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ABSTRACT

Forty-one small liberal arts colleges were visited during the 1997-98 school year in order to talk to key information technology staff and to see computing facilities. A survey containing 15 factual and 10 open-ended questions was used to gather information. This paper presents findings in the following areas and comparison with results of a similar study conducted ten years earlier: (1) general impressions; (2) computer science (CS) programs, including number of schools offering CS majors, curriculum models, number of schools with separate CS departments, and number of full-time faculty; (3) support staff, including the trend toward greater numbers of academic support staff as compared to administrative staff, the decreasing need for programmers and data entry staff, staff structure and responsibilities, and support problems created by the advent of Internet/intranet access; (4) equipment, including computer replacement cycles, repair services, network specifications, and use of Apple Macintosh systems; and (5) financial, including comparison of budgets for computer and library services with the total educational and general budget. The extent that investment in technology can improve teaching and learning is identified as a key issue. Appendices include a list of colleges visited, tables of survey data for 1997-98 and for 1987, and a copy of the questionnaire. (AEF)

Computing Trends in Small Liberal Arts Colleges: Ten Years Later

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Abstract

Ten years ago, I visited 41 small liberal arts colleges in the east and midwest and presented a paper at ASCUE summarizing the answers to questions such as: What is happening to Computer Science programs at these colleges? What trends are noticeable in support staffing levels and organization? How many public access microcomputers are enough? Should students be required to buy computers? Should colleges provide faculty, administrators and staff with micro-computers? [Smith]

This past fall and winter, I visited another group of 41 colleges with significant overlap with the group from ten years ago. Some of the questions I asked ten years ago were still relevant and others were not. One phenomenon which has revolutionized academic computing in the last decade is the ubiquitous nature of networks and access to the web. This paper contains tables in the appendices and graphs throughout to help colleges position themselves on the spectrum of answers to many questions, both old and new, regarding information technology at small colleges.

1. Introduction

As part of my sabbatical project during the 1997-98 school year, I visited 41 small liberal arts colleges ranging in size from 300 to 3,800 students (c.f. Appendix 1). Over half of the schools had enrollments between 1000 and 2000. I selected these particular schools because they constituted the list of schools to which Saint Mary's compares itself. At each school, I made appointments with the Academic Dean, the Computer Center Director and a faculty member in Computer Science and asked 15 factual and 10 open ended questions from a survey form which I sent in advance to the chief academic officer at each school (c.f. Appendix 4).

My purpose in visiting these schools was to talk to key people in the information technology areas and to see the computing facilities in action. I was interested in innovative means the schools were using to solve problems common to all of us – how to optimize the use of scarce equipment and personnel resources to support teaching and learning. At each campus, I walked through all the academic buildings and poked into classrooms, departmental labs and campus-wide computing facilities.

2. General Impressions

This is an exciting time for information technology in higher education. Access to a networked computer is becoming almost as commonplace as access to a phone or to electricity. Whereas only

14 of the schools I visited ten years ago planned to put a computer in each faculty office, every one of this year's schools had already provided or was in the process of installing networked workstations in every faculty, administrative, and staff office, as well as network drops in most classrooms. In fact, by next fall, all but six of the colleges will have network connections in their residence halls on a "port per pillow" arrangement. Four of these six have plans to network their residence halls within three years.

An interesting phenomena which has emerged in the last few years is the merging of library and computer services under a single director. Only 8 of the colleges I visited had gone this route and one of these had reverted back to separate directors after a year or two. In all cases, the merger occurred because of the particular situation the college found itself, usually upon the resignation of one of the two directors. The most successful mergers occurred when a technology-oriented library director was put in charge of both library and computer services. Computer support staff were more open to the service-oriented approach of the library than the library staff was to the technology-oriented atmosphere of a computer center. In two cases, the director of the merged entity was elevated to CIO (Chief Information Officer) status.

One area in which there has been no change from ten years ago is the policy requiring students to buy computers. While there is discussion at several schools about leasing workstations to each student or weaving the cost of a computer into a student's financial aid package, none have established such a policy. While not many schools have survey data to back up their estimates of the percentage of students bringing networkable computers to campus, the median estimate is 40%. The percentage of networked computers is significantly lower. The usage trends indicate that the first year network connections are available in residence halls or classrooms there is not much use made of them. The following year the usage increases significantly and by the third year there is widespread use.

