	1,076	66
Zenith	502	11	291	13	77	5
Compaq	315	7	338	15	151	9
IBM	236	5	447	19	226	14
Toshiba	153	3	149	6	13	1
Tandy	113	2	11	>1	7	>1
NEC	29	<1	25	1	28	2
Other	126	3	77	3	49	3
Total	**4,700**	**100%**	**2,328**	**100%**	**1,627**	**100%**
Average systems per school	34.8		17.2		19.8	

schools, by vendor. Zenith systems increased slightly, now being available in 47% of the schools, whereas both Compaq and IBM decreased slightly. Toshiba, Hewlett-Packard, and NEC stayed about the same.

Table 11 presents the portable microcomputer systems by total numbers. Exactly the same number of schools reported having portable systems, yet there was a growth in overall percentages due to differences in the sample sizes between 1988 and 1989. Eighty-three percent of the business schools in this Sixth Survey (1989) reported having portable microcomputers, up from 77% in the Fifth Survey (1988). Although data was collected by model, in Table 11 the models were aggregated by vendor to summarize the data, due to the ever growing number of different models available. Hewlett-Packard clearly dominates with 69% of the systems. Zenith has taken over the second position, with 11% of the systems. IBM has dropped considerably in this past year, from 19% to now only 5%.

5.6 High Performance 32-bit Graphic Workstations

Another area of potential growth has been the 32-bit high performance graphics workstation. These systems filled a perceived void between the microcomputer and the mini/mainframe computer. However, with the emergence of the high performance microcomputers (e.g., IBM PS/2 Model 80 or Apple Macintosh IIcx), the distinction between workstations and microcomputers is becoming a gray area. Table 12 presents the information on workstations found in this year's sample of schools, ranked by the percentage of schools with a particular model. The table shows that there has been only a slight increase in the number of schools acquiring workstations, although the actual number of workstations has more than doubled. Sun Systems are still found in most of the schools, while Vaxstations are the most abundant, accounting for 49% of the reported systems.

Table 12.
High Performance 32-bit Graphic Workstations

	1989 N = 33			1988 N = 31		
	Percent Schools	Total Systems n	%	Percent Schools	Total Systems n	%
Model						
Sun	39%	73	23%	42%	50	34%
Vaxstation	36	153	49	19	16	11
IBM RT	30	33	10	26	59	41
Xerox	9	30	9	3	4	3
HP Apollo	9	21	7	10	13	9
NeXT	9	3	1			
TI Explorer	9	3	1	10	3	2
Total		**316**	**100%**		**145**	**100%**

6. Computer Labs

Data on computer labs was provided by 157 (96%) of the business schools. Four hundred ninety separate computer labs were identified, accounting for 12,450 microcomputers, an average of 25.4 microcomputers per computer lab. Appendix 3 details the computer lab environment for the 468 labs reported which had four or more microcomputer systems.

The 12,450 microcomputers in the labs comprise 40% of the total microcomputers reported in this study. Twenty-two percent of the schools reported having one computer lab and an additional 23% reported two labs. Eighteen percent and 16% have three and four labs respectively, while 20% of the schools have five, six or seven computer labs. One school reported 10 labs (California State University, Fresno) and one school reported 12 labs (University of Arizona). Fifty percent of the labs are used for regular classroom instruction, and 59% of the labs have a consultant available at least two-thirds of the open hours. Eight percent of the labs were reported as dedicated for faculty use only.

The labs show extensive communication capabilities, with 50% having the microcomputers networked and 48% having the microcomputers linked to a host mini/mainframe system. Every lab reported having at least one type of output device, with dot-matrix printers being reported most often, 52%. Twenty-one percent of the schools reported a laser printer in addition to the dot-matrix, and another 11% reported a plotter as well. Only 7% of the schools reported laser printers as the only output device.

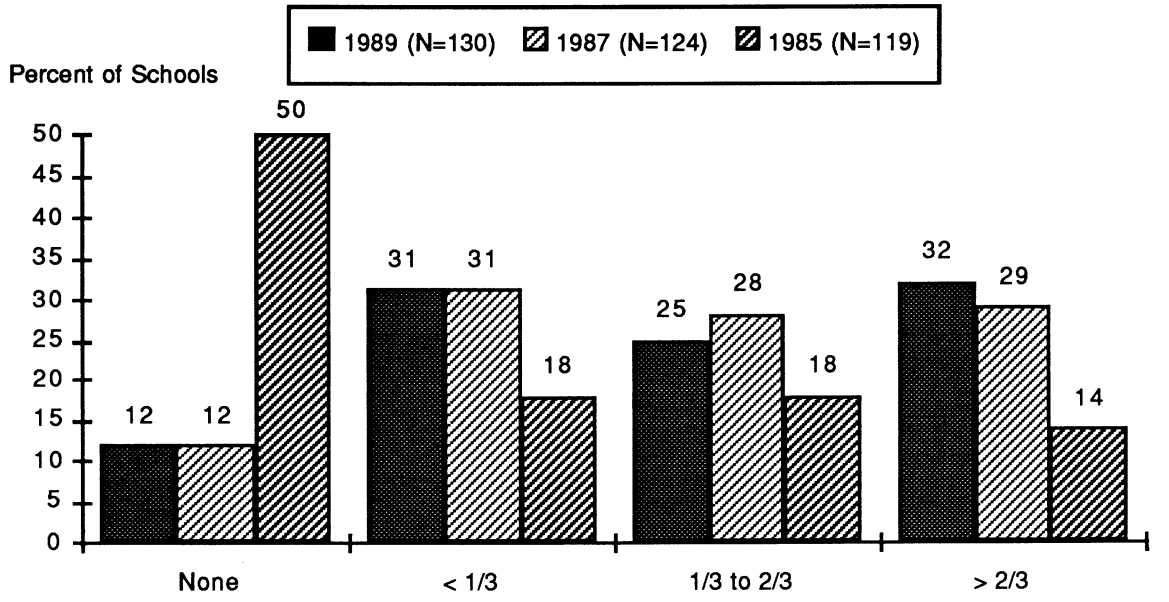
7. Communications

Connectivity between microcomputers continues to increase in the business schools. In 1989, 80% of the schools provided details of local area network software, compared to 66% for 1987 and 39% for 1985.

7.1 Microcomputer Communications

Network data provided by 130 of the business schools for 25,468 microcomputers showed that 45% (11,390) of the microcomputers are stand alones, not linked to any other computer systems. Eighteen percent (4,487) are linked to a host only, 10% (2,497) are linked to other microcomputers, and 28% (7,094) are linked to both a host and other microcomputers. Figure 6 displays these data, summarized by percentage of microcomputers with connectivity, for the 130 schools providing responses to this question. In this aggregate form very little change was seen in the amount of microcomputer networking, even though the schools making up the data were not the same. The schools with greater than two-thirds of their microcomputers networked, increased slightly whereas those schools with between one-third and two-thirds of their microcomputers networked decreased by about the same amount. The other categories stayed exactly the same. The "none" category maybe somewhat misleading, as the schools which did not provide data were not added into that category, even though it is likely that a great many of them did not provide any connectivity between their micros.

Figure 6.
Microcomputers with Communications Connectivity



7.2 Local Area Networks

Information regarding the specific hardware and software approach used in their local area networks was provided by 131 business schools. The LANs mentioned at least three times and the percentage of the individual networks also linked to a host mini/mainframe system are listed in Table 13.

With regard to the LAN systems being connected to a host mini/mainframe, the Decnet, the Ungermann Bass, and the Ethernet schools all show more than 80% connectivity of their systems to a host. Of the 144 business schools which provided data regarding a data switch, port selector, or PABX, 51% (73 schools) responded that they provide this type of access to mini/mainframes, with Micom being identified thirteen times, AT&T seven, Gandolf and Rolm each six, and IBM four.

Of the 131 business schools which reported LAN software, 58 (44%) listed only one LAN software, 33 (25%) listed two different LAN software systems, 19 (15%) listed three, 14 (11%) listed four, and 7 (5%) listed five or more.

Table 13.
Local Area Networks Installed
(Percent of schools)

	1989		1987	1985
Type of LAN (at least 3)	**N=131**	**Networked to host**	**N=84**	**N=49**
Novell (Arcnet or Netware)	47%	36%	26%	12%
Ethernet	36	83	40	24
Apple Talk	35	34	23	6
IBM Token Ring	24	57	12	
IBM PCnet	15	22	20	4
Decnet	13	94	20	6
Starlan	11	75	7	
Ungermann Bass	6	88	6	
Unisys	3	75	4	4
Others	20	31	41	

7.3 Network Applications

The distinction between local and wide area networks has become increasingly blurred as the software which bridges between the applications has become more transparent to the user. Table 14 summarizes the more common local area and wide area network applications by user group, ranked in order of average percent usage. Compared to data from the 1987 survey, electronic mail remained the most common network application. Five categories in this question (MCI Mail, online calendaring, print server, software distribution, and The Source), were indicated by less than one percent within all user groups. In all instances, the faculty user group shows a higher percent of usage than any of the other user groups.

Table 14.
Network Applications
(by User Group Percents)
(N = 149)

Application	Avg.	Under Grad	MBA	Faculty	Sec/ Admin	Computer Staff
Electronic mail	52%	28%	36%	76%	60%	59%
Document/file transfer	47	33	38	68	47	50
BITNET	47	22	37	85	30	59
Database access	42	32	40	63	36	40
File server	42	40	44	46	35	44
Disk backup/restore	30	16	18	38	34	43
CompuServe	14	9	12	30	3	17
Electronic conferencing	10	5	9	15	7	14
Internet	9	4	7	15	7	11

8. Software

The participating business schools listed the principal software packages for fifteen different categories separately by mini/mainframe and microcomputer usage as well as by instruction and research usage. Table 15 summarizes the software usage as reported by the schools for each of these categories. This table is sorted by number of schools reporting microcomputer software packages and emphasizes the variety of packages in each category. For example, the first line shows that for spreadsheets, 12 business schools listed software packages for mini/mainframes and 156 schools listed software packages for microcomputers. Within the mini/mainframe category, 7 packages were identified as used for instruction and for research. Within the microcomputer category, 17 different packages were identified for instructional usage, whereas 16 were listed as being used for research.

This summary table allows some interesting insights into the use of computers in the business schools. Five categories of software applications (communications, statistical packages, programming languages, modeling and optimization, and simulation) appear to be used about evenly on both the mini/mainframe and microcomputer systems although there is slightly more usage of statistical packages on the larger systems and communications on the smaller systems. The other ten categories of software applications are used predominantly on microcomputers. Among these, the most popular are spreadsheets, word processing, and database management systems.

Table 15.
Summary of Computer Software Usage
(ordered by number of schools reporting microcomputer sw usage)

	Mini/mainframes			Microcomputer		
		# of Packages			# of Packages	
	# Schools	Instruction	Research	# Schools	Instruction	Research
Spreadsheets	12	7	6	156	17	16
Word Processing	31	13	22	155	28	29
Database Mgmt Sys	84	32	34	148	28	23
Communications	102	22	26	126	35	39
Statistical	139	14	11	119	34	34
Prog Languages	117	19	17	115	18	16
Graphics	35	13	19	97	60	56
Modeling/Opt	85	26	27	94	38	29
Desktop Pub	20	8	7	85	13	13
Dev Tools	9	11	9	75	22	13
Business Games	37	28	4	71	52	9
AI/Expert Sys	20	10	11	69	28	24
Simulation	62	8	10	54	20	14
Integrated				51	17	12
Project Mgmt	3	2	2	48	17	10

Several applications show a considerable number of different software packages. Within the mini/mainframe category, there were 32 and 34 different software packages listed for database management systems. For microcomputers, more than 30 different software packages were listed in five areas. In the graphics category, 60 packages were for instructional use and 56

were for research use. For business games, a wide variety of packages, 52, were given for instructional use. Communications, statistics, and modeling and optimization were the other applications with more than 30 different software packages identified. The diversity of software packages within the microcomputer domain tends to substantiate the popularity of microcomputer usage over the mini/mainframes in the business school environment.

Detailed tables are given for the software applications in the sections which follow. It should be noted that for these tables a differing number of schools is shown, since some schools did not report software for that category. The count after a particular software package name reflects the number of times that package was reported by five or more schools. "Other" reflects the number of software packages reported by less than five schools.

An interesting note is that in both the 1985 and 1987 surveys, the software packages used in three or more schools could be presented in one table. This year, the criteria was increased to five or more schools, and yet the list was so extensive that separate tables were required for each category.

8.1 Artificial Intelligence, Expert Systems

This software application area, detailed for the first time in this survey, is summarized in Table 16 and shows that more software packages are specified for microcomputers than for mini/mainframe systems. LISP was the only package identified by five or more schools for the mini/mainframes. Prolog, Exsys, Guru, LISP, and VP-Expert are listed most commonly for microcomputers, with VP-Expert especially strong for instructional use.

Table 16.
Artificial Intelligence, Expert System Software
(N = Number of schools reporting software package)

Mini/mainframes (N=20)				Microcomputer (N=69)			
Instruction		Research		Instruction		Research	
LISP	5	LISP	7	VP-Expert	22	Prolog	15
Other	16	Other	18	Prolog	15	Exsys	8
				Exsys	13	Guru	8
				Guru	12	LISP	8
				Prsl Cnlt	6	VP-Expert	8
				Other	32	Prsl Cnlt	5
						Other	22
Different Packages	10		11		28		24

8.2 Business Games

As in the 1987 survey results, this type of application software remains stronger for instructional usage than for research, with Markstrat continuing to be the most popular package. However, as shown in Table 17, the high number of different packages for microcomputers, 52, reflects the integration of business games into the curriculum.

Table 17.
B[illegible]iness Games Software
(N = N[illegible]mber of schools reporting software package)

Mini/ma[illegible].ames (N=37)				Microcomputer (N=71)			
Instr[illegible]on		Research		Instruction		Research	
Markstrat	13	Other	4	Markstrat	16	Other	11
Other	27			Bus Adv	7		
				Marketing Game	6		
				Other	67		
Different Packages	28		4		52		9

8.3 Communications

Communications software is another new application area detailed for the first time in this survey. Table 18 shows a very high response rate among the schools in both computing environments. KERMIT is the most commonly used communications package, although there are a large number of other packages listed.

This application category shows a significant variety in the number of software packages being used. For example, for microcomputers 39 different packages were identified by 126 schools for research support, but only 4 packages were listed by five or more schools. Thus 35 different packages were being supported by four or fewer schools.

Table 18.
Communications Software
(N = Number of schools reporting software package)

Mini/mainframes (N=102)				Microcomputer (N=126)			
Instruction		Research		Instruction		Research	
KERMIT	72	KERMIT	80	KERMIT	76	KERMIT	80
YTERM	10	YTERM	15	Procomm	33	Procomm	37
Procomm	6	Procomm	7	YTERM	16	YTERM	20
Other	23	Other	25	Other	40	Crosstalk	7
						Other	48
Different Packages	22		26		35		39

8.4 Database Management Systems

Database management systems software is one of the top three microcomputer applications identified in Table 15. As shown in Table 19, 148 business schools listed microcomputer database software, about twice as many as reported this software for mini/mainframes.

dBase was the most dominant microcomputer package, with R:BASE the clear second choice, followed by a variety of other packages. For the mini/mainframe systems, a large variety of packages were identified with Oracle, SQL, and INGRES, mentioned about the same number of times.

Table 19.
Database Management System Software
(N = Number of schools reporting software package)

Mini/mainframes (N=84)				Microcomputer (N=148)			
Instruction		Research		Instruction		Research	
Oracle	15	INGRES	12	dBase	123	dBase	73
SQL	15	Oracle	11	R:BASE	45	R:BASE	33
INGRES	14	SQL	9	Oracle	12	Oracle	11
Informix	5	Focus	6	Focus	10	Focus	9
PowerHouse	5	Other	37	INGRES	8	INGRES	8
RDB	5			Other	30	Paradox	5
Other	28					Other	23
Different Packages	32		34		28		23

8.5 Desktop Publishing

Detailed information regarding the software packages used for desktop publishing was another of the new application categories. As may be seen in Table 20, desktop publishing is primarily a microcomputer application, with four times as many schools responding with software listings for the microcomputers as for the mini/mainframes. The most popular package for the microcomputers is PageMaker, followed by Ventura, and TeX, which also appears in the mini/mainframe category.

8.6 Development Tools

Development or CASE (Computer-aided software engineering) tools are becoming an important part of the instructional environment for system analysis and design courses. Excelerator was listed by 62 of the 75 schools identifying microcomputer-based CASE software.

Table 20.
Desktop Publishing Software
(N = Number of schools reporting software package)

Mini/mainframes (N=20)				Microcomputer (N=85)			
Instruction		Research		Instruction		Research	
TeX	7	TeX	14	PageMaker	37	PageMaker	35
Other	7	Other	6	Ventura	14	Ventura	19
				TeX	6	TeX	17
				Ready Set Go	5	Other	14
				Other	11		
Different Packages	8		7		13		13

8.7 Graphics and Presentation Software

Graphics application software, detailed in Table 21, is dominated by usage on microcomputers, with almost three times as many schools listing software than for the mini/mainframe systems. This application showed the greatest variety of different microcomputer packages with Harvard Graphics the most common. SAS Graph is the dominant graphics package for mini/mainframes.

Table 21.
Graphics and Presentation Software
(N = Number of schools reporting software package)

Mini/mainframes (N=35)				Microcomputer (N=97)			
Instruction		Research		Instruction		Research	
SAS Graph	10	SAS Graph	14	Harvard	39	Harvard	42
SPSS	5	SPSS	6	Lotus	20	Freelance	17
Other	11	Telegraf	3	FreeLance	11	Lotus	15
		Other	19	MacDraw	8	MacDraw	10
				Storyboard	7	Chart	8
				Chart-Master	6	HP Gallery	6
				HP Gallery	5	SAS Graph	6
				MacPaint	5	Other	62
				Other	65		
Different Packages	13		19		60		56

8.8 Integrated Packages

Integrated packages combine spreadsheet, word processing, database, graphics and communication capabilities under one common interface. This category applies to microcomputers only and 51 schools reported using these systems. There was no clear leader with Framework,

Symphony, Works, and Enable all listed about 10 times each. Even though integrated packages were once perceived as a potential replacement for the various separate application packages, this has not happened, and in fact there has been a 13% decrease in the number of schools listing this application between 1987 and 1989.

8.9 Modeling and Optimization

LINDO and IFPS continue to dominate this application software for both the mini/mainframe and microcomputer systems. This is one of the computer applications showing about the same amount of usage in both environments, although the microcomputer environment shows a greater number of different software packages, 38 and 29, versus 26 and 27 for the mini/mainframes, as presented in Table 22.

Table 22.
Modeling and Optimization Software
(N = Number of schools reporting software package)

Mini/mainframes (N=85)				Microcomputer (N=94)			
Instruction		Research		Instruction		Research	
LINDO	47	LINDO	38	LINDO	59	LINDO	30
IFPS	38	IFPS	27	IFPS	34	IFPS	18
Other	26	Other	27	What's Best!	11	What's Best!	5
				Storm	9	Other	31
				QSB	5		
				Other	36		
Different Packages	26		27		38		29

8.10 Programming Languages

Once the only software, programming languages now share the domain, being listed sixth in Table 15. As shown in Table 23, BASIC is the preferred programming language for the microcomputer environment, while COBOL is the preferred language for instructional purposes and FORTRAN for research in the mini/mainframes environment.

8.11 Project Management

Details on project management software are another of the application areas first appearing as separate categories in this year's survey, and again like several of the others appearing for the first time, it is a microcomputer dominated application. Harvard Project Management was mentioned by 16 schools, Mac Project by 11, and Time Line by 5.

Table 23.
Programming Language Software
(N = Number of schools reporting software package)

Mini/mainframes (N=117)				Microcomputer (N=115)			
Instruction		Research		Instruction		Research	
COBOL	73	FORTRAN	63	BASIC	84	BASIC	58
BASIC	40	BASIC	36	Pascal	30	FORTRAN	38
FORTRAN	28	COBOL	32	C	25	C	31
Pascal	26	Pascal	27	COBOL	25	Pascal	29
C	17	C	24	FORTRAN	18	COBOL	9
PL/1	6	PL/1	10	Prolog	8	Prolog	8
Other	20	Other	16	Other	12	LISP	5
						Other	15
Different Packages	19		17		18		16

8.12 Simulation

Simulation is another application which is now used about the same in both computing environments, a change from the 1987 report, when this application was primarily a mini/mainframe application. As presented in Table 24, note that GPSS dominates overall.

Table 24.
Simulation Software
(N = Number of schools reporting software package)

Mini/mainframes (N=62)				Microcomputer (N=54)			
Instruction		Research		Instruction		Research	
GPSS	36	GPSS	22	GPSS	12	STELLA	10
Simscript	15	SLAM	15	STELLA	8	GPSS	9
SLAM	13	Simscript	12	SLAM	7	Simscript	8
Other	5	Other	9	Simscript	6	SLAM	5
				Other	23	Other	10
Different Packages	8		10		20		14

8.13 Spreadsheet Packages

As indicated in Table 25, 156 schools are using 17 different spreadsheet packages with Lotus 1-2-3 continuing to dominate, being specified by about two-thirds of the schools. All of the other microcomputer software packages listed, except for SuperCalc, appear for the first time this year, with Excel making an especially prominent showing. In the mini/mainframe category, 20/20 was the only package to meet the criteria for inclusion in the table.

Table 25.
Spreadsheet Software
(N = Number of schools reporting software package)

Mini/mainframes (N=12)				Microcomputer (N=156)			
Instruction		Research		Instruction		Research	
20/20	5	20/20	7	Lotus 1-2-3	141	Lotus 1-2-3	104
Other	6	Other	5	Excel	38	Excel	40
				Ovation	21	Ovation	20
				VP-Planner	17	VP-Planner	8
				SuperCalc	6	SuperCalc	5
				Other	17	Other	13
Different Packages	7		6		17		16

8.14 Statistical Packages

Statistical software is an area in which mini/mainframes still dominate, but microcomputer versions are becoming more prevelant. Interestingly, as shown in Table 26, the major mini/mainframe packages appear to have been successfully migrated to the microcomputer environment, with SAS and SPSS dominating across both environments.

Table 26.
Statistical Software
(N = Number of schools reporting software package)

Mini/mainframes (N=139)				Microcomputer (N=119)			
Instruction		Research		Instruction		Research	
SAS	85	SPSS	98	SPSS	37	SPSS	53
SPSS	80	SAS	96	SAS	32	SAS	49
Minitab	39	BMPD	15	Minitab	26	SYSTAT	16
BMPD	10	Minitab	13	SYSTAT	13	Minitab	12
Other	12	LISREL	5	StatGraphics	12	RATS	9
		TSP	5	Microstat	6	Gauss	6
		Other	8	TSP	5	StatGraphics	6
				RATS	5	TSP	6
				Other	33	Other	32
Different Packages	14		11		34		34

8.15 Word Processing

Word processing is the single most prevelant software application. As shown in Table 27, 155 business schools listed 29 different microcomputer word processing packages. WordPerfect has remained the dominant package, reported by about two-thirds of the schools. MS Word

was reported by more business schools than WordStar, reversing the positions held in the 1987 survey data.

Table 27.
Word Processing Software
(N = Number of schools reporting software package)

Mini/mainframes (N=31)				Microcomputer (N=155)			
Instruction		Research		Instruction		Research	
Other	22	Script	6	WordPerfect	114	WordPerfect	101
		XEDIT	6	MS Word	38	MS Word	41
		TeX	5	WordStar	35	WordStar	36
		Other	27	PC-Write	13	PC-Write	10
				DisplayWrite	9	DisplayWrite	8
				MultiMate	7	MultiMate	7
				MacWrite	5	PFS Write	5
				PFS: Write	5	TeX	5
				Other	30	Other	28
Different Packages	13		22		28		29

8.16 Other Software Packages

Software packages listed in the "other" category of applications included general decision support systems, group decision support systems and conferencing software, accounting application software, CAD, bibliographic and text analysis, and utility and virus protection software. Although some of these categories of application software are situation specific, some may become presented as detailed listings as they are integrated into the general business school computing environment.

9. Instruction

Instructional oriented questions were expanded this year to include computer literacy entrance and graduation requirements/expectations, and the mix of mini/mainframe and microcomputer usage, in addition to the continuing questions regarding hands-on computer use in core courses, sources of courseware, classroom electronic equipment, and computer-related training.

9.1 Entrance and Graduation Requirements/Expectations

This Sixth Survey requested rather extensive information regarding both computer literacy entrance and graduation requirements and/or expectations, separately for the undergraduate and MBA programs. Of the 149 business schools supporting undergraduate business programs, 81% (120) stated that there were no computer literacy entrance requirements for their students. Fifteen percent (22) of the business schools had requirements. Fourteen schools required a computer course while several schools specified that some training was necessary. Others

required a hands-on exam, basic familiarity and understanding of microcomputers, or a knowledge of DOS, problem solving, and keyboard skills.

For the 157 schools with MBA programs, 66% (104) stated that there were no computer literacy entrance requirements. Twenty-nine percent (46) of the graduate business schools specified requirements, including computer concepts, MIS, applications courses (19 schools), general computer literacy (word processing, spreadsheets and database management systems), or familiarity and experience (17 schools). Five of the graduate level schools stated that they required computer proficiency hands-on exams, using microcomputer applications software. Several others mentioned workshops or non-credit remedial courses.

Table 28 summarizes the computer requirements and/or expectations upon graduation from business school for both the undergraduate and the MBA programs. The requirements are interesting in that, although the order of importance of the requirements (as suggested by the percentage rankings) are the same in all cases but one (the computer entrance exam), a larger percent of the undergraduate schools than the MBA schools specify requirements. The emphasis on microcomputer systems in the business school environment is again seen in the requirement of mini/mainframe use by only 50% of the undergraduate programs, and by only 38% in the MBA programs.

In several instances other requirements were specified, including applications introductory and statistical package courses. Additionally, 61 undergraduate schools and 29 MBA program schools required programming languages. BASIC was the required language for 67% of the undergraduate schools and 62% of the graduate program schools, followed by Pascal (15% and 3%), COBOL (12% and 7%), and FORTRAN (2%), of the undergraduate and graduate programs respectively.

Table 28.
Computer Requirements and Expectations Upon Graduation
(Percent of schools)

	Undergraduate N=149		MBA N=157	
	Required	Expected	Required	Expected
Computer/Info Sys course	91%	3%	75%	10%
Microcomputer use	83	12	76	17
Spreadsheet use	81	14	72	21
Word Processing use	71	20	51	37
Database use	58	19	41	29
Mini/mainframe use	50	25	38	30
Programming language	41	16	19	15
Online database retrieval	18	25	17	29
Computer literacy exam	11	10	12	11

9.2 Microcomputer/Mainframe Usage Mix

In order to better understand the role of mini/mainframes, this year's survey included questions concerning student usage of both microcomputer and mini/mainframe systems at the undergraduate and the graduate level. For the undergraduate programs, 145 of the 149 schools provided data, and indicated that, on the average, 80% of their student computing was done on microcomputers and 20% on mini/mainframes. For the MBA programs, all the schools provided data and indicated that on the average, 83% of their student computing was done on microcomputers and 17% on mini/mainframes. With regard to the appropriateness of this microcomputer and mini/mainframe usage mix, both the undergraduate and the graduate schools responded, on the average, that this usage mix was "about right." Only 5% of the undergraduate and 7% of the graduate schools responded in the extreme, indicating that there was too much emphasis on microcomputers, whereas none of the schools responded in the other extreme of too much emphasis on mini/mainframe usage. In general, it appears that there is only a slight concern regarding a possible overemphasis on microcomputer usage at the expense of the larger systems.

9.3 Penetration into the Curriculum

The business schools indicated whether hands-on use of computing was required in their undergraduate and graduate core courses, using the course descriptions as given by AACSB. Data was gathered on whether required computer use occurred in none, some, or all of the sections. Figure 7 summarizes the responses for the undergraduate core courses and Figure 8 for the graduate core courses.

Figure 7.
Required Computer Use in Undergraduate Core Courses

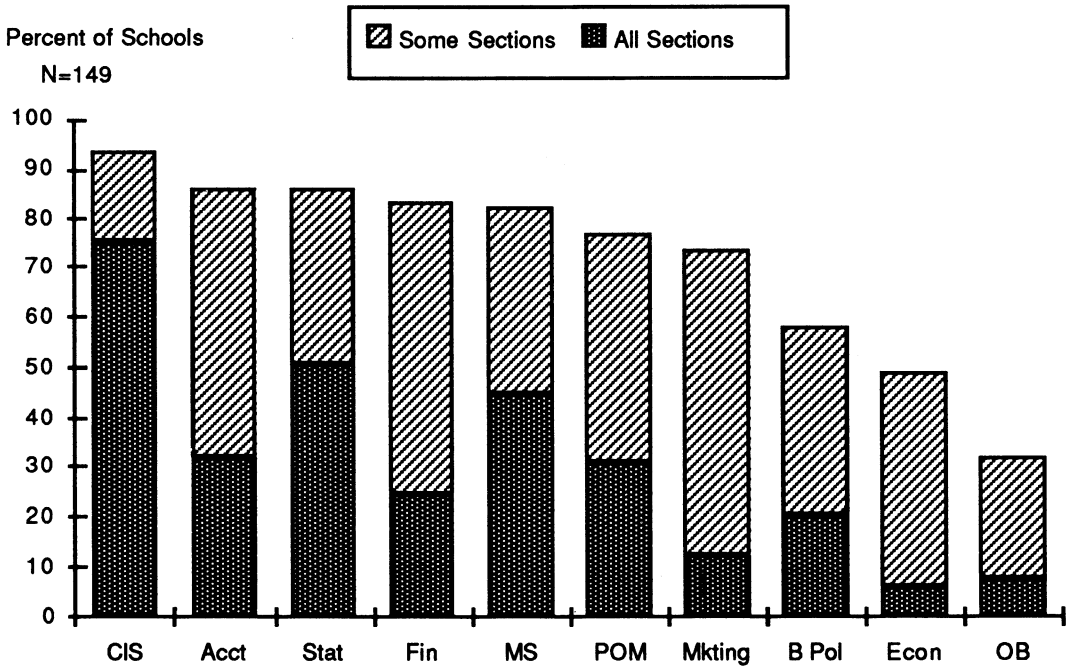
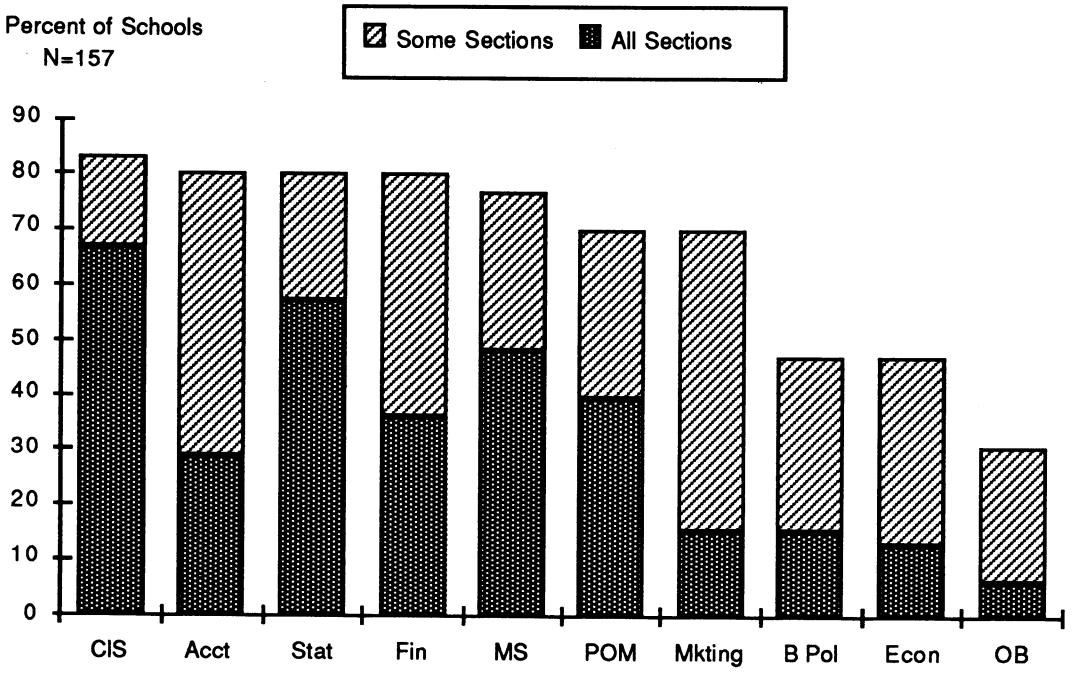


Figure 8.
Required Computer Use in Graduate Core Courses



To see an aggregate growth of required computer usage across the curriculum, the data for Figures 7 and 8 was compared with that from both 1987 and 1985, and is shown in Table 29. The net change for each academic area between the 1989 and the 1987 data was calculated, and then

Table 29.
Growth in Required Computer Usage in Core Courses

	Undergraduate				Graduate			
Core Courses	**1989**	Change	**1987**	**1985**	**1989**	Change	**1987**	**1985**
Accounting	86%	2%	84%	62%	80%	10%	70%	55%
Business Policy	58	11	47	42	47	3	44	32
Economics	49	12	37	29	47	16	31	32
Finance	83	2	81	64	80	5	75	76
Info Systems	93	-1	94	87	83	5	78	78
Mgt Science	32	6	26	20	77	3	74	77
Marketing	82	1	81	82	70	12	58	55
Org Behavior	74	5	69	52	31	9	22	21
Prod/Operations	77	3	74	78	70	-5	75	71
Statistics	86	5	81	76	80	8	72	69
Average	72%	4.6%	67.4%	59.5%	66.5%	6.6%	59.9%	56.6%

averaged into an undergraduate and graduate total for each of the years. Table 29 shows a slow, but continuing increase of computer usage for both business programs, about 5% for the undergraduate programs and 6.6% for the graduate. As can be seen in the table, the largest overall increases occurred in Economics and Business Policy at the undergraduate level and Economics and Marketing at the graduate level.

9.4 Sources of Courseware

For core courses for which a school indicated that there was at least some required computer use, the source of the courseware was requested. Courseware was either developed internally, acquired with the textbook, acquired from commercial sources, or acquired from another university. Many schools indicated multiple sources for a particular course, and some listed commercial packages such as Lotus 1-2-3 as the courseware. Tables 30 and 31 summarize this data separately for the undergraduate and graduate core courses. The "N" values in the tables are the number of schools which indicated at least some required computer use. The source percent values across each line are the percent of schools in each cell based on that "N".

Both tables indicate that commercial software packages are currently the dominant source of courseware, although when compared to the 1987 data, the graduate level course shows a 14% increase (64% to 78%), whereas the undergraduate shows only about a 7% increase (from 68% to 75%). Major increases were also seen in the amount of courseware acquired with textbooks, 21% (28% to 49%) for the undergraduate level courseware and 20% (19% to 39%) for the graduate level. The internally developed and acquisitions from other university percentages remained about the same as the 1987 data.