Providing network connections in the residence halls has not reduced the demand for public access computers. The most common reason for this counter-intuitive result is that much academic work in residential colleges is beginning to stress collaboration among groups of students. These groups prefer to work in a space where there are several computers and a printer available. E-mail is very popular, with more than 90% of the students checking their email each day at many schools. The public labs are used to read and answer email by students who prefer not to return to their residence halls during the day. In fact, the median number of students per public access workstation has fallen over the past ten years from 40 to 11. The last decile in 1998 is the same as the first decile in 1987 (c.f. Appendices 2 and 3, line 4). The number of hours per week a public workstation is available for each student has risen from a median of 2 in 1987 to 10 in 1998. Even with this increased availability and access, all schools are still reporting steady demand for their public lab facilities.

I was continually surprised by the different but effective ways that schools are designing classroom and lab facilities to make them easy for non-technically-oriented faculty to use, and by the commitment to service on the part of over-worked information technology staff. I discovered that several schools give students excellent opportunities for leadership in helping faculty, staff and other students make optimal use of the college's information technology resources.

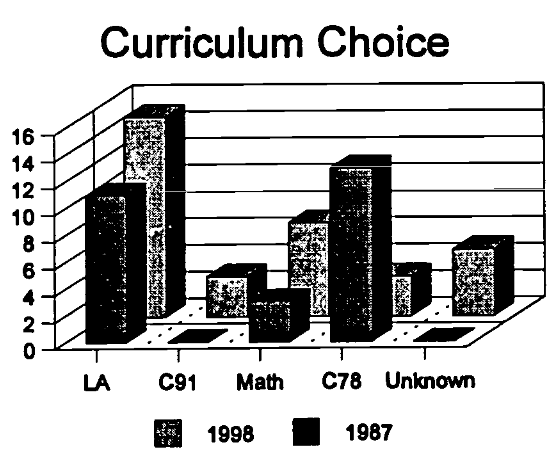
Ten years ago students were used almost exclusively as lab monitors. Now, they are acting as webmasters, conducting workshops for other students, faculty and staff, handling network problems in the residence halls, repairing equipment, working at help desks, etc. Nine schools use the Residence Computer Consultant (RCC) model pioneered at Stanford and adapted for small colleges by Wellesley. [RESNET] This model entrusts students with varying degrees of responsibility for residence hall computing in return for special privileges, equipment and/or salaries. Of course, the experience gained by students in all these support areas is invaluable as they enter the job market.

I will group the rest of my findings into categories and cover each category in a separate section: Computer Science Programs, Support Staff, Equipment, and Financial Results. Interspersed in the text are graphs summarizing the data on the topic being discussed.

3. Computer Science Programs

Of the 41 colleges visited, all but 8 have a computer science (CS) major and all but 8 have a minor program. Only 2 colleges have neither a major or a minor (some schools with CS majors do not allow minors). This marks an increase from ten years ago when only 26 of the schools had major programs. The enrollment in the major is somewhat limited as none of the schools had more than one percent of their student body graduating with a computer science major this year. I asked if the CS major was expected to attract students who would not normally choose the school, and no one, from the deans on down, thought that this was the case. Some faculty believe that Computer Science attracts a higher quality of student, however.

Ten years ago, the schools offering majors were evenly split between those who followed Curriculum 78 [ACM] and those who followed the Model Curriculum for a Liberal Arts Degree in Computer Science [Gibbs & Tucker], with a few opting for a math-oriented model (i.e., one requiring more than five math courses). This year, the most popular model was the Gibbs & Tucker Liberal Arts (LA) model (15 schools), followed by the math-oriented one (7 schools). Only 3 schools were still using Curriculum 78 (C78), 3 had full blown Curriculum 91 [ACM/IEEE] (C91) programs, and 5 were impossible to classify.



Although I expected to find that the location of the Computer Science major had a significant influence over the curriculum, this was not the case. Of the 7 colleges with math oriented curricula, 4 had Computer Science under the Math department and the other 3 had separate Computer Science departments.

The number of schools with separate Computer Science departments has increased over the ten years from 6 in 1987 to 15 in 1998. The reasons cited for separate departments ten years ago (i.e., differences in faculty evaluation, equipment needs and course loads) are still valid. In addition, many of the CS faculty who were originally trained as mathematicians are ready for retirement and are being replaced whenever possible by faculty with PhDs in Computer Science. It is easier to attract these new PhDs to an independent Computer Science Department.

The total number of Computer Science full-time-equivalent (FTE) faculty in all 41 schools this year is 93, compared with 88.5 in 1987. Of these 93, 41 have a PhD in Computer Science, compared with only 15 in 1987. The faculty with Computer Science PhDs are fairly spread out among 25 of the 41 schools, whereas only 9 schools had Computer Science PhDs in 1978. A number of schools are actively searching for faculty with CS PhDs, with a confidence that was lacking ten years ago.