Table 30.
Sources of Undergraduate Courseware
(Percent of schools with required computer use)

Undergraduate Core Class	N	Internal	Textbooks	Commercial	Other University
Accounting	128	24%	62%	69%	7%
Business Policy	86	14	47	63	8
Economics	73	26	41	69	8
Finance	123	24	52	75	4
Information Systems	138	36	57	88	8
Management Science	122	25	56	80	7
Marketing	110	22	47	68	8
Organizational Behavior	48	25	48	77	6
Production/ Operations	155	23	51	74	5
Statistics	128	20	30	82	9
Average		24	49	75	7

Table 31.
Sources of Graduate Courseware
(Percent of schools with required computer use)

Graduate Core Class	N	Internal	Textbooks	Commercial	Other University
Accounting	125	26%	46%	71%	7%
Business Policy	74	19	39	69	7
Economics	73	22	33	77	4
Finance	125	29	38	80	6
Information Systems	130	33	40	86	12
Management Science	120	24	46	79	6
Marketing	109	22	36	76	6
Organizational Behavior	49	27	37	80	6
Production/ Operations	110	26	40	76	7
Statistics	125	22	33	83	7
Average		25	39	78	7

9.5 Classroom Electronic Equipment

There was an increase of 7% (83% of the business schools in the 1987 Fourth Survey to 90% in this 1989 Sixth Survey), in classrooms that are now equipped to display interactive computer output, either from terminals or microcomputers. Of the 146 schools indicating the use of interactive computer output display technology, 87 schools (60%) had permanently installed equipment; 68 schools (47%) in less than 25% of the classrooms, 10 schools (7%) in 25% to 50% of the classrooms, and 9 schools (6%) in more than 50% of their classrooms. Again, a heavy dependency was shown on mobile units which could be wheeled between classrooms. Ninety-three percent (135 schools) reported using these, with 28 schools reporting one mobile unit, 40 schools two, 20 schools three, 14 schools four, and 21 schools five or more. Most of these units were either delivered to the classroom by staff or picked up and returned by the faculty. Several of the business schools mentioned that the units were assigned or stored in the classroom, or were the responsibility of the central audio-visual department of the university.

The video projectors that were specifically mentioned included Sony (80 in 43 schools), Electrohome (35 in 18 schools), Barco (30 in 11 schools), and Sharp (8 in 3 schools). The video monitors that were specifically mentioned included Sony with 27 in 13 schools, Zenith with 14 in 8 schools and NEC with 14 in 5 schools. Datashow was the most often specified LCD device used with the overhead projectors with 119 in 72 schools, followed by Sharp with 54 in 27 schools, Magnabyte with 17 in 9 schools, and PC Viewer with 14 in 8 schools.

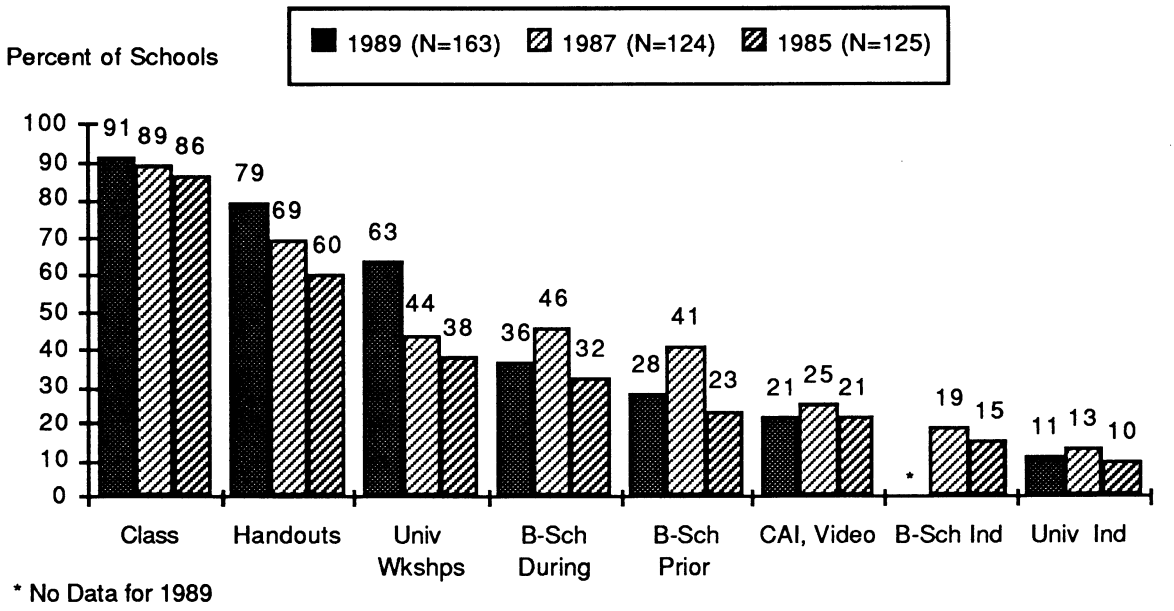
9.6 Training

Figure 9 displays the type of computer-related training for students for 1985, 1987, and 1989. In this table the relative position of the types of training have remained the same except for in university-provided workshops, which showed a large increase to become more popular than business school training during the academic year.

The respondents were also asked to identify the different types of computer-related training provided to their students, faculty, and staff, as well as to indicate the effectiveness of

the training program. Table 32 displays the data relating to seven different training approaches by user group. (The category "business school provided one-to-one" was inadvertently omitted from the questionnaire.) Classroom instruction is shown to be the dominate form of training for students, followed by handouts/documentation, and university-provided workshops. Documentation is the primary approach used for faculty, and university-provided workshops for staff. The table shows that business school workshops prior to the beginning of classes were reported to be the most effective approach for MBA students (3.3), while the university-provided workshops, even though most common, are perceived to be amongst the least effective of the approaches (2.3).

Figure 9.
Types of Computer-related Training for Students



10. Databases Available for Instruction and Research

Information regarding databases which are available for research and instruction for at least 10% of the 163 business schools in this survey is summarized in Table 33, ordered by percent of availability.

Compustat again remains the most widely used database and is available in 74% (121) of the schools. Twenty-eight percent (45) of the schools reported storing the Compustat database online, 48% (78) schools used tape storage, and 17% (27) schools reported now having Compustat available on CD-ROM. Some schools indicated that Compustat was available on all three storage media. Terminal dial-up appears to be the most common access method reported by 36% (58) of the schools. Faculty are shown to be the primary users. Continuing across Table 33, Compustat users are reported to be given "some support" by the schools, on average, and only 9% of the schools have an access charge for using the database.

Table 32.
Computer-Related Training By User Group
(Percent of Schools)

Type of Training	Undergrad N=149		MBA N=157		Faculty N=163		Staff N=163	
As part of classroom instruction	93%	3.0*	89%	2.9	23%	2.5	22%	2.7
University-provided workshops	46	2.5	80	2.3	44	2.6	76	2.7
University provided one-on-one training	10	2.3	11	2.2	34	2.9	32	2.8
Business school workshops (prior to the beginning of classes)	16	3.0	40	3.3	22	2.8	20	2.8
Business school workshops (during the academic year)	28	2.9	43	3.1	41	2.7	41	2.9
Handouts, workbooks, and other documentation	79	2.9	78	3.0	71	2.8	66	2.8
CAI, video training	20	2.2	22	2.2	23	2.2	22	2.2

* Average effectiveness, scaled 1 (inadequate) to 5 (exceptionally effective in meeting user needs).

Although usage changes by database for user group, averaging across all of the databases, the faculty were shown to be the primary users (29%), followed by the MBA students (16%), and the PhD students (14%). ABI Inform showed the highest level of support at 3.9.

Table 33.
Databases Available for Research and Instruction
N=163
(Ordered by availability)
(Percent of schools)

Availability	Database	Storage format			Access method			Primary users			Level of support for users	Access charge	Funding available
		online	tape	CD-ROM	stand-alone system	terminal dialup	via network	Faculty	PhD	MBA	1 = users on own 3 = some support 5 = extensive support		
74%	Compustat	28%	48%	17%	17%	36%	26%	67%	34%	29%	3.0 (1.3)	9%	17%
63	CRSP	26	42		7	33	28	58	31	20	3.0 (1.3)	7	14
37	Library catalog	34	1	4	6	18	23	35	18	28	3.0 (1.2)	3	5
26	Dow Jones	21	4		4	28	5	25	7	17	3.0 (1.3)	12	10
24	Citibase	12	13		4	10	13	22	11	9	3.1 (1.2)	1	3
21	Compact Disclosure	4	2	17	17	3	2	14	7	13	2.9 (1.1)	1	4
17	ABI Inform	8		11	11	7	1	12	6	11	3.9 (1.3)	4	4
17	Lexis	17			1	16	1	14	4	7	2.8 (1.4)	8	9
13	Value Line	6	6		4	4	4	13	4	8	3.2 (1.3)	1	1

11. Administrative Systems

Table 34 presents the computer-related administrative systems supported or developed by the business schools, ordered by percent of staff usage. Note that even though word processing is not a true administrative system, it is the most commonly occurring computer-related activity among business school staffs, reported by 62% of the schools in this survey.

For many of the administrative activities, end-user micro-based systems were reported more commonly than business school mini/mainframe or campus-supported systems, especially for budget preparation, faculty records, and faculty course assignment systems. The respondents indicated that most of these systems were developed in Lotus or dBase. The single most common use of business school mini/mainframes was electronic mail systems, which also has the largest number of primary users, other than word processing.

The table suggests that there are relatively few databases shared between the systems, with the possible exception of student records, admissions, and registration and enrollment, reported by approximately 22% of the schools. Very few schools listed commercial mini/mainframe administrative system software, rather that most systems were developed in-house.

Table 34.
Administrative Systems Supported/Developed by Business Schools
(N=163)
(Ordered by percent of staff usage)

Activity	Computer system (check one)			Primary users (check one)			Common database with other systems	Level of support for users
	business school		campus	faculty	students	staff		1 = users on own 3 = some support 5 = extensive support
	micro	mini/ mainframe						
Word processing	69%	13%	10%	45%	34%	62%	5%	3.5 (1.1)
Student records	13	20	36	7	3	52	24	3.4 (1.2)
Budget preparation	41	8	17	6		50	6	2.8 (1.2)
Admissions	20	20	27	4	2	49	23	3.4 (1.4)
Alumni and development	22	15	25	3		46	14	3.2 (1.2)
Class scheduling	25	12	20	10	3	42	13	3.0 (1.2)
Registration and enrollment	10	18	29	6	9	40	21	3.5 (1.2)
Electronic mail	12	27	29	39	14	36	8	3.5 (1.1)
Room scheduling	15	7	15	6	2	31	6	2.9 (1.3)
Faculty records	24	5	11	8		27	9	2.9 (1.2)
Faculty course assignment	20	7	10	9		26	8	2.9 (1.2)
Publications	29	7	5	15	1	24	3	2.8 (1.3)
Placement services	18	13	5		14	23	6	3.5 (1.3)
Contracts and grant administration	9	3	19	7		21	7	2.7 (1.1)
School catalog	9	1	13	2	2	16	6	2.6 (1.2)
Event listings	6	6	10	6	7	13	4	3.0 (1.3)
Student class bidding	3	6	7	1	11	7	8	3.7 (1.1)

SIXTH ANNUAL UCLA SURVEY: 1989
GENERAL SCHOOL DATA

INSTITUTION	TYPE	UGRAD (FTE)	MBA (FTE)	PHD (FTE)	FAC (FTE)	COMPUTER BUDGET	COMP BDGT/ STUDENT($)	COMP/TOT BUDGET(%)	STUD/COMP STAFF	COMPUTER FEE
U OF AKRON	PUB	1880	560	.	105	.	.	.	4880	
U OF ALABAMA	PUB	4282	202	119	104	356000	77	4.8	256	YES
U OF ALASKA, FAIRBANKS	PUB	600	90	.	36	150000	217	6.5	230	YES
ALFRED U	PRIV	370	.	.	21	90000	243	9.0	370	
APPALACHIAN STATE U	PUB	3500	110	.	98	150855	42	35.1	2407	YES
U OF ARIZONA	PUB	5699	330	136	136	700000	114	8.7	247	
ARIZONA STATE U	PUB	8850	794	145	190	125000	13	.	3916	
U OF ARKANSAS, FAYETTEVILLE	PUB	3222	171	74	108	100000	29	1.7	.	YES
AUBURN U	PUB	3582	163	26	115	.	.	.	.	
BABSON COLLEGE	PRIV	1546	194	218	125	.	.	.	98	
BALL STATE U	PUB	3543	394	.	107	358000	91	6.3	562	
BAYLOR U	PRIV	3076	163	.	127	260000	80	2.1	463	YES
BENTLEY COLLEGE	PRIV	5499	838	.	256	3900000	615	6.2	.	YES
BOISE STATE U	PUB	2947	222	.	69	77000	24	.	792	
BOSTON COLLEGE	PRIV	550	105	.	83	.	.	.	.	
BRADLEY U	PRIV	766	64	.	42	.	.	.	3320	
BRIGHAM YOUNG U	PRIV	4000	600	.	115	.	.	.	657	YES
U CALIF, BERKELEY (HAAS)	PUB	530	457	93	76	500000	463	2.8	166	
U CALIF, IRVINE	PUB	.	239	38	46	242487	875	5.4	50	
U CALIF, LOS ANGELES (ANDERSON)	PUB	.	900	150	106	900000	857	6.2	53	YES
CALIF STATE U, BAKERSFIELD	PUB	450	84	.	35	.	.	.	.	
CALIF POLY STATE U, SLO	PUB	1650	133	.	63	100000	56	25.0	1783	YES
CALIF STATE U, FULLERTON	PUB	6715	554	.	156	100000	14	1.2	808	
CALIF STATE U, HAYWARD	PUB	3835	604	.	107	107400	24	2.0	493	
CALIF STATE U, FRESNO	PUB	3586	238	.	117	40292	11	17.2	382	
CANISIUS COLLEGE	PRIV	1430	179	.	53	.	.	.	.	YES

CARNEGIE MELLON U	PRIV	339	513	73	95	500000	541	.	93	
CASE WESTERN RESERVE (WEATHERHEAD)	PRIV	188	710	107	58	339000	337	2.7	101	
U OF CENTRAL ARKANSAS	PUB	1650	60	.	41	200000	117	10.0	.	
U CENTRAL FLORIDA	PUB	3810	652	14	93	65000	15	.	.	
CENTRAL MICHIGAN U	PUB	2150	200	.	101	92950	40	29.2	235	
U OF CINCINNATI	PUB	1300	227	64	90	235379	148	4.6	177	
CLARK U	PUB	80	390	.	19	6000	13	0.3	78	
CLARKSON U	PRIV	495	65	.	40	.	.	.	560	
CLEVELAND STATE U (NANCE)	PUB	1600	530	20	120	1300000	605	17.3	538	
U OF COLORADO, BOULDER	PUB	2430	416	77	80	60000	21	1.2	.	
COLORADO STATE U	PUB	2230	175	.	68	98546	41	2.3	759	
COLUMBIA U	PRIV	.	1232	100	144	850000	638	2.1	111	YES
U OF CONNECTICUT	PUB	1187	1410	30	80	100000	38	3.7	876	
CORNELL U (JOHNSON)	PRIV	.	454	27	44	800000	1663	6.7	34	
CREIGHTON U	PRIV	843	233	.	44	40000	37	0.7	196	
U OF DELAWARE	PUB	1988	263	.	115	390000	173	7.2	225	
DUKE U (FUQUA)	PRIV	.	770	33	52	.	.	.	67	
DUQUESNE U	PRIV	1025	310	.	52	70000	52	28.0	.	
EAST CAROLINA U	PUB	792	121	.	62	112219	123	58.5	140	
EAST TEXAS STATE U	PUB	847	137	.	31	17500	18	33.8	656	YES
EASTERN WASHINGTON U	PUB	966	142	.	42	.	.	.	1108	
EMORY U	PRIV	250	250	.	41	200000	400	3.4	125	
FLORIDA ATLANTIC U	PUB	3377	294	7	85	250000	68	4.5	245	
FLORIDA INTERNATIONAL U	PUB	1609	336	25	103	22500	11	3.1	.	
FLORIDA STATE U	PUB	3496	202	85	119	450000	119	6.0	398	
GEORGE WASHINGTON U	PRIV	1520	1505	119	81	.	.	.	393	YES
U OF GEORGIA	PUB	4869	214	124	130	220000	42	.	868	
GEORGIA SOUTHERN U	PUB	2750	150	.	65	5000	2	7.9	.	
GEORGIA STATE U	PUB	6000	2307	167	205	550000	65	3.7	193	
HARVARD U	PRIV	.	1596	111	206	4500000	2636	3.5	36	

U OF HAWAII	PUB	1122	218	5	113	640000	476	10.7	84	YES
HOFSTRA U	PRIV	3339	436	.	119	.	.	.	3775	
U OF HOUSTON	PUB	3300	1300	100	89	130000	28	2.1	588	YES
U OF ILLINOIS, URBANA-CHAMPAIGN	PUB	3500	576	231	173	500000	116	4.0	149	YES
INDIANA U, BLOOMINGTON	PUB	1397	485	130	139	.	.	.	252	YES
INDIANA-PURDUE U, FORT WAYNE	PUB	283	171	.	37	.	.	.	252	YES
U OF IOWA	PUB	2684	685	151	102	401500	114	4.0	352	YES
JAMES MADISON U	PUB	3171	162	.	102	40000	12	16.6	3333	
U OF KANSAS	PUB	937	455	35	72	.	.	.	951	
KANSAS STATE U	PUB	2873	150	.	52	66500	22	1.9	1512	
U OF LOUISVILLE	PUB	1423	360	.	72	100000	56	1.9	1783	
LOYOLA COLLEGE	PRIV	.	.	.	.	.	.	.	.	
LOYOLA MARYMOUNT U (LA)	PRIV	1248	324	.	43	44439	28	.	524	
LOYOLA U, CHICAGO	PRIV	1319	350	.	85	.	.	.	.	
LOYOLA U, NEW ORLEANS	PRIV	1025	295	.	41	.	.	.	660	
U OF MAINE	PUB	1048	92	.	24	23880	21	16.2	.	YES
MARQUETTE U	PRIV	1960	498	.	81	100000	41	2.5	223	YES
U OF MARYLAND	PUB	1800	700	100	105	255000	98	4.2	371	
MIT (SLOAN)	PRIV	200	450	100	81	500000	667	.	88	YES
U OF MICHIGAN, ANN ARBOR	PUB	616	1709	103	135	1130000	465	3.1	95	YES
MICHIGAN STATE U	PUB	6882	601	172	178	50000	7	0.2	5103	
U OF MINNESOTA (CARLSON)	PUB	1386	2268	153	112	.	.	.	761	YES
MISSISSIPPI STATE U	PUB	2898	114	60	84	83000	27	1.6	236	
U OF MISSOURI, ST LOUIS	PUB	2400	240	.	60	200000	76	6.7	1320	
U OF MONTANA	PUB	1551	169	.	38	.	.	.	3440	YES
U OF MONTEVALLO	PUB	388	.	.	15	67000	173	7.7	388	
MURRAY STATE U	PUB	1529	112	.	60	2000	1	0.0	.	
U OF NEW ORLEANS	PUB	3806	415	28	93	55000	13	1.2	4249	
NEW YORK U (STERN)	PRIV	2066	1864	96	230	2000000	497	3.8	115	YES
NICHOLLS STATE U	PUB	800	88	.	45	53000	60	1.7	592	

U OF NORTH CAROLINA, CHARLOTTE	PUB	2341	178	.	93	33000	13	20.4	.	YES
U OF NORTH DAKOTA	PUB	1500	70	.	65	.	.	.	.	
NORTHEAST LOUISIANA U	PUB	1951	101	.	54	60000	29	.	684	
NORTHEASTERN U	PRIV	4152	953	.	143	.	.	.	851	
NORTHERN ARIZONA U	PUB	1772	47	.	64	.	.	.	.	
NORTHWESTERN U (KELLOGG)	PRIV	.	1350	100	145	.	.	.	66	YES
U OF NOTRE DAME	PRIV	1578	330	.	82	120000	63	1.6	954	
THE OHIO STATE U	PUB	3160	490	191	139	1700000	443	7.7	223	
U OF OREGON	PUB	2120	180	48	60	100000	43	25.0	335	YES
OREGON STATE U	PUB	2650	174	.	67	86000	30	2.2	533	
U OF THE PACIFIC	PRIV	571	.	.	26	6000	11	9.8	381	
PACIFIC LUTHERAN U	PRIV	525	127	.	24	.	.	.	.	
PAN AMERICAN U	PRIV	2500	70	.	44	0	.	.	.	YES
U OF PENNSYLVANIA (WHARTON)	PRIV	2455	1590	386	215	2146609	484	2.6	150	YES
PENN STATE U	PUB	5753	340	110	136	200000	32	1.2	4135	
PURDUE U (KRANNERT)	PUB	2391	317	120	105	342000	121	3.3	283	
U OF RICHMOND (ROBINS)	PRIV	365	286	.	48	17500	27	.	260	
U OF ROCHESTER (SIMON)	PRIV	.	655	48	54	494000	703	11.4	78	YES
ROCHESTER INSTITUTE OF TECHNOLOGY		1048	171	.	50	110000	90	2.7	.	
ROLLINS COLLEGE (CRUMMER)	PRIV	.	220	.	18	114000	518	5.0	110	
RUTGERS U	PUB	700	250	.	75	150000	158	2.5	.	
ST CLOUD STATE U	PUB	3908	81	.	77	106000	27	37.9	1995	
SAN DIEGO STATE U	PUB	7352	842	.	135	.	.	.	683	
SAN FRANCISCO STATE U	PUB	5712	711	.	145	105000	16	.	1071	
SAN JOSE STATE U	PUB	5681	323	.	115	150000	25	2.0	1001	
SEATTLE U	PRIV	400	255	.	43	18000	27	.	2620	
U OF SOUTH CAROLINA	PRIV	3286	850	139	125	707000	165	.	153	
U OF SOUTH DAKOTA	PUB	592	155	.	36	.	.	.	.	YES
U SOUTHERN CALIFORNIA	PRIV	2735	750	75	192	965000	271	.	171	
SOUTHERN ILLINOIS U, EDWARDSVILLE	PUB	1225	695	.	79	150000	78	3.5	120	YES

SOUTHERN METHODIST U	PRIV	657	599	.	63	240000	191	3.0	251	YES
U OF SOUTHERN MISSISSIPPI	PUB	2134	107	.	77	.	.	.	560	
STANFORD U	PRIV	.	672	75	86	2000000	2677	10.0	32	YES
STATE U NEW YORK, ALBANY	PUB	821	344	16	54	10000	8	0.3	295	
STATE U NEW YORK, BUFFALO	PUB	1136	956	97	79	60340	28	1.2	365	
SYRACUSE U	PRIV	2103	738	41	88	.	.	.	.	
TEMPLE U	PRIV	5411	643	84	209	195000	32	1.5	1023	
U OF TENNESSEE, KNOXVILLE	PUB	4100	350	135	120	310000	68	1.9	287	
TENNESSEE TECH U	PUB	1450	150	.	39	30000	19	1.1	2133	
U TEXAS, AUSTIN	PUB	8644	1128	203	149	478000	48	3.8	722	YES
U OF TEXAS, SAN ANTONIO	PUB	4000	400	.	101	20000	5	0.7	4400	YES
TEXAS A & M	PUB	6400	600	100	153	100000	14	0.8	7100	YES
TEXAS TECH U	PUB	4385	450	76	• 98	167000	34	23.9	982	YES
U OF TOLEDO	PUB	3686	300	.	96	78000	20	1.1	1993	
TULANE U	PRIV	345	479	.	63	100000	121	1.0	824	
U OF UTAH	PUB	800	200	50	60	300000	286	11.5	105	YES
UTAH STATE U	PUB	1592	185	5	50	150000	84	6.4	356	YES
VALDOSTA STATE COLLEGE	PUB	1320	32	.	31	45000	33	2.0	159	
VANDERBILT U (OWEN)	PRIV	.	.	.	.	256500	.	4.3	.	
U OF VERMONT	PUB	810	30	.	30	306424	365	.	280	
VILLANOVA U	PRIV	2321	544	.	89	.	.	.	716	
U OF VIRGINIA (DARDEN)	PUB	.	471	5	60	300000	630	3.8	60	
VIRGINIA TECH (PAMPLIN)	PUB	3241	288	107	157	800000	220	9.5	7272	
WAKE FOREST U (BABCOCK)	PRIV	333	320	.	16	95000	145	.	327	YES
U OF WASHINGTON	PUB	1414	485	98	94	300000	150	2.7	266	
WASHINGTON U (OLIN)	PRIV	526	561	23	53	450000	405	3.7	111	
WASHINGTON AND LEE U	PRIV	80	.	.	7	.	.	.	.	
WAYNE STATE U	PUB	1392	1772	.	86	.	.	.	396	YES
WESTERN CAROLINA U	PUB	1182	128	.	45	76000	58	3.3	437	
WESTERN ILLINOIS U	PUB	1807	242	.	82	35000	17	6.5	.	YES

COLLEGE OF WILLIAM AND MARY	PUB	420	325	.	52	.	.	.	1490	YES
U WISCONSIN, EAU CLAIRE	PUB	2830	47	.	70	.	.	.	.	
U WISCONSIN, LA CROSSE	PUB	2167	57	.	56	.	.	.	.	
U WISCONSIN, MADISON	PUB	1177	740	112	91	335000	165	4.9	271	
U WISCONSIN, OSHKOSH	PUB	2450	500	.	44	40000	14	11.1	3933	
WRIGHT STATE U	PUB	1782	585	.	79	14000	6	0.2	.	
U WYOMING	PUB	1275	61	27	62	61000	45	1.6	.	
YALE U	PRIV	.	367	50	72	550000	1319	.	70	YES
U OF ALBERTA	PUB	1723	110	25	114	355000	191	4.6	531	YES
U BRITISH COLUMBIA	PUB	1500	400	65	93	140000	71	0.2	655	YES
U OF CALGARY	PUB	660	350	.	87	500000	495	8.3	404	
DALHOUSIE U	PUB	850	260	.	43	200000	180	10.0	247	
MCGILL U	PRIV	1600	550	35	95	150000	69	3.0	364	YES
MCMASTER U	PUB	1546	502	14	60	60000	29	1.5	687	
QUEEN'S U, KINGSTON	PUB	750	205	35	50	95000	96	2.9	1980	YES
U TORONTO	PUB	1500	560	40	65	264000	126	4.6	600	
U WESTERN ONTARIO	PUB	320	520	30	83	400000	460	5.0	134	

SIXTH ANNUAL UCLA SURVEY: 1989
HARDWARE RESOURCES

INSTITUTION	MAINFRAME MODEL(S), YR(S)	#	MICROCOMPUTERS (N>3)	TOTAL MICROS	STUDS/ MICRO	FAC/ MICRO
	* B-SCHOOL ACCESS ONLY					
U OF AKRON	IBM 3090/200 (87) IBM 4381 (86) PRIME 850 (83) VAX 785 (86)	119 41 14 28	IBM PC, PCXT IBM PS/2 EQUITY I+, III+ ITT	203	23	1.4
U OF ALABAMA	IBM 3081 (1984) IBM 3081 (1988)	177 4 17 9 10 6 32 23 6	IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES PC 286 CLONES PC 386 CLONES ZENITH 150 & ABOVE SPERRY 386	280	45	0.9
U OF ALASKA, FAIRBANKS	* IBM 4341 (89) * UNISYS (88) VAX (80)	8 11 36 14 16 18	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PS/2 PC 286 CLONES UNISYS	107	14	0.9
ALFRED U		70	IBM PC, PCXT	70	5	0
APPALACHIAN STATE U	DEC VAX 8550 (87)	8 44 6 80	DEC RAINBOW IBM PC, PCXT IBM PS/2 PC, XT CLONES	138	56	1.3
U OF ARIZONA	* VAX 11/750,780,8600 * NCR TOWER XP,32 IBM 4381 VAX 11/780,8600,8700 CDC CYBER 175	154 5 68 76 46 103 11 25 40 31	AT & T 286 DEC RAINBOW IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES ZENITH DMV DIGITAL PRO 350 OTHER	568	22	0.6
ARIZONA STATE U	IBM 3090 1 DEC VAX 8600	54 21 10 530 25 5 60 10	APPLE MACINTOSH APPLE MACINTOSH II HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT IBM PS/2 ZENITH ZENITH 150 & ABOVE	717	24	0.7

U OF ARKANSAS, FAYETTEVILLE	IBM 4341 MOD 3 * PRIME 9750	20 30 8 63 64	IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES ZENITH 150 & ABOVE	187	26	2.3
AUBURN U	IBM 3081D IBM 3083EX VAX 11/785 VAX 8200 AND 8500 CRAY XMP24	15 110 20	AT & T 286 IBM PC, PCXT ZENITH	153	58	1.6
BABSON COLLEGE	DEC PDP 11/70 (76) DEC VAX 11/780 (80) DEC VAX 11/785 (84)	5 170 150 75	APPLE MACINTOSH DEC RAINBOW IBM PC, PCXT PC, XT CLONES	402	16	1.1
BALL STATE U	IBM 370.3083 DEC VAX 11/780, 4 DEC VAX 11/8650 * DEC MICROVAX II (87)	18 8 4 42 69 28 86 4	APPLE II SERIES APPLE MACINTOSH APPLE MACINTOSH II AT & T 286 IBM PC, PCXT IBM PS/2 ZENITH 150 & ABOVE CPT W/DOS	261	28	1.1
BAYLOR U	* IBM 4361-L5 (86) * IBM 4381-P22 (88) * IBM 5362-P MINI (87)	4 4 242 4 60	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2	314	25	0.8
BENTLEY COLLEGE	PRIME 9955 - II PRIME 9955- II MICROVAX - UNIX MICROVAX VMS PRIME 850	16 400 4 25	HP 150 HP VECTRA 286 HP VECTRA 386 PC, XT CLONES	457	84	1.7
BOISE STATE U	IBM 4341 (81) HP 3000 (77)	20 48 16 6 7	HP 150 IBM PC, PCXT IBM PS/2 PC 286 CLONES ZENITH 150 & ABOVE	104	58	1.7
BOSTON COLLEGE	IBM 3090 (85) VAX CLUSTER, 4 (81,86)	505 40 115	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT	660	4	0.2
BRADLEY U	CDC 930 (89) VAX 780	5 83	IBM PC, PCXT 6300	92	17	1.1

BRIGHAM YOUNG U	VAX 8600 (88)	35	APPLE MACINTOSH	278	29	1.3
		5	APPLE MACINTOSH II			
		11	AT & T 286			
		200	IBM PC, PCXT			
		5	IBM PC/AT			
		22	IBM PS/2			
U CALIF, BERKELEY (HAAS)	IBM 7090	23	APPLE MACINTOSH	179	10	1.7
	DEC VAX 8600	24	HP VECTRA 286			
		33	IBM PC, PCXT			
		75	IBM PC/AT			
		22	IBM PS/2			
U CALIF, IRVINE	* HP 3000 MICRO XE	21	APPLE MACINTOSH II	147	4	1
	DEC VMS 11/780 AND 785	76	HP VECTRA 286			
	DEC VMS 8350	22	HP VECTRA 386			
	BALANCE SEQUENT 21000	23	IBM PC, PCXT			
	IBM 9375					
U CALIF, LOS ANGELES (ANDERSON)	* MICRO 3000XE (88)	55	APPLE MACINTOSH	383	7	0.7
	IBM 3090 (85)	45	HP 150			
	* HP 9000/850 (88)	112	HP VECTRA 286			
		8	HP VECTRA 386			
		5	IBM PC, PCXT			
		146	IBM PC/AT			
		12	IBM PS/2			
CALIF STATE U, BAKERSFIELD	VAX 8250 (88)	30	ZENITH	33	0	1.1
	PRIME 9750 (85)					
	CYBER 180830 (80)					
CALIF POLY STATE U, SLO	CYBER	6	HP 150	110	31	2.3
	IBM 4300	58	HP VECTRA 286			
	IBM 3090	7	HP VECTRA 386			
	* HP 3000 (2)	9	IBM PC, PCXT			
		5	PC, XT CLONES			
		22	BRAND NOT GIVEN			
CALIF STATE U, FULLERTON	CDC 180/830,860 (85,87)	17	APPLE MACINTOSH	273	55	1.3
	PRIME 9755 (86)	67	IBM PC, PCXT			
	WANG OS 60	9	IBM PS/2			
	PDP 11/44 & 70 (81,84)	154	PC, XT CLONES			
		10	PC 286 CLONES			
		4	ZENITH 150 & ABOVE			
		9	WANG			
CALIF STATE U, HAYWARD	CDLCYBER 170/7XX,3(81,86)	38	AT & T 286	105	92	3.7
	AT&T 3B2-400, 9	12	AT & T 386			
	PRIME 9755 (86)	52	IBM PC, PCXT			
	* AT&T 3B2-400					
CALIF STATE U, FRESNO	DEC VAX 11/785 (87)	231	IBM PS/2	304	18	1.4
	PRIME 9755 (86)	63	PC, XT CLONES			
	CDC CYBER 720 2 (80)	7	UNISYS			
	CDC CYBER 830 (86)					
	* IBM 3180					

CANISIUS COLLEGE	DEC VAX 8650 (87) DEC VAX 750 (82)	51 5 63 7 46	APPLE II SERIES APPLE MACINTOSH IBM PC, PCXT IBM PS/2 ZENITH	172	21	0.9
CARNEGIE MELLON U	DEC 2060,6 DEC VAX 11/780, 3 DEC PDP 11 IBM 3083 (84)	22 41 170 5 40 5 10	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2 PC 386 CLONES ZENITH	296	9	1
CASE WESTERN RESERVE (WEATHERHEAD)	DEC 2060 IBM 4381 (87) VAX 11/780	4 15 30 135	APPLE MACINTOSH IBM PC, PCXT PC, XT CLONES PC 286 CLONES	184	15	0.9
U OF CENTRAL ARKANSAS	IBM 4381 * IBM 4341 * IBM SYSTEM/36	44 50	IBM PC, PCXT ZENITH 150 & ABOVE	94	29	1.6
U CENTRAL FLORIDA	IBM 4381 IBM SYSTEM 38	10 150	APPLE II SERIES IBM PC, PCXT	163	84	1.2
CENTRAL MICHIGAN U	IBM 3090 * IBM 36 (MINI)	8 124 8 18	AT & T 286 IBM PC, PCXT IBM PS/2 ZENITH	158	26	2.4
U OF CINCINNATI	AMDAHL 5580,470 (80,84) VAX 785 (85) VAX 750 (87) * AT&T 3B2 (87) * MICROVAX II (87)	10 50 84 5	APPLE MACINTOSH IBM PC, PCXT ZENITH ZENITH 150 & ABOVE	151	32	1.1
CLARK U	VAX, 3	4	DEC RAINBOW	11	43	0
CLARKSON U	IBM 4341 GOULD POWERNODE (83) ALLUNIT (85)	10 9 60	IBM PC, PCXT ZENITH ZENITH 150 & ABOVE	79	20	1
CLEVELAND STATE U (NANCE)	IBM 3081 (86) * VAX 750, 2 (84,86) * VAX 730, 2 (83,85)	23 6 47 220	IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES	296	11	1.4