It is interesting to note that the number of FTE Computer Science faculty in the schools I visited has not increased much over the last ten years in spite of the insistence of Curriculum 91 and the ACM/IEEE accrediting body that every department that offers a CS major should have a minimum of 5 faculty FTE. All but six of the departments have 3 or fewer teachers and seem to be coping quite well, although the graduating-senior/CS-faculty median ratio is 3 to 1. If we expand this ratio to include the other 3 classes, realizing that the lower division classes have more potential majors, we obtain a much higher student/faculty ratio than the one for the college as a whole.

Although the number of graduating seniors in Computer Science is not very high, many schools report that their lower level courses are bursting at the seams and that this is a new phenomenon in the last year or two. Only 3 schools are experiencing a decline in the numbers of majors, 12 are holding steady, 11 are experiencing a slow rise in the numbers of majors, and 9 are seeing a steep increase in majors. This trend mirrors the perceived shortage of computer scientists in business and industry. The question remains whether or not the increased numbers of students in the lower level courses include a significant number who have the ability and stamina to succeed in the major.

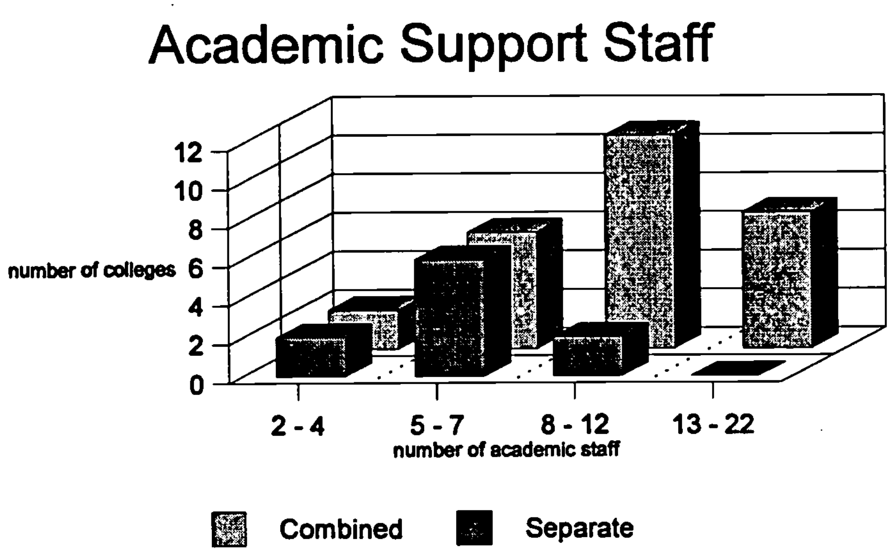
Before closing this section, I want to point out that there were only 3 schools with Management Information Systems (MIS) major programs among the colleges I visited. A reason for this may be that faculty are not taught traditional MIS topics, such as systems analysis and design, in graduate school. MIS faculty tend to come from business and industry and lack the academic credentials to teach at a liberal arts college. Also, MIS programs often operate out of Business departments which are not accepted in traditional liberal arts colleges. It is interesting to note that many of the Computer Science graduates of these colleges take MIS-type jobs after they graduate.

4. Support Staff

One of the most surprising results from this year's college visits was the fact that information technology support personnel for academics now greatly outnumber those dedicated to administrative computing. Ten years ago, just the opposite was true. In 1987, the median number of academic computing staff was 2 compared to a median of 5 for the administrative staff. This year the median for academic staff is 7 and that for administrative staff is 4.5. There are several reasons for this reversal in trends.

All but four of the colleges are using packages for administrative computing, so they need few, if any, programmers. Ten years ago more than half of the colleges had developed their own administrative software. Most of the data entry is being done by users, alleviating the need for data entry people in administrative computing. The advent of both local and wide area networks and the software to ensure easy access to and full use of these resources (the intranet) has created a need for network managers and assistants. These positions were not needed ten years ago. Since the network supports the academic mission and the number of networked computers on the academic side now far exceeds the number on the administrative side, I counted network staff under the academic umbrella.

I also noted that 31 of the schools had a single combined staff structure, whereas the other 10 had separated the staff into academic and administrative departments often reporting to different senior officers. Ten years ago, only 20 of the colleges had combined staffs. Many of the schools with a combined staff have blurred the academic/administrative staff responsibilities, choosing a functional breakdown as more efficient, i.e., one or more of the staff would do desktop support throughout the college, others would do training, others network support, or help desk, or ordering, etc.