U OF COLORADO, BOULDER	CDC 720 DEC VAX 11/750, 2 DEC VAX 11/780 DEC VAX 11/785	4 124 12 36	APPLE MACINTOSH IBM PC, PCXT IBM PC/AT IBM PS/2	185	34	1
COLORADO STATE U	* HP 3000/58 * AT&T 3B2/400 * AT&T 3B2/500 * IBM 3081 CDC CYBER 180/840	19 52 5 13 115	AT & T 286 HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT PC, XT CLONES	208	20	0.9
COLUMBIA U	* IBM 4381 * VAX 11-780 IBM 3083, 9381 DEC 20 * NCR TOWER	9 4 20 9 155 6 50 27	APPLE MACINTOSH APPLE MACINTOSH II HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT IBM PC/AT UNISYS NCR	282	8	2.4
U OF CONNECTICUT	IBM 3090 (87)	34 19 5 44 12 5	IBM PC, PCXT IBM PS/2 PC, XT CLONES ZENITH CORONA NWCA	122	41	2
CORNELL U (JOHNSON)	* VAX 785,8530 * MICROVAX II IBM 4381 IBM 3090 * HP 3000	54 20 16 13 18 24	APPLE MACINTOSH DEC RAINBOW HP VECTRA 286 IBM PC, PCXT IBM PS/2 PC, XT CLONES	152	8	0.9
CREIGHTON U	SPERRY 1100/71 H2	19 47	AT & T 286 PC, XT CLONES	66	22	3.4
U OF DELAWARE	IBM 3081D (85) VAX/UNIX IBM 4200 BURROUGHS	48 61 8	IBM PC, PCXT IBM PS/2 PC, XT CLONES	119	38	3.8
DUKE U (FUQUA)	* IBM 4381 (87) MODEL 13 IBM 3081 * ATT 3B2 (88)	68 122 10 10 91 12 5 5	AT & T 286 IBM PC, PCXT IBM PC/AT IBM PS/2 UNISYS ZENITH NCR NO NAME GIVEN	327	6	0.7

DUQUESNE U	SPERRY 1100/70	. 96	IBM PC, PCXT	109	20	1.5
		5	IBM PS/2			
		5	PC 286 CLONES			
EAST CAROLINA U	SPERRY 1100, 2	9	APPLE MACINTOSH	92	19	2
	IBM 4381,2	13	APPLE MACINTOSH II			
	AT&T 32B	8	IBM PC, PCXT			
	DECV MVAX	11	IBM PC/AT			
		26	IBM PS/2			
		21	ZENITH 150 & ABOVE			
EAST TEXAS STATE U	IBM 93/70, 2	46	IBM PC, PCXT	66	23	2.6
		7	PC, XT CLONES			
		12	PACKARD BELL XTDONE			
EASTERN WASHINGTON U	DEC VAX 11/780, 2 (84)	11	AT & T 286	96	19	1.3
	IBM 4381 (85)	18	HP 150			
		34	IBM PC, PCXT			
		30	ZENITH 150 & ABOVE			
EMORY U	* VAX 11/750 (80)	38	APPLE MACINTOSH	114	11	1.4
	IBM 3090	7	IBM PC, PCXT			
	VAX 8550	36	ZENITH			
		32	ZENITH 150 & ABOVE			
FLORIDA ATLANTIC U	* AT&T 32B	14	IBM PC, PCXT	42	153	28.3
	VAX	. 14	PC, XT CLONES			
	HARRIS	7	UNISYS			
	HP MINI					
	GOULD					
FLORIDA INTERNATIONAL U	DEC VAX 8800 (86)	56	IBM PC, PCXT	141	60	1.1
		4	IBM PC/AT			
		81	ZENITH			
FLORIDA STATE U	CDC CYBER 205 (85)	55	IBM PC, PCXT	178	50	2.2
	CDC/ETA 10 (87)	4	IBM PC/AT			
	IBM 3090-400 (86)	37	IBM PS/2			
	CDC CYBER 850 (88)	7	ZENITH			
	IBM 4381-13 (88)	72	ZENITH 150 & ABOVE			
GEORGE WASHINGTON U	IBM 4381	8	APPLE II SERIES	49	185	2.9
	* WANG OIS 140	18	IBM PC, PCXT			
		21	IBM PC/AT			
U OF GEORGIA	* IBM 4381	25	APPLE MACINTOSH	304	35	1.6
	* AT&T 3B2/300	8	APPLE MACINTOSH II			
	* SUN4/2805	52	AT & T 286			
	IBM 3090 (87)	143	IBM PC, PCXT			
	CDC CYBERS,4 AND DEC VAX	9	IBM PC/AT			
		19	IBM PS/2			
		6	ZENITH 150 & ABOVE			
		27	CORONA			
		12	MISC			

GEORGIA SOUTHERN U	CYBER 825 CYBER 850 TI 990	8 35 4 6 5	IBM PC, PCXT IBM PS/2 PC, XT CLONES PC 286 CLONES ZENITH	61	414	1.6
GEORGIA STATE U	UNIVAC 90/80, 2 UNIVAC 1100/92 AMDAHL * IBM 4361 IBM SYS/36, 2	12 326 103 92	APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2	534	45	0.9
HARVARD U	* IBM 4381 (84) DECSYSTEM 1095 (79) * DEC VAX 8530 (87) * GENL AUTO ZEBRA 5820 (87)	230 163 147	IBM PC, PCXT IBM PC/AT IBM PS/2	543	7	51.5
U OF HAWAII	IBM 3081 (81) DEC 20 (80) VAX 8XXX (86, 88) CYBER 180-830 (85) IBM 4381 (81)	46 5 125	IBM PC, PCXT IBM PS/2 LEADING EDGE D	187	15	2.2
HOFSTRA U	IBM 4381 VAX 11/780, 2 VAX 8530	50	IBM PC, PCXT	52	0	2.6
U OF HOUSTON	AS 900 HONEYWELL DEC VAX (88)	19 98 5 98 35 31	APPLE MACINTOSH IBM PC, PCXT IBM PC/AT PC, XT CLONES ZENITH COMPAQ DESKPRO	291	31	1
U OF ILLINOIS, URBANA-CHAMPAIGN	IBM CONVEX * IBM SYS S/36 CRAY	4 219 160 23 15	APPLE MACINTOSH IBM PC, PCXT IBM PC/AT IBM PS/2 ZENITH	421	36	1.1
INDIANA U, BLOOMINGTON	CDC 170/855 (81) * IBM 4381 (84) IBM 3090 VAX 11/7XX,6 VAX 8600,4	4 20 6 288 21 18 50 106 75	APPLE MACINTOSH II AT & T 286 HP VECTRA 286 IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES ZENITH ZENITH 150 & ABOVE	590	8	0.6
INDIANA-PURDUE U, FORT WAYNE	VAX 11/780 IBM 4381	6 42	IBM PC, PCXT ZENITH 150 & ABOVE	50	50	1.2

U OF IOWA	IBM 4381 (86) PRIME 9950 (80, 86) DEC VAX 780 (85)	33 77 5 84 11 5 28 7	APPLE MACINTOSH HP VECTRA 286 HP VECTRA 386 IBM PC, PCXT IBM PC/AT IBM PS/2 LEADING EDGE KAYPRO	254	34	1.2
JAMES MADISON U	DEC VAX 8650 (87) DEC VAX 8530 (87)	25 50 40 5	IBM PC, PCXT IBM PS/2 PC, XT CLONES PC 286 CLONES	120	83	1.4
U OF KANSAS	NAS 8043 DEC VAX 8650 IBM 3081 KS	8 47 62	APPLE MACINTOSH AT & T 286 ZENITH 150 & ABOVE	120	32	1.3
KANSAS STATE U	NAS 6630 (84) IBM 4381-1 MVS/SP (93)	23 88	IBM PC, PCXT ZENITH 150 & ABOVE	111	45	1.7
U OF LOUISVILLE	IBM 3081 (86) VAX CLUSTER (86)	4 5 190	APPLE MACINTOSH II IBM PC, PCXT ITT	205	18	1
LOYOLA COLLEGE	DEC VAX 11/785, 2				0	0
LOYOLA MARYMOUNT U (LA)	MAGNUSON N80 MOD 42 1 IBM 4341-12 PRIME 2250	53 5 11 4	IBM PC, PCXT PC, XT CLONES PC 286 CLONES FORTUNE 21:16	74	45	1.2
LOYOLA U, CHICAGO	IBM 3081	55 11 20	IBM PC, PCXT PC 386 CLONES ATT 6300/XT	87	51	2
LOYOLA U, NEW ORLEANS	HP 3000/48 VAX 11/750 IBM 4361	16 10 12	APPLE MACINTOSH PC, XT CLONES ZENITH	38	44	6.8
U OF MAINE	IBM 3090	39 4 5	IBM PC, PCXT IBM PS/2 ZENITH 150 & ABOVE	53	60	0.8
MARQUETTE U	DEC VAX CLUSTER, 5 * MERIDIAN MINI (NTI)	13 62 42 13 4 13 4	APPLE MACINTOSH AT & T 286 IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES ZENITH	155	33	1.1

U OF MARYLAND	* VAX 750	7 APPLE MACINTOSH 26 APPLE MACINTOSH II 20 IBM PC, PCXT 30 IBM PC/AT 111 IBM PS/2	194	27	1.5
MIT (SLOAN)	* IBM 4381 (89) * ATT 3B2 (88)	67 APPLE MACINTOSH 30 APPLE MACINTOSH II 50 AT & T 286 21 AT & T 386 160 IBM PC, PCXT 69 IBM PC/AT 31 IBM PS/2	428	15	0.4
U OF MICHIGAN, ANN ARBOR	IBM 3090-400 (MTS) AMDAHL 5860 DEC VAX (OCC USE)	100 APPLE MACINTOSH 6 IBM PC, PCXT 480 UNISYS	588	14	0.6
MICHIGAN STATE U	IBM 3090 (87) VAX (87)	30 IBM PC, PCXT 92 ZENITH 150 & ABOVE 4 COMPAQ 386	130	232	17.8
U OF MINNESOTA (CARLSON)	CYBER * IBM 4341 CRAY 2 ENCORE VAX 8600	14 APPLE MACINTOSH 4 APPLE MACINTOSH II 20 IBM PC, PCXT 30 IBM PC/AT 73 IBM PS/2 70 PC, XT CLONES 60 ZENITH	271	127	0.7
MISSISSIPPI STATE U	SPERRY 1174 (85)	20 APPLE II SERIES 5 IBM PC, PCXT 192 PC, XT CLONES 5 PC 286 CLONES 8 TANDY 55 UNISYS 20 ZENITH 150 & ABOVE	305	16	1.1
U OF MISSOURI, ST LOUIS	IBM 4381 (86) IBM 30XX (87) DEC VAX (86)	69 IBM PC, PCXT 15 IBM PS/2	85	85	1.4
U OF MONTANA	VAX 8600	15 IBM PC, PCXT 20 PC, XT CLONES 5 PC 386 CLONES 7 ZENITH	48	0	0.9
U OF MONTEVALLO	DEC MICRO VAX 11 DEC 750	4 APPLE II SERIES 9 IBM PC, PCXT 19 ZENITH 150 & ABOVE	33	13	7.5
MURRAY STATE U	IBM 4341 (81) * AT&T 3B2/400 (86)	30 IBM PC, PCXT 110 ZENITH	144	18	1.2

U OF NEW ORLEANS	VAX 8600 CLUSTER (4) (84, IBM 4381 (86)	18 11	ZENITH ZENITH 150 & ABOVE	30	142	0
NEW YORK U (STERN)	* VAX 8700 (87) * VAX 11/7XX, 2 (82) * MICROVAX II (92) * SUN 4/280 IBM 3090, CYBER 1	20 20 265 15 103 25 76 258 5	APPLE MACINTOSH HP VECTRA 386 IBM PC, PCXT IBM PC/AT IBM PS/2 PC 386 CLONES ZENITH ZENITH 150 & ABOVE EUREX	793	13	0.6
NICHOLLS STATE U	UNISYS A6 DEC 1/70	5 110	ZENITH ZENITH 150 & ABOVE	115	10	2.3
U OF NORTH CAROLINA, CHARLOTTE	BURROUGHS 6930 (85) IBM 4381	80 36	IBM PC, PCXT ZENITH 150 & ABOVE	118	42	2.2
U OF NORTH DAKOTA	IBM 3090-180 IBM 3081-032 VAX 11/780	65 5 78	IBM PC, PCXT PC, XT CLONES ZENITH	150	19	0.9
NORTHEAST LOUISIANA U	IBM 4381 * DEC VAX 750	82 55	PC, XT CLONES PC 286 CLONES	140	20	1.8
NORTHEASTERN U		6 135 50 50	APPLE MACINTOSH IBM PC, PCXT ZENITH 150 & ABOVE ATT 6300	241	102	0.9
NORTHERN ARIZONA U	IBM 3083 (85) IBM 9370 (88) VAX (87)	17 12 40 90	IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES	159	26	1
NORTHWESTERN U (KELLOGG)	* HP3000/70 (86) VAX 11-780 * IBM 4361 * HP 9000/8356 CYBER	23 15 100 230 20	HP VECTRA 286 HP VECTRA 386 UNISYS ZENITH ZENITH 150 & ABOVE	388	10	0.7
U OF NOTRE DAME	IBM 3033 (84) CONVEX C120 (89)	30 39 27 7	APPLE MACINTOSH IBM PC, PCXT IBM PS/2 ZENITH 150 & ABOVE	105	41	2

THE OHIO STATE U	* PRIME 9955 * NCR TOWER 600 * BANYON	88 APPLE MACINTOSH 56 IBM PC, PCXT 10 IBM PC/AT 15 PC, XT CLONES 37 NCR PC6 87 NCR PC8	303	24	1.2
U OF OREGON	* HP 3000 48 (85) IBM 4341 VAX 8850	50 APPLE MACINTOSH 40 HP VECTRA 286 11 IBM PC, PCXT 7 PC, XT CLONES	109	39	2.1
OREGON STATE U	* QUANTEL CYBER IBM 4381 FPS/VAX	54 HP VECTRA 286 4 HP VECTRA 386 4 IBM PC, PCXT 154 LEADING EDGE 30 AST 286 25 AST 386	275	21	0.6
U OF THE PACIFIC	DEC VAX 11/785 (85)	4 IBM PS/2 11 PC, XT CLONES	19	0	1.7
PACIFIC LUTHERAN U	VAX 6200 & 6220 (88)	13 IBM PC, PCXT	14	0	4
PAN AMERICAN U		75 PC 286 CLONES 51 ZENITH 150 & ABOVE	126	29	1.8
U OF PENNSYLVANIA (WHARTON)	* DEC VAX 8700, 2 * DEC MICROVAX 3XXX,3, AND * AT&T 3B2-600 * FPS M64/60 IBM 3090-200	78 APPLE MACINTOSH 10 APPLE MACINTOSH II 66 DEC RAINBOW 43 IBM PS/2 152 PC, XT CLONES 371 PC 286 CLONES 12 PC 386 CLONES 7 DEC MATE 25 DEC PRO	765	18	1.1
PENN STATE U	IBM 3090 (86) IBM 4341, 2 (85)	123 IBM PC, PCXT 44 IBM PC/AT 17 IBM PS/2 45 PC, XT CLONES 41 IBM MODEL 30	270	48	1.2
PURDUE U (KRANNERT)	IBM 3090 (85) CYBER 205 (84) VAX 8600 (89) SEQUENT SYMMETRY (89)	87 APPLE MACINTOSH 10 APPLE MACINTOSH II 50 HP 150 73 HP VECTRA 286 12 IBM PC, PCXT 27 IBM PC/AT 4 ZENITH 37 IBM 6152 7 HP9000/319	310	21	0.9

U OF RICHMOND (ROBINS)	VAX 750 VAX 785	14 38	IBM PC, PCXT PC, XT CLONES	54	23	3
U OF ROCHESTER (SIMON)	* HP 3000 (82) * IBM 4361 (85)	70 22 10 25 28 30 20 5 4	APPLE MACINTOSH APPLE MACINTOSH II HP VECTRA 286 IBM PC, PCXT IBM PC/AT IBM PS/2 PC, XT CLONES PC 286 CLONES PC 386 CLONES	216	10	0.5
ROCHESTER INSTITUTE OF TECHNOLOGY	IBM 3083 DEC VAX CLUSTER (3) VAX 11/785, 2	65 4 22	IBM PC, PCXT IBM PC/AT IBM PS/2	91	30	1.3
ROLLINS COLLEGE (CRUMMER)	VAX 11/750 * HARRIS HCX-7	49 4 6	AT & T 286 IBM PC, PCXT IBM PS/2	59	9	1
RUTGERS U		4 6 30 80 9 30	APPLE MACINTOSH AT & T 386 IBM PC, PCXT ZENITH ZENITH 150 & ABOVE MITSUBISHI 286	164	10	1.5
ST CLOUD STATE U	UNIVAC 1100/90 VAX 8550	5 5 80 20 40 4 5 4	APPLE II SERIES APPLE MACINTOSH IBM PC, PCXT IBM PC/AT PC, XT CLONES PC 286 CLONES PC 386 CLONES ZENITH	166	56	1
SAN DIEGO STATE U	VAX 1 CYBER 1	22 110 40 28 5 5	APPLE II SERIES IBM PC, PCXT IBM PC/AT IBM PS/2 PC 286 CLONES PC 386 CLONES	210	82	1.3
SAN FRANCISCO STATE U	CYBER 170/730 PRIME 7000 CYBER 170/760 IBM 3090	118 6 20 125 10	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT PC, XT CLONES PC 286 CLONES	280	42	1.4
SAN JOSE STATE U	CYBER (83) PRIME (83) * VAX CLUSTER (84,85) * HP3000 42 (83) IBM 3081 (89)	4 37 22 45 82	APPLE MACINTOSH DEC RAINBOW HP 150 PC, XT CLONES PC/AT COMP	191	57	1.8

SEATTLE U	ENCORE IBM HP3000	6 IBM PC, PCXT 22 PC, XT CLONES 4 PC 286 CLONES	34	328	1.4
U OF SOUTH CAROLINA	* IBM 4381 (84) IBM 3081-D24, 2 (83,84) DEC VAX 11-780 (84) * IBM SYS 36 FPS MT-64	12 APPLE MACINTOSH 109 IBM PC, PCXT 10 IBM PC/AT 50 IBM PS/2 6 ZENITH 150 & ABOVE	193	41	3.2
U OF SOUTH DAKOTA	IBM 4381 MOD 14 (84)	16 AT & T 286 27 IBM PC, PCXT 13 PC, XT CLONES 4 ZENITH	60	29	1.7
U SOUTHERN CALIFORNIA	IBM 3081 MVS IBM 4341 VM/CMS DEC 20 TOPS * HP3000/44 MPE	31 APPLE MACINTOSH 8 APPLE MACINTOSH II 320 IBM PC, PCXT 12 IBM PC/AT 4 IBM PS/2 32 PC, XT CLONES 102 PC 286 CLONES 16 PC 386 CLONES 7 AST 286	532	20	1.2
SOUTHERN ILLINOIS U, EDWARDSVILLE	IBM 4381 (86)	7 IBM PC, PCXT 8 IBM PC/AT 52 ZENITH 97 ZENITH 150 & ABOVE	167	22	1.4
SOUTHERN METHODIST U	IBM 3081 (84) * AT&T 3B15 (87) * AT&T 3B2, 4 (86) IBM 3081 (89)	6 APPLE MACINTOSH 21 AT & T 286 10 AT & T 386 30 IBM PC, PCXT 65 PC 286 CLONES 8 PC 386 CLONES 20 AT&T 6300	167	16	1.2
U OF SOUTHERN MISSISSIPPI	HONEYWELL DPS-90 * IBM SYS 36	13 IBM PC, PCXT 5 PC, XT CLONES 52 TANDY 6 LEADING EDGE	78	66	3.1
STANFORD U	* DEC 20, 2 * VAX 8550	80 APPLE MACINTOSH 7 HP 150 22 HP VECTRA 286 63 IBM PC, PCXT 48 IBM PC/AT 18 IBM PS/2 21 PC, XT CLONES	262	8	0.7
STATE U NEW YORK, ALBANY	IBM 3081 VAX 8650 VAX 6220 UNISYS 7000	10 IBM PC, PCXT 10 ZENITH 41 ZENITH 150 & ABOVE	63	51	1.5

STATE U NEW YORK, BUFFALO	DEC VAX 780,750 IBM 3081	74 7 9 7	IBM PC, PCXT IBM PC/AT IBM PS/2 IBM MODEL 30-286	101	91	1.4
SYRACUSE U	IBM 3090, 2 DEC VAX 8600, 2	75 10	IBM PC, PCXT ZENITH	94	96	2.2
TEMPLE U	CDC 750 IBM 4381 DEC VAX 780 PDP 11/CIS	55 116 15	IBM PC, PCXT IBM PS/2 ZENITH	192	59	4.5
U OF TENNESSEE, KNOXVILLE	IBM 3090 MVS IBM 3081 VM 1 VAX CLUSTER	5 258 • 94 10	APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2	370	38	1
TENNESSEE TECH U	VAX-11, 3 (85) DEC 8800 (87)	29 17 23	DEC RAINBOW IBM PC, PCXT PC LIMITED	70	55	1.2
U TEXAS, AUSTIN	IBM 4381, 2 (83,85) DEC 8700 (88) * VAX 11/785 CRAY (86) * WANG VS-65 (86)	86 9 268 25 35	APPLE MACINTOSH APPLE MACINTOSH II IBM PC, PCXT IBM PC/AT IBM PS/2	423	59	0.8
U OF TEXAS, SAN ANTONIO	IBM VAX	53 34	IBM PC, PCXT PC 286 CLONES	88	81	3.3
TEXAS A & M	AMDAHL * IBM 4361 (84) IBM 3090	25 25 32 45 106 5 30 60 • 25	APPLE MACINTOSH APPLE MACINTOSH II DEC RAINBOW HP VECTRA 286 IBM PC, PCXT IBM PC/AT IBM PS/2 ZENITH TI	354	28	1.9
TEXAS TECH U	IBM 3081-KX VAX 8650 VAX 780 * VAX 750, 2 AT&T 3B2	10 32 10 125 17 6	APPLE MACINTOSH DEC RAINBOW IBM PC, PCXT ZENITH 150 & ABOVE PACKARD BELL AT COMPUADD 286	200	44	1.6
U OF TOLEDO	NAS 9080 VAX 785	20 91	IBM PC, PCXT ITT XTRA	111	61	2.1

TULANE U	IBM 3831	13	APPLE MACINTOSH	120	20	1.9
		11	IBM PC, PCXT			
		51	PC, XT CLONES			
		42	ITT XTRA			
U OF UTAH	IBM 4381 (83)	5	APPLE MACINTOSH	155	13	1.5
		30	IBM PC, PCXT			
		24	PC 286 CLONES			
		90	SPERRY & LEADING EDGE			
UTAH STATE U	VAX 8650	14	UNISYS	194	14	0.9
	UBM 4341	170	TELEVIDEO 1605			
		10	CAMPUS BUILT Z-80			
VALDOSTA STATE COLLEGE	CYBER 850 (80)	41	IBM PC, PCXT	60	36	2
	IBM 4341 (80)	18	ZENITH 150 & ABOVE			
	PRIME 750 (84)					
VANDERBILT U (OWEN)					0	0
U OF VERMONT	IBM 4081, 2 (85,87)	286	AT & T 286	294	3	0.9
	DEC 8600 (85)	5	IBM PS/2			
	* DEC 780 (85)					
	* DG MV10000 (85)					
VILLANOVA U	IBM 4381	12	IBM PC, PCXT	125	47	1.6
	VAX 11-780,2	20	IBM PS/2			
	MICROVAX	92	ZENITH 150 & ABOVE			
U OF VIRGINIA (DARDEN)	CDC CYBER 855	25	APPLE MACINTOSH	200	7	0.9
	PRIME 750	7	APPLE MACINTOSH II			
	* WANG VS 7010 (88)	67	IBM PC, PCXT			
		21	IBM PC/AT			
		54	IBM PS/2			
		6	PC, XT CLONES			
		16	PC 286 CLONES			
VIRGINIA TECH (PAMPLIN)	IBM 3090 (88)	135	IBM PC, PCXT	188	63	1.3
	IBM 3084 (85)	8	IBM PC/AT			
	DEC VAX 11/780, 2 (83)	6	IBM PS/2			
		6	PC 386 CLONES			
		• 32	ZENITH 150 & ABOVE			
WAKE FOREST U (BABCOCK)	* WANG OIS	60	ZENITH	78	17	0.7
		14	WANG			
U OF WASHINGTON	CDC CYBER 180/845 (87)	11	APPLE MACINTOSH	258	14	1.5
	DEC VAX 8700	41	APPLE MACINTOSH II			
	IBM 4381 (87)	46	HP 150			
		44	HP VECTRA 286			
		82	IBM PC, PCXT			
		21	IBM PC/AT			
		6	IBM PS/2			
		4	ZENITH			

WASHINGTON U (OLIN)	IBM 43XX, 4 * VAX 8810 (88) * VAX 6620 (88)	30 40 7 7	IBM PC, PCXT IBM PC/AT PC, XT CLONES PC 286 CLONES	90	29	1.1
WASHINGTON AND LEE U	PRIME 9955	32 30	IBM PS/2 PC 286 CLONES	62	3	0.3
WAYNE STATE U	AMDAHL 470V/8 IBM 4381 IBM 3080GX	4 30 22 155	APPLE MACINTOSH IBM PC, PCXT IBM PS/2 ZENITH 150 & ABOVE	215	30	0.9
WESTERN CAROLINA U	DIGITAL CAV 11/870 (82) DIGITAL 11/850 (87)	4 25 29 7 11	IBM PC/AT ZENITH EPSON EQUITY III+ ZENITH 386 ZENITH 286	78	24	4.5
WESTERN ILLINOIS U	IBM 4381, 2 (84,87) DEC MICROVAX II (86) CDC CYBER 180-830 (79)	59 4 49 39	IBM PC, PCXT IBM PS/2 ZENITH ZENITH 150 & ABOVE	157	42	1.3
COLLEGE OF WILLIAM AND MARY	PRIME 850 * PRIME 750 PRIME 9950 NAS	8 5 8 5 5 10	APPLE MACINTOSH II HP 150 HP VECTRA 286 IBM PC/AT IBM PS/2 CLONE AT	42	53	2.1
U WISCONSIN, EAU CLAIRE	HONEYWELL DPS/8-49C (85)	155 24 20 35	IBM PC, PCXT IBM PS/2 TANDY ZENITH 150 & ABOVE	235	13	14
U WISCONSIN, LA CROSSE	VAX 11/780	44	IBM PC, PCXT	44	89	4.7
U WISCONSIN, MADISON	DEC VAX 780 DEC VAX 8200	46 102 11 29	AT & T 286 IBM PC, PCXT IBM PC/AT IBM PS/2	193	25	1
U WISCONSIN, OSHKOSH	IBM 4380 VAX, 2	20 5 25	IBM PC, PCXT ZENITH ZENITH 150 & ABOVE	54	0	0.9

WRIGHT STATE U	VAX 750, 3 VAX 785, 1 IBM 3083B	68 PC, XT CLONES 29 ZENITH 150 & ABOVE 4 3COM WORKSTATIONS	103	0	1
U WYOMING	DEC 11/785 (85) IBM 3081 (86) VAX DEC 8800, 2 (87)	13 IBM PC, PCXT 71 ZENITH 150 & ABOVE 15 ZENITH 248	107	24	1.5
YALE U	IBM 3090 (85) AMDAHL V8 DEC VAX 8600 (86) * DEC VAX 750 * CELERITY 1260 D	87 IBM PC, PCXT 45 IBM PC/AT 20 IBM PS/2	152	6	1.9
U OF ALBERTA	AMDAHL 5870 (78) MTS IBM 4381 (80) VM IBM 3081(K) MVS	61 APPLE MACINTOSH 70 IBM PC, PCXT 8 IBM PC/AT 7 IBM PS/2 11 PC, XT CLONES 4 ZENITH 6 ZENITH 150 & ABOVE	173	26	1.6
U BRITISH COLUMBIA	* DATA GEN MV10000 UBC MAINFRAME	6 APPLE MACINTOSH 31 IBM PC, PCXT 68 PC, XT CLONES 53 UNISYS 7 ZENITH 5 ??	175	30	1.1
U OF CALGARY	HONEYWELL DPS/70M CDC CYBER 860 IBM 3081 CDC CYBER 870	80 IBM PC, PCXT 66 IBM PC/AT 7 IBM PS/2	153	18	1.4
DALHOUSIE U	DEC VAX 8800 (87) * DEC MICROVAX, 3 (85) DEC 11/785 DEC 11/750 CDC CYBER 170/730	77 IBM PC, PCXT 23 PC, XT CLONES 5 PC 286 CLONES 4 PC 386 CLONES	113	23	0.8
MCGILL U	IBM 3090 IBM 4341	46 IBM PC, PCXT 5 IBM PS/2 82 PC, XT CLONES 7 PC 286 CLONES 4 PC 386 CLONES	145	36	1.6
MCMASTER U	IBM 4361 1 VAX 11/780,2 * VAX 11/780	38 IBM PC, PCXT 25 IBM PS/2 36 PC, XT CLONES 25 ZENITH	132	36	1.2

QUEEN'S U, KINGSTON		7	APPLE MACINTOSH	111	23	1
		39	IBM PC, PCXT			
		4	IBM PS/2			
		18	PC, XT CLONES			
		36	ZENITH 150 & ABOVE			
U TORONTO	* DATAGEN MV15000 MOD 10 (8	4	IBM PC, PCXT	29	100	21.7
		4	PC, XT CLONES			
		21	ZENITH			
U WESTERN ONTARIO	* IBM 4381 MOD 13 (85)	20	HP VECTRA 286	132	21	1.2
		102	IBM PC/AT			
		7	IBM PS/2			

SIXTH ANNUAL UCLA SURVEY: 1989
COMPUTER LABS

INSTITUTION	NUMBER MICROS	MICROCOMPUTERS	NET-WORK	HOST	PRINTER TERR	PLOTTER OUTPUT	FAX	GRAPHICS	DATA ACCESS	STAT PACKAGES	PRIMARY USERS	CONSULT TIME
U OF AKRON	35	IBM P/S 2 MODEL 50Z			2	0	0		U	G		>2/3
	41	IBM PC	NET		8	0	0		U	G		>2/3
	30	IBM PC	NET		2	0	0		U	G		>2/3
U OF ALABAMA	22	SPERRY PC			6	0	0		U	G		>2/3
	21	IBM PC	NET		5	1	0		U	G		>2/3
	17	IBM PC			4	0	0		U	G		>2/3
	30	IBM PC			8	0	0		U	G		>2/3
	7	ZENITH XT/ SPERRY PC/ IBM PC	NET		2	1	0	F				<1/3
U OF ALASKA, FAIRBANKS	15	UNISYS	NET	LINK	2	1	0		U	G		<1/3
	18	IBM & CLONE		LINK	9	0	0		U			1/3-2/3
	6	IBM	NET	LINK	6	0	2	F				<1/3
	15	MACINTOSH	NET		0	3	0		U	G		<1/3
ALFRED U	30	IBM	NET	LINK	2	1	0	F	U			>2/3
APPALACHIAN STATE U	41	IBM, SPERRY/UNISYS, AT&T	NET		1	0	0		U	G		>2/3
	18	IBM, SPERRY, AT&T	NET		1	0	0		U	G		
U OF ARIZONA	5	IBM AT , IBM PS2 MODEL 30, MAC II, IBM PS2 MODEL 70		LINK	1	2	1	F				<1/3
	16	PC/XT IBM, MAC SE, MAC I		LINK	11	1	1			G		>2/3
	27	PS/2 MODEL 50, PS/2 MODEL 80, PS/2 MODEL 60	NET	LINK	0	1	0	F				<1/3
	32	AT&T 6312	NET	LINK	0	1	0	F				<1/3
	32	AT&T 6312	NET	LINK	0	1	0	F			S	<1/3
	63	AT&T 6312	NET	LINK	0	1	0		U			>2/3
	26	AT&T 6312	NET	LINK	0	1	0	F			S	<1/3
	19	NCR PC, AT&T 6386, IBM PS/2 50, ARTISOFT AT,(ETC)			4	2	0	F				<1/3
	30	IBM PS/2 50 , CDC IST		LINK	3	2	1	F				>2/3
	12	NCR DECISION MATE 5	NET	LINK	0	0	0	F				<1/3
	7	ARTISOFT AT, ARTISOFT XT	NET	LINK	1	0	0	F				<1/3
ARIZONA STATE U	120	IBM	NET		0	2	2		U	G		1/3-2/3
	35	IBM	NET		0	1	1		U	G		<1/3
U OF ARKANSAS, FAYETTEVILLE	32	LEE DATA	NET	LINK	10	0	0		U			<1/3
	40	ZENITH/286			40	0	0		U	G		<1/3
	24	ZENITH/286			24	0	0		U	G	S	<1/3
	30	IBM EGA ATIS	NET		30	1	1	F	U	G	S	<1/3
AUBURN U	50	IBM + HOME ASSEMBLED		LINK	25	0	2		U	G		>2/3
	6	IBM, AT&T		LINK	2	1	0	F		G		<1/3

BABSON COLLEGE	40	IBM/COMPAT., APPLE MAC, DEC RAINBOW		LINK	20	0	0		U	G		>2/3
	22	IBM PC/COMPAT. W/ COLOR MAC		LINK	20	1	0		U	G		>2/3
	19	IBM PC/COMPAT, DEC RAINBOW		LINK	10	0	0		U	G		>2/3
	25	IBM PC		LINK	20	0	0		U	G		>2/3
	24	IBM PC/COMPAT., DEC RAINBOW		LINK	6	0	0		U	G		1/3-2/3
	21	IBM 286/COMPAT.	NET	LINK	1	1	0		U	G		>2/3
BALL STATE U	30	IBM-PC, IBM-286 50 Z		LINK	11	0	0	F	U	G		>2/3
	27	IBM PC			12	1	1	F	U	G	S	>2/3
	41	ZENITH PC			12	1	1	F	U	G	S	>2/3
	10	MAC SE, ZENITH 159, IBM PC, CPT-DOS	NET	LINK	4	2	0	F	U		S	>2/3
	10	MAC II, ZENITH, MAC SE	NET	LINK	1	1	0	F	U		S	>2/3
	18	APPLE II			3	0	0	F				<1/3
BAYLOR U	55	IBM PC			25	1	0		U	G		>2/3
	25	IBM PC			12	0	0		U	G		1/3-2/3
	25	IBM PC	NET	LINK	12	0	0		U	G		<1/3
	25	IBM PS/2 MODEL 50	NET	LINK	12	0	0		U	G		<1/3
BENTLEY COLLEGE	70	HP VECTRA			70	0	0		U	G		>2/3
	16	HP VECTRA CS PORTABLE			16	0	0		U	G		>2/3
	21	IBM PC IXT (ALSO-CONTINUING ED. L28)			5	0	0		U	G	S	>2/3
	4	RS 120 VECTRA/ MAC PLUS			1	1	0	F				
	30	PRIME/MICROVAX TERMINALS & 4 SPECIAL PURPOSE VECTRAS			0	0	0					
BOISE STATE U	30				4	1	1		U	G		>2/3
	30				8	0	0		U	G		
BOSTON COLLEGE	130	APPLE + IBM			0	0	0					
	10	APPLE + IBM			0	0	0					
BRADLEY U	25	AT&T 6300	NET	LINK	22	0	0		U			>2/3
	21	AT&T 6300	NET	LINK	1	0	0		U	G		>2/3
BRIGHAM YOUNG U	110	IBM PC & PS II (80), MAC PLUS (30)	NET		76	7	3		U	G		>2/3
	40	IBM PC	NET		10	0	0		U	G		>2/3
U CALIF, BERKELEY (HAAS)	20	IBM PC/XT, IBM PC/AT	NET		2	1	0		U	G		>2/3
	14		NET		2	1	0		U	G		>2/3
	20				3	5	0		U	G		>2/3
	21				20	0	0		U	G		>2/3
U CALIF, IRVINE	32	HP VECTRA	NET	LINK	10	2	2			G		>2/3
	20	HP QS/16 (80386 BASED)	NET	LINK	2	2	0			G		>2/3
	15	MACINTOSH IIX (IN PROGRESS CURRENTLY)	NET	LINK	1	1	0			G		>2/3
U CALIF, LOS ANGELES (ANDERSON)	31	IBM PC/AT	NET		3	0	0	F		G	S	
	25	MAC IICX	NET		4	0	0	F		G	S	
	24	HP VECTRA	NET	LINK	4	0	0	F		G	S	
	22	HP VECTRA(16), MAC(6). PRINT CENTER	NET		0	4	3	F		G	S	
	7	IBM PC/AT, IBM RT, IBM PS2 (ADV DEVELPMENT LAB)			3	1	3	F			S	
CALIF STATE U, BAKERSFIELD	20	IBM			5	0	0		U	G		>2/3
	20	MAC			4	0	0		U	G	S	>2/3
	15	APPLE II			3	0	0		U	G	S	>2/3
	10	ZENITH EASY PC		LINK	3	0	0		U	G	S	>2/3