Some schools had divided up the departments so a staff member would be primarily responsible for several departments which could be a mixture of academic and administrative. Being primarily responsible for a department meant that the department personnel would call that staff member when a problem occurred and the staff member would make sure that the problem was solved. In many cases this meant calling in one of the other staff members who were more expert in handling the given type of problem. Several colleges had sophisticated help desk software which kept track of the progress in solving problems, so nothing was allowed to fall through the cracks. The graph above illustrates that the schools with combined staffs tended to have a larger proportion of academic staff.

The advent of internet and intranet access throughout the campus and especially in the residence halls has brought with it its own set of support problems. Some of the colleges spend significant staff time hooking up students to the campus network, as much as six weeks of the semester. Other colleges do it all over a two-day period where students bring their computers to a central place for installation of network software and checkout. Colleges using the RCC model do not have to commit staff time to the actual hookup, but they do need to train the resident computer consultants. Many schools are reluctant to have staff open up a student-owned computer to install network cards unless the college is a certified repair shop for that computer. A few colleges charge students for network connection and use the money to pay students or staff working overtime, but this extra charge may discourage students from hooking up. The key to efficient installation seems to be widespread availability of well prepared documentation and software so that, in many cases, users can hook themselves up without assistance.

5. Equipment

The most striking impression I received from my college visits this year is that computer equipment is becoming viewed more and more as having a 3 - 5 year useful life with replacement of 1/5 - 1/3 of campus workstations being budgeted every year. Ten years ago, a computer was expected to last at least ten years and colleges which had invested heavily in campus-wide computing were sitting back and resting on their laurels. A few schools this year are still not committing to a regular replacement cycle. Instead, they depend on windfall replacement, i.e., they wait for a large donation or grant to come along before replacing obsolete computers. I found that 11 colleges replace their desktop units every five years; 21 replace them every four years; and 4 do so every three years.

One result of the 3 - 5 year replacement cycle is that most colleges have powerful up-to-date equipment in public access computer labs. Seventeen of the schools have a policy that brings the newest equipment into the public access areas for a year and then this equipment flows (cascades) to other users on campus. This policy shows that students have top priority and also ensures that the latest software will run in the public labs. A few colleges discourage cascading of computers from one user to another since a staff member must reconfigure the same system several times during its lifetime, thus draining scarce staff resources.

One school has delivery of systems down to a science. They spread out the ordering of new computers over the year in small batches. When an order arrives, the technicians install software in a converted classroom. Then the new users are brought in for group training, each on the machine that s/he will soon have in their office. Once the training is done, the computers are quickly delivered and systems to be cascaded are brought back for reconfiguring. The person to get the reconfigured system is brought in for training in the next wave. This avoids a large inventory of systems waiting for weeks to be configured and delivered.

Replacing equipment on a regular basis raises the question of what to do with obsolete systems. Colleges which repair their own systems (26 out of 41) often cannibalize the old systems for parts and junk the rest. Another approach is to refurbish the obsolete systems so that they are functional and give them to non-profit entities like schools or other agencies. Some schools sell the old computers at an auction or give them to their own faculty or students, which sometimes means that the obsolete systems reappear at the college and the new owners expect support.

Colleges which do not repair their own desktops either outsource the job to a local repair shop (7 schools) or have some combination of inhouse repair and outsourcing (6 schools). The number of schools with technicians to repair equipment has almost doubled over the last ten years. Many schools purchase extended warranties with their new equipment, ensuring their repair by the manufacturer's local representative for two or three years, after which they can be replaced if they break down. Many schools (23) do not repair student-owned computers although they do provide some level of advice about what is wrong and where they can get it repaired. Colleges which sell computers to students (8) do provide repair service and 6 repair student-owned computers on a time and materials basis. The other 4 schools arrange to have a repair service come on campus to pick up and deliver student machines.

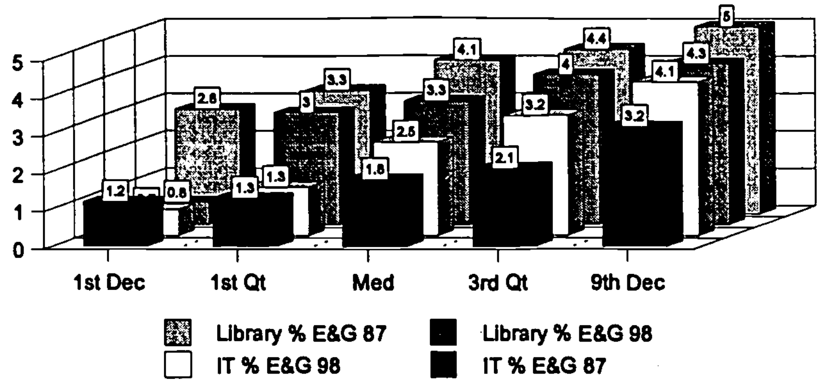
Some schools specify one or two network cards which students are required to use. A few schools provide free cards and cables. Others sell them in the bookstore. A few have computer stores where they offer network-ready systems at a discount. With competition from mail order resellers, it has been more and more difficult for college stores to afford to sell systems at an attractive price. Several schools are closing their computer stores as a result. If a student computer does not meet specifications to be network ready, a few colleges have the policy that staff will spend one hour trying to hook it up and then the student is on their own. It is very important to send specifications for network-ready computers to students and their families as early as possible before the start of the school year – before high school graduation for incoming first year students.