CALIF POLY STATE U, SLO	35	HP VECTRA (286)	NET	LINK	10	1	0			U	G			>2/3
	20	HP VECTRA (286)	NET	LINK	6	0	0			U	G			>2/3
	8	IBM (5), VECTRA (2), CLONE (1)			3	0	0			U	G			>2/3
CALIF STATE U, FULLERTON	24	PC CLONE	NET		6	0	0			U	G			>2/3
	40	PC CLONE			10	0	0			U	G			<1/3
	34	IBM/CLONE	NET		20	0	1			U	G			>2/3
	7	MACINTOSH, ZENITH, IBM AND CLONE			1	2	0	F						>2/3
CALIF STATE U, HAYWARD	23	IBM PC			4	0	0			U	G			>2/3
	26	ATT PC 6300. TELERAY T1061. INCLUDING 12 TERMS.			3	0	0			U	G			>2/3
	12	ATT 6383	NET	LINK	2	0	0	F	U					<1/3
	12	IBM PC, INCLUDING 10 TERMINALS.			3	0	0			U	G			<1/3
CALIF STATE U, FRESNO	30	IBM PS/2 MODEL 50			15	0	0			U	G			
	25	IBM PS/S MOD 50			15	0	0			U	G			
	25	IBM PS/2 MOD 50			15	0	0			U	G			
	20	IBM PS/2 MOD 50		LINK	10	0	0			U	G			
	20	IBM PS/2 MOD 50			10	0	0			U	G			
	20	IBM PS/2 MOD 50			10	0	0			U	G			
	20	IBM PS/2 MOD 50			0	4	0	F			G	S		
	20	IBM PS/2 MOD 50			10	0	0			U	G			
	20	IBM PS/2 MOD 50		LINK	10	0	0			U	G			>2/3
	8	IBM PS/2 MOD 50			8	0	0				G			
CANISIUS COLLEGE	29	IBM PC	NET		15	1	0			U	G			
	26	APPLE II ENHANCED	NET		13	0	0			U	G			
	4	ZENITH 286, IBM PC, MAC SE, APPLE II		LINK	2	1	0	F				S		
	17	APPLE II(5), APPLE IIGS(1), IBM PC(11)			8	0	0			U	G			
	4	IBM PC, IBM PS/2 60 (TWO EACH)	NET		3	0	0			U	G			
CARNEGIE MELLON U	4	MAC II. IBM RT, XT, XT-286.	NET	LINK	0	2	1	F				S		<1/3
	4	VAX WORKSTATION. IBM RT, PS/2-80. MAC II	NET	LINK	2	2	0	F						<1/3
	17	IBM PS/2-30 (16). MAC (1)	NET	LINK	14	2	0				G			1/3-2/3
	30	MAC II	NET	LINK	0	2	0				G			1/3-2/3
	21	IBM PC/2-30/XT (20). MAC (1)	NET	LINK	20	0	0				G			1/3-2/3
	20	IBM PS/2-80	NET		0	1	0	F						<1/3
CASE WESTERN RESERVE (WEATHERHEAD)	60	IBM PC & AT COMPATIBLE	NET		0	2	1			U	G			>2/3
U OF CENTRAL ARKANSAS	30	IBM & ZENITH			30	1	1			U	G			>2/3
	30	IBM & ZENITH			30	0	0			U	G			>2/3
	4	IBM & ZENITH			2	1	2	F			G	S		>2/3
U CENTRAL FLORIDA	60	IBM PS/2 , 30'S	NET		8	1	1			U				1/3-2/3
CENTRAL MICHIGAN U	8	IBM	NET	LINK	1	1	1			U				<1/3
	32	IBM			1	0	0			U				1/3-2/3
	26	IBM			1	0	0	F	U	G				>2/3
	18	IBM	NET	LINK	0	1	0	F	U	G				>2/3
U OF CINCINNATI	20	IBM PC W/ INTEL INBOARD 386 CARDS	NET	LINK	3	0	0			U	G			>2/3
	24	ZENITH 148	NET	LINK	3	1	0			U	G			>2/3

CLARKSON U	14	ZENITH	NET	LINK	1	0	0			G		1/3-2/3
	4	ZENITH	NET	LINK	1	0	1		U	G		1/3-2/3
	7	IBM PC	NET		1	0	0		U			>2/3
CLEVELAND STATE U (NANCE)	90	ITT, IBM			25	0	0		U	G		<1/3
	30	ITT			8	0	0		U	G		<1/3
	30	ITT			9	0	0		U	G		<1/3
	20	ITT, IBM	NET		10	0	0			G		<1/3
	25	IBM			4	0	0	F				<1/3
	25	ITT			8	0	0		U	G		<1/3
U OF COLORADO, BOULDER	39	ZENITH			0	0	0		U	G		
	20	PS/2 MOD 50	NET	LINK	1	1	0		U	G		>2/3
	20	ZENITH		LINK	10	0	0		U	G		>2/3
COLORADO STATE U	18	AT&T 6312	NET	LINK	2	0	0		U	G		1/3-2/3
	27	IBM PC. HP VECTRA. NCR PC-6	NET	LINK	15	0	8		U	G		>2/3
	39	NCR PC-6			20	0	0		U	G		>2/3
	28	HP VECTRA	NET	LINK	20	1	0		U	G		>2/3
COLUMBIA U	65	NCR/IBM/HP/APPLE	NET	LINK	20	4	1			G		>2/3
	25	IBM	NET	LINK	0	1	0	F		G		
	25	UNISYS	NET	LINK	0	1	0	F		G		
U OF CONNECTICUT	32	ZENITH			8	0	0		U			<1/3
	34	IBM. NECA. CORONA. MAC SE.			7	1	0		U			<1/3
CORNELL U (JOHNSON)	16	MAC SE	NET	LINK	0	1	0			G		>2/3
	16	IBM PS2/50Z	NET	LINK	1	2	0			G		>2/3
	12	HP VECTRA	NET	LINK	1	1	0			G		1/3-2/3
CREIGHTON U	51	AT&T/SPERRY.			26	1	0		U	G		>2/3
U OF DELAWARE	62	IBM			21	2	1		U			>2/3
DUKE U (FUQUA)	42	AT&T 286 (6312)	NET		40	2	0			G		1/3-2/3
	22	UNISYS 286 (B26)	NET		20	2	0			G		
	25	AT&T; UNISY PC	NET		25	0	0			G		
DUQUESNE U	46	IBM			23	1	0		U	G	S	>2/3
	8	IBM	NET		1	0	1	F	U	G	S	>2/3
EAST CAROLINA U	46	APPLE, IBM, ZENITH	NET	LINK	36	1	0		U	G		>2/3
EAST TEXAS STATE U	18	IBM PC XT			9	1	0		U	G		>2/3
	20	IBM PC XT			9	0	0		U	G		>2/3
EASTERN WASHINGTON U	48	HP. IBM. ZENITH.	NET	LINK	1	1	1		U			>2/3
EMORY U	44	MOC SE; ZENITH PC (1480158).		LINK	11	3	1		U	G		>2/3

FLORIDA ATLANTIC U	38	APPLE MAC II. UNISYS. IBM. NEC.	NET	LINK	16	1	0		U	G					>2/3
	8	HP. IBM. APPLE MAC.	NET	LINK	6	2	0	F			S				>2/3
FLORIDA INTERNATIONAL U	23	ZENITH	NET		6	0	0		U	G					>2/3
	10	IBM			6	0	0		U	G					>2/3
FLORIDA STATE U	27	IBM PC/XT	NET	LINK	9	0	0		U						>2/3
	49	ZENITH Z-150	NET	LINK	22	0	0		U						>2/3
	7	IBM PC/XT	NET	LINK	4	0	0	F							<1/3
GEORGE WASHINGTON U	30	IBM PS/2 MOD 30	NET	LINK	0	2	0		U	G					>2/3
	8	IBM PC/AT			5	0	0		U	G					>2/3
U OF GEORGIA	36	AT&T 6300	NET		18	0	0		U						<1/3
	21	IBM XT	NET		16	0	0		U	G					<1/3
	28	IBM XT	NET	LINK	16	0	0		U	G					<1/3
	24	IBM XT	NET		12	0	0		U	G					<1/3
	24	TELEVIDEO 905. IBM 3178. IBM 3179.		LINK	0	0	1		U	G					<1/3
	28	AT&T 3B/2 PLUS(4). TERMINALS(24).	NET		1	0	0		U						<1/3
GEORGIA SOUTHERN U	6	IBM. ZENITH			2	0	0		U						>2/3
GEORGIA STATE U	18	IBM PC			18	0	0		U	G					>2/3
	18	IBM PC			18	0	0		U	G					>2/3
	20	IBM PC			18	0	0		U	G					>2/3
	20	IBM AT/PS/Z			0	0	0	F	U	G					<1/3
	6	IBM PC/ DEC/ MACINTOSH			0	3	1			G	S				<1/3
	6	IBM PC			6	0	0	F		G	S				<1/3
HARVARD U	16	IBM		LINK	16	0	0			G					<1/3
U OF HAWAII	40	IBM. LEADING EDGE			7	1	1		U	G					>2/3
	40	IBM. LEADING EDGE			6	0	0		U	G					
	25	IBM (TIED TO IBM OR 3081 & OTHER MAINFRAMS)		LINK	0	0	0		U	G					
U OF HOUSTON	60	IBM PC XT + CLONE			20	0	0		U	G					
	40	ZENITH + XT + CLONE			5	0	0		U	G					
	22	SPERRY			5	0	0		U	G					
	22	COMPAQ PORTIII			4	0	0								
U OF ILLINOIS, URBANA-CHAMPAIGN	120	IBM PC/AT (70). IBM PS/2-50 (50)	NET		3	3	1			G					>2/3
	45	PC (30). MAC SE (15).			8	0	0		U	G					1/3-2/3
	70	PS/2-30	NET		2	1	2		U						>2/3
INDIANA U, BLOOMINGTON	24	IBM XT	NET		6	0	0		U	G					1/3-2/3
	64	ZENITH 286		LINK	4	0	0		U	G					>2/3
	60	ZENITH 148		LINK	0	0	0		U						<1/3
	24	ZENITH 148		LINK	0	0	0		U						<1/3
	4	MIX; HP VECTRA. MAC SE. IBM XT. CLONE		LINK	1	2	0	F			S				<1/3
U OF IOWA	70	IBM XT (50). MCR 286 (5). MACINTOSH (15).	NET		6	3	0	F	U	G					>2/3
	25	HP VECTRA	NET	LINK	1	0	0	F	U	G	S				>2/3
	4	IBM PC. NCR 386. MAC.	NET		1	0	0	F		G	S				<1/3

JAMES MADISON U	20	IBM PS/2 MODEL 50	NET	LINK	5	0	1		U			>2/3
	20	IBM PC	NET		5	0	0		U			>2/3
	30	WIN (PC-AT CLONE). MACINTOSH.	NET		8	1	1		U			>2/3
U OF KANSAS	39	ZENITH & ATT.			13	0	0		U	G		>2/3
KANSAS STATE U	63	ZENITH(57). IBM PC (6).		LINK	17	1	1		U	G		>2/3
U OF LOUISVILLE	33	ITT	NET	LINK	2	0	0		U			>2/3
	60	ITT/APPLE/MAC/IBM		LINK	12	0	0	F	U	G		>2/3
	4	ITT		LINK	2	0	0	F				<1/3
	4	ITT		LINK	2	1	0	F				<1/3
	4	ITT		LINK	2	0	0	F				<1/3
LOYOLA COLLEGE	21	IBM PC	NET	LINK	1	1	0		U	G		>2/3
	20	IBM PC	NET	LINK	1	1	0		U	G		>2/3
	20	10 ZENITH 296. 10 MACINTOSH SE	NET	LINK	0	1	0		U	G		>2/3
	10	IBM PC	NET	LINK	1	0	0			G		<1/3
	10	IBM PC/XT			5	0	0		U			>2/3
LOYOLA U, CHICAGO	33	IBM XT	NET		18	0	0		U	G		<1/3
	25	IBM 3278		LINK	3	0	0		U			<1/3
U OF MAINE	20	IBM PC	NET	LINK	7	1	0		U	G		>2/3
MARQUETTE U	30	AT&T 8086			27	1	1		U	G		>2/3
	20	IBM PC 8088			10	0	0		U	G		>2/3
	19	AT&T (9). MAC SE (10)			9	0	0		U	G		>2/3
	30	MICROTERMS		LINK	1	0	0		U	G		<1/3
U OF MARYLAND	28	PS2-39/286 (18). MAC II (10).	NET	LINK	2	2	0		U	G		>2/3
	5	MAC (2). DOS (3).	NET	LINK	0	2	0	F			S	>2/3
	20	IBM AT	NET	LINK	2	1	0			G		>2/3
	8	IBM XT			2	0	0			G		<1/3
	4	IBM XT			2	0	0			G		<1/3
	20	PS250	NET	LINK	2	1	0		U			>2/3
MIT (SLOAN)	12	MAC SE(6); ATT PC COMPATIBLE (6)	NET		2	0	0		U	G		>2/3
	30	ATT 6310/12	NET	LINK	5	1	1		U	G		>2/3
	13	MAC SE AND MAC II	NET		4	2	0		U	G	S	>2/3
U OF MICHIGAN, ANN ARBOR	65	UNISYS PW500(286CHIP); MACINTOSH SE; IBM XT.	NET	LINK	3	5	0		U	G		>2/3
	50	UNISYS PW500; MACINTOSH SE.	NET	LINK	3	4	0		U	G		>2/3
	11	UNISYS PW500; MACINTOSH SE.	NET	LINK	2	2	0			G		>2/3
	7	UNISYS PW500; MACINTOSH SE.	NET	LINK	5	2	0			G		<1/3
MICHIGAN STATE U	38	IBM. ZENITH.			20	0	0		U	G		>2/3
	8	COMPACT			8	0	1	F				<1/3
MISSISSIPPI STATE U	47	PC CLONES. MIXED VENDORS.	NET	LINK	1	0	0	F	U	G		>2/3
	48	COMPU ODD. PC-XT.	NET	LINK	12	0	1	F	U			>2/3

U OF MISSOURI, ST LOUIS	22	IBM PC			11	0	0		U		>2/3
	9	IBM PS/2 70			0	1	0		U		>2/3
U OF MONTANA	25	IBM PCS			25	0	0		U	G	>2/3
U OF MONTEVALLO	29	IBM PC (9). APPLE II (4). ZENITH 200 SERIES (16).			30	1	0		U	S	>2/3
MURRAY STATE U	40	ZENITH			5	1	0		U	G	>2/3
	35	ZENITH/IBM			5	0	0		U	G	
U OF NEW ORLEANS	30	ZENITH 100, 148, 158, 150. APPLE MACINTOSH.		LINK	12	0	0		U	G	>2/3
NEW YORK U (STERN)	12			LINK	12	0	1			G	<1/3
	45		NET	LINK	36	3	1			G	>2/3
	43		NET	LINK	0	3	1			G	>2/3
	25			LINK	14	0	0		U		>2/3
	12		NET	LINK	0	0	1	F		G	>2/3
	35			LINK	45	0	0			G	>2/3
NICHOLLS STATE U	26	ZENITH 150+			6	0	0		U	G	<1/3
	16	ZENITH 150+			4	0	0		U	G	<1/3
	25	ZENITH 150+			5	0	0		U		1/3-2/3
	15	ZENITH 150+			3	0	0		U		1/3-2/3
U OF NORTH CAROLINA, CHARLOTTE	25	IBM PC			7	0	0		U		>2/3
	30	IBM PC			6	0	0		U		>2/3
U OF NORTH DAKOTA	25	IBM			6	0	0		U	G	>2/3
	32	ZENITH			8	0	0		U	G	<1/3
	15	ZENITH			6	0	0		U		<1/3
	24	ZENITH TERMINALS HOOKED TO MF.			0	0	0				
NORTHEAST LOUISIANA U	26	IBM PC/TANDY 1200 + 1300	NET	LINK	25	1	0		U	G	>2/3
	36	TANDY 1200, 3000	NET	LINK	18	1	0		U	G	>2/3
	30	TANDY 1200			25	0	0		U		1/3-2/3
	26	VT 220			0	0	0				
NORTHEASTERN U	50	ATT 6300	NET		1	0	1		U	G	>2/3
NORTHERN ARIZONA U	28	IBM PS/2 MOD 30			7	0	0		U		<1/3
	20	XT CLONE			5	0	0		U		<1/3
	6	IBM PS/2 MOD 50			1	0	0		U		<1/3
	7	AT CLONE	NET		2	0	0			G	<1/3
NORTHWESTERN U (KELLOGG)	20	ZENITH 150			10	1	1			G	>2/3
	20	HP AT	NET	LINK	10	1	4			G	>2/3
	25	ZENITH 150	NET		12	1	0			G	<1/3
	20	ZENITH 150	NET		10	0	0			G	1/3-2/3
	8	MAC SE	NET		1	1	0			G	<1/3
	70	UNISYS AT	NET		20	3	0			G	<1/3

U OF NOTRE DAME	20	IBM. MAC.			7	0	0		U	G		>2/3
	20	IBM. ZENITH.			7	0	0		U	G		>2/3
	8	IBM. MAC.	NET		1	4	0	F				<1/3
THE OHIO STATE U	30	NCR PC 810	NET	LINK	1	0	0		U	G		>2/3
	30	NCR PC 6		LINK	1	0	0		U	G		>2/3
U OF OREGON	15	MACINTOSH 512	NET		3	0	0		U			
	18	MACINTOSH SE	NET		3	1	0	F		G		
	16	HP VECTRA	NET	LINK	4	1	1	F	U	G		>2/3
OREGON STATE U	40	HP VECTRA 286. LE 8088.	NET		25	0	0		U			>2/3
	52	LE 8088	NET	LINK	18	0	0		U			>2/3
	26	HP VECTRA 286	NET	LINK	0	2	0			G		>2/3
	4	HP VECTRA 286	NET	LINK	2	0	0		U	G		>2/3
U OF THE PACIFIC	17	IBM MOD 50-2 (PS-2)			2	0	0		U			>2/3
PAN AMERICAN U	35	PACKARD BELL 286			7	1	0		U	G		>2/3
	30	ZENITH 150	NET		5	0	0		U			1/3-2/3
	30	PACKARD BELL 286	NET		10	0	0		U	G		1/3-2/3
U OF PENNSYLVANIA (WHARTON)	8	UNISYS PC MICRO IT			4	1	0		U	G		<1/3
	12	UNISY PC MICRO IT			6	0	0		U	G		<1/3
	40	HP VECTRA		LINK	20	0	0	F	U	G	S	<1/3
	23	19 IBM XT AND 4 APOLLO	NET		10	0	0		U	G		<1/3
	45	44 HP VECTRA AND 1 DEC RAINBOW.	NET	LINK	20	1	1			G		<1/3
	24	APPLE MACINTOSH	NET		12	0	0		U			>2/3
PENN STATE U	20	IBM MOD 30			5	1	2		U	G		>2/3
	20	IBM MOD 30			5	1	2		U	G		>2/3
	25	AT&T 6300			6	0	2		U	G		>2/3
	52	IBM PC			13	2	2		U	G		>2/3
PURDUE U (KRANNERT)	24	IBM PC/AT	NET		0	1	1		U	G		1/3-2/3
	24	VECTRA	NET		0	1	1		U	G		1/3-2/3
	24	MACINTOSH +	NET		0	2	0		U	G		1/3-2/3
	24	IBM 6152	NET	LINK	0	2	2		U	G		1/3-2/3
	5	MAC II CX	NET		0	1	0		U			1/3-2/3
	5	HP 9000/319	NET		0	1	0		U	G		1/3-2/3
U OF RICHMOND (ROBINS)	17	CLONES PC(16)/ AT&T 386(1)	NET	LINK	8	0	0	F	U	G		>2/3
	8	IBM PC			4	0	0		U	G		<1/3
U OF ROCHESTER (SIMON)	62	IBM(XT,AT,PS/2). MAC(512K, SE). HP (VECTRA).	NET	LINK	4	4	0	F	U	G	S	>2/3
ROCHESTER INSTITUTE OF TECHNOLOGY	20	PC XT			1	0	0	F	U	G		>2/3
	20	PC 20, 50			1	0	0	F	U	G		>2/3
ROLLINS COLLEGE (CRUMMER)	25	AT&T 6300		LINK	15	1	1			G		>2/3
RUTGERS U	33	IBM/MAC/ZENITH/AT&T	NET		17	1	1	F		G		>2/3
	30	MITSUBISHI	NET		0	0	0	F		G		

ST CLOUD STATE U	21	EPSON				10	0	0		U				>2/3
	18	IBM PC/ EPSONS				16	0	0		U				>2/3
	30	IBM PC				16	0	0		U				>2/3
SAN DIEGO STATE U	25	XT				1	0	0		U	G			>2/3
	25	386 FILESERVER. AT CLONE.	NET	LINK		1	0	0		U	G			>2/3
	25	XT, 6 AT CLONE.				1	0	0		U	G			>2/3
SAN FRANCISCO STATE U	20	MAC II(2). AT&T(2). NEXT. 386 CLONE.	NET			2	1	0	F		G			>2/3
	30	MAC SE	NET			0	0	0		U				>2/3
	8	286 CLONE		LINK		6	0	0		U				>2/3
	94	SE. XT CLONE. AT.	NET	LINK		10	2	1	F	U	G			>2/3
SAN JOSE STATE U	47	TELEVIDEO AT COMPATIBLE	NET			6	0	0		U	G			1/3-2/3
	25	HP VECTRA	NET	LINK		2	0	1		U	G			1/3-2/3
	8	CLUB AMERICA AT COMPATIBLE		LINK		2	0	0		U	G			1/3-2/3
	28	DIGITAL RAINBOW-100		LINK		4	0	0		U	G			1/3-2/3
SEATTLE U	20	IBM		LINK		5	0	0		U	G			<1/3
U OF SOUTH CAROLINA	93	IBM PC/XT (57). ZENITH(20). MACINTOSH(16).	NET	LINK		31	3	1		U	G			>2/3
	25	ZENITH	NET	LINK		5	0	0	F	U	G			
	25	IBM PS-2/60	NET	LINK		25	0	0	F	U	G	S		1/3-2/3
	40	MACINTOSH	NET	LINK		0	0	0						
	8	MACINTOSH	NET	LINK		3	1	0	F		G			1/3-2/3
U OF SOUTH DAKOTA	24	IBM. AT&T.				20	1	0		U	G			
U SOUTHERN CALIFORNIA	65	IBM/APPLE	NET	LINK		35	4	1		U	G			>2/3
	30	IBM/APPLE/ZENITH/CLONE	NET			0	4	1		U	G	S		>2/3
	49	IBM	NET	LINK		1	0	0		U	G	S		<1/3
SOUTHERN ILLINOIS U, EDWARDSVILLE	35	ZENITH 140 + 150.				10	0	0		U				>2/3
	12	ZENITH 150				4	0	0	F	U	G			>2/3
	20	ZENITH 150				5	1	0	F	U	G	S		>2/3
	24	ZENITH 150	NET			4	1	0	F	U	G	S		>2/3
SOUTHERN METHODIST U	20	FILESTAR 286	NET	LINK		1	0	0		U				>2/3
	20	IBM	NET	LINK		1	0	0			G			>2/3
	40	AT&T 286 + 386.	NET	LINK		20	1	1	F	U	G			>2/3
U OF SOUTHERN MISSISSIPPI	34	TANDY 1000				16	0	0		U				<1/3
STANFORD U	60	HP. EPSON. IBM. APPLE.	NET	LINK		25	2	0			G			>2/3
	5	IBM	NET	LINK		0	1	1						<1/3
	4	IBM. APPLE.	NET	LINK		1	2	1	F					>2/3
	5	IBM. APPLE.	NET	LINK		1	1	0				S		>2/3
STATE U NEW YORK, ALBANY	23	IBM(10). ZEN 148(10). ZEN 158(2). ZEN PORT(1).				10	0	0		U	G			>2/3
STATE U NEW YORK, BUFFALO	40	XT, PC (16). IBM-30-286 (24).		LINK		1	1	0			G			>2/3

SYRACUSE U	24	IBM PC	NET	LINK	1	1	1		U	G		<1/3
TEMPLE U	30	IBM PC	NET	LINK	1	0	0		U	G		>2/3
	40	IBM PS/2 MOD 30	NET	LINK	1	0	0		U	G		>2/3
U OF TENNESSEE, KNOXVILLE	32	IBM PC W 20 MEG HARDCARD		LINK	4	1	0		U	G		>2/3
	20	DITTO			2	1	0		U	G		>2/3
	12	XT (10). AT (2). BOTH ARE IBM.		LINK	2	0	0			G	S	<1/3
	30	IBM AT	NET		0	2	0					<1/3
TENNESSEE TECH U	19	IBM PC. DELL.			7	0	0		U	G		>2/3
U TEXAS, AUSTIN	65	IBM PC & COMPATIBLES			23	1	0		U	G		>2/3
	37	APPLE MACINTOSH(36). IBM PC (1) FOR FILEXFER.	NET	LINK	11	2	0		U	G		>2/3
	68	IBM PC			12	0	0		U	G		>2/3
	7	IBM PC/AT (1). IBM PC (4). APPLE MACINTOSH(2).			2	0	0	F				
	7		NET		3	0	0		U	G		
	25	IBM PC/AT 370	NET	LINK	1	0	0			G		>2/3
U OF TEXAS, SAN ANTONIO	55	IBM PC. IBM AT CLONE.			15	2	2		U	G		1/3-2/3
	4	HP VECTRA. IBM XT.		LINK	1	1	1	F				<1/3
TEXAS A & M	30	APPLE MAC SE	NET		0	1	0		U	G		<1/3
	50	ZENITH			1	0	0		U			<1/3
	50	IBM XT			1	0	0		U	G		<1/3
	35	HP VECTRA	NET	LINK	0	1	0		U	G		<1/3
	35	IBM XT			0	1	0			G		<1/3
TEXAS TECH U	20	IBM/ZENITH.			1	0	0		U	G		<1/3
	34	ZENITH	NET	LINK	1	0	0		U	G		<1/3
	30	ZENITH(24). MAC (6).	NET	LINK	1	0	0		U	G		<1/3
U OF TOLEDO	26	IBM & ITT			13	0	0		U	G		>2/3
	25	IBM & ITT			8	0	0		U	G		>2/3
	8	ITT	NET		1	0	0	F	U	G		<1/3
	25	MEMOREX TERMINALS TO MAINFRAME		LINK	0	0	0		U	G		>2/3
TULANE U	33	APPLE MAC+,AT&T 6300,ITT XTRA,ZENITH159,IBM PC W/AT	NET	BRD	33	4	0		U	G		>2/3
U OF UTAH	84	IBM. VECTRA. SPERRY.	NET	LINK	3	0	2	F	U	G		>2/3
UTAH STATE U	36	TELEVIDEO 1605	NET	LINK	6	0	0	F	U	G		>2/3
	25	TELEVIDEO 1605	NET	LINK	2	1	0		U	G		>2/3
	35	IBM MOD 70 (18). TELEVIDEO 1605 (17).	NET	LINK	4	1	0	F	U	G		>2/3
	25	TELEVIDEO 1605	NET	LINK	2	0	0		U	G		>2/3
	25	TELEVIDEO 1605	NET	LINK	2	0	0		U	G		>2/3
VALDOSTA STATE COLLEGE	18	IBM XT (11). ZENITH 159S (7).			11	0	0	F	U			>2/3
	20	IBM XT (19). ZENITH 159 (1).		LINK	1	0	0	F	U			>2/3
VANDERBILT U (OWEN)	38	MACINTOSH SE/ IBM PS2 MOD 30/ IBM PC			19	2	1			G		>2/3

U OF VERMONT	35	AT&T 6300	NET	LINK	2	0	1		U		1/3-2/3
	30	AT&T 6300	NET	LINK	2	1	0		U		1/3-2/3
	5	AT&T 6300	NET	LINK	1	1	0		U	G	<1/3
VILLANOVA U	26	ZENITH 286 LP			8	0	0		U	G	>2/3
	16	ZENITH 159			5	0	0	F	U	G	>2/3
	16	IBM MOD 20-286			0	0	0	F	U	G	<1/3
	4	IBM XT (2). ZENITH 159(2).			1	2	0	F			<1/3
U OF VIRGINIA (DARDEN)	36	IBM PS/2 MOD 50. IMB PC. IBM PC/XT.	NET	LINK	7	2	0			G	>2/3
	11	APPLE MACINTOSH + APPLE MACINTOSH II.	NET		1	1	0			G	>2/3
	4	IBM PC	NET	LINK	1	0	0			G	>2/3
	8	WIN AT 286	NET	LINK	0	0	0	F		G	>2/3
VIRGINIA TECH (PAMPLIN)	20	IBM PC			0	0	0		U		<1/3
	21	ZENITH 248			6	0	0		U		<1/3
	25	IBM PS/2. ZENTIH 248, 386. AST. AT&T.			7	0	1		U	G	>2/3
WAKE FOREST U (BABCOCK)	26	ZENITH 159	NET		1	2	0			G	<1/3
U OF WASHINGTON	38	IBM PC		LINK	0	0	0		U		>2/3
	38	HP VECTRA		LINK	19	0	0		U	G	>2/3
	21	MAC II	NET	LINK	3	1	0		U	G	>2/3
	43	HP 150		LINK	40	2	6		U		>2/3
WASHINGTON U (OLIN)	30	IBM			10	1	1		U	G	>2/3
	7	286-CLONES	NET		1	0	0		U	G	<1/3
WASHINGTON AND LEE U	31	PS/2		LINK	7	0	1	F	U		>2/3
WAYNE STATE U	24	IBM PC/XT/AT	NET		0	0	0		U	G	>2/3
	24	ZENITH 158			1	0	0		U	G	>2/3
	22	IBM PS/2. ZENITH. MACINTOSH.			9	4	1		U	G	>2/3
	21	IBM PS/2. ZENITH.			13	0	0		U	G	>2/3
WESTERN CAROLINA U	42	IBM PC/AT, ZENITH, EPSON EQUITY III+.			10	0	0		U	G	>2/3
	12	EPSON EQUITY III, ZENITH 286.			12	0	0		U		
WESTERN ILLINOIS U	17	ZENITH 150+	NET		3	0	0		U		>2/3
	32	IBM PC	NET		8	0	0		U		>2/3
COLLEGE OF WILLIAM AND MARY	42	WIN			6	0	0		U	G	1/3-2/3
U WISCONSIN, EAU CLAIRE	25	IBM PC	NET		1	0	0		U	G	<1/3
	25	PS/2	NET		1	0	0		U	G	<1/3
	20	ZENITH 158	NET	LINK	1	0	0		U	G	1/3-2/3
	30	ZENITH 158			0	1	0		U	G	<1/3
U WISCONSIN, LA CROSSE	24	ZENITH 238	NET	LINK	3	1	0		U	G	1/3-2/3
	24	ZENITH 238	NET	LINK	3	1	0		U	G	1/3-2/3

U WISCONSIN, MADISON	30	IBM XT. ATT 6300			13	0	0		U				1/3-2/3
	14	IBM PC	NET		3	0	0		U				
	12	IBM PC	NET		1	0	0		U				
	6	IBM XT. IBM PS/2 (50,80). COMPAQ.		LINK	4	0	0	F					<1/3
	19	IBM PS/2 MOD 50.	NET		2	1	0	F		G			<1/3
U WISCONSIN, OSHKOSH	4	IBM PS2/80. MAC II. IBM XT.			2	0	1	F					<1/3
	20	IBM PC. (SEEM TO BE PS/2)			5	0	0		U	G			>2/3
	30	IBM PS/2 50. IBM PC.			1	0	0		U	G			>2/3
	10	VT 100			2	0	0	F	U	G			>2/3
	40	VT 100			1	0	0	F	U	G			1/3-2/3
WRIGHT STATE U	20	NCR PC 4			10	0	0		U	G			<1/3
U WYOMING	26	ZENITH 159			12	0	0		U	G			>2/3
	27	ZENITH 159			8	0	0		U	G	S		1/3-2/3
	7	ZENITH 248 (80826)		LINK	4	0	1	F	U	G			<1/3
YALE U	70	IBM	NET	LINK	70	2	2			G			>2/3
	15	APPLE	NET		0	0	0						
U OF ALBERTA	28	IBM PC	NET		28	0	0		U	G			
	28	APPLE MACINTOSH	NET		0	1	1		U	G			
	11	IBM PC. APPLE MACINTOSH.			5	0	0	F		G			>2/3
	5	IBM CLONE 386. IBM PC. ZENITH. APPLE MACINTOSH.			3	0	0						>2/3
	5	IBM PC. APPLE MACINTOSH.	NET	LINK	1	2	0	F			S		>2/3
U BRITISH COLUMBIA	27	IBM 286	NET	LINK	1	1	0		U	G			>2/3
	35	P.BELL 8086			1	1	0	F	U				>2/3
	4	SE			0	1	0	F	U	G			>2/3
U OF CALGARY	56	IBM XT, XT/286, AT		LINK	23	0	0		U	G			
DALHOUSIE U	45		NET	LINK	15	1	1		U	G			>2/3
MCGILL U	30	IBM PC/XT. PC COMPATIBLE.			10	1	0		U	G			>2/3
	30	IBM PC/XT. PC COMPATIBLE.			2	1	0		U	G			>2/3
MCMASTER U	30	IBM PC-XT (17). ZENITH-XT (13).	NET	LINK	0	0	0		U	G			>2/3
	12	ZENITH XT	NET	LINK	0	0	0		U	G			>2/3
	15	IBM PS/2 MOD 50Z	NET	LINK	1	0	1		U	G			>2/3
QUEEN'S U, KINGSTON	29	IBM			24	3	2	F	U	G	S		>2/3
U TORONTO	42	OLIVETTI M290(40). OLIVETTI M380/XP5 FILESRVRS(2).	NET	LINK	2	1	0	F	U	G	S		1/3-2/3
U WESTERN ONTARIO	20	IBM AT	NET		4	1	0		U	G			>2/3
	20	HP ES	NET		4	1	2		U	G			>2/3