On a final note before closing this section, Apple Computers is alive and well in higher education regardless of how small a fraction of the microcomputer market they hold in the outside world. In the colleges I visited, Macintosh systems make up a median of 40% of the desktop systems. Several of the schools are now or recently had been Apple resellers. One advantage of Macintosh computers is the ease with which they can be connected to the network. Most schools, however, are making their new purchases from the Intel market, needing to hedge their bets in case Apple goes under.

6. Financial Results

Only one-third (14) of the schools I visited this year provided me with financial data concerning the comparison of the Educational and General (E&G) budgets for Computer Services and the Library vis a vis the total E&G budget of the school, and I am not certain that the data these schools provided can be fairly compared since different schools have different accounting procedures. Lines 20 - 27 of Appendix 2 and lines 17 - 25 of Appendix 3 give summaries of the financial results for the 1998 and 1987 surveys respectively. What is noteworthy is that, although the overall dollar figures have almost doubled in all categories for the library and nearly tripled for the computer center, the respective percentages of the total E&G budget have actually fallen over the ten years except for the mid to high end of computer center spending. When one talks to some administrators and faculty, one gets the impression that spending on information technology has skyrocketed out of control. At best, it has barely reached parity with library spending. In my 1987 paper, I quoted from Roger Haigh's 1983 article that an institution should spend at least as much on computer resources as on the library [Haigh]. With the expanded role of Information Technology in providing information resources to the college, this goal of parity between information technology and library spending is even more important today than it was 15 years ago. See the next page for a graphical illustration of the Information Technology and Library budgets from 1987 and 1998.

Percent of E&G Dollars - IT vs Library



7. Key Issue

One question that still remains to be asked is to what extent investment in technology can improve teaching and learning. It is clear that today's citizens must become knowledge workers and must be good at accessing and processing data electronically. If students are to be encouraged to use technology in their education, faculty must first learn how to incorporate technology into their teaching. I asked each dean I talked to whether there were any incentives in place for faculty to use technology effectively in the classroom. No school had a policy which specifically mentioned technology use as a factor during the tenure and promotion process. Most deans told me that successful and appropriate integration of technology into their teaching and/or creative or scholarly work would be looked upon very favorably when faculty come up for review.

Nine of the colleges had external or internal grant money set aside for faculty to use to gain skill in using information technology. Some other schools had general grant money which could be sought for this purpose. It was very rare that a faculty member would get released time to prepare a technology-rich course or for any other reason. Not many schools have realized how much a risk faculty take when they use technology in their courses. If it is not used well or the equipment does not work correctly, students are ready to complain. Also, since students are very familiar with high-quality video game interfaces, they can be very critical of a faculty member's first attempt to bring technology into the classroom.

8. Conclusion

In this paper, I have tried to identify some questions and provide a range of answers which will further the planning effort at small colleges. Any school can ask the same questions (c.f. Appendix 4) and see where it stands by plotting its position in the table given in Appendix 2. In this way a college can see the areas that need improvement and take steps to change. Where I spotted trends, I pointed them out, but there is so much data that it was hard to identify all of them.

In my opinion, the stage is being set for an exciting experiment in learning with technology. Most colleges have wired the campus, established an intranet, and are committed to providing up-to-date equipment. Support staff levels are beginning to climb and better organization is making them more efficient. Faculty are observing how the use of technology has the potential to extend learning beyond the classroom, and students are accepting the challenge. I am looking forward to the changes the next ten years will bring to education and to the role that technology will play in bringing about those changes.

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Appendix 1
List of Colleges Visited

1987	1997-98
Allegheny College, PA	* Alma College, MI
* Alma College, MI	* Augustana College, IL
* Augustana College, IL	* Beloit College, WI
Bates College, ME	Butler University, IN
Beloit College, WI	Coe College, IA
Butler University, WI	Connecticut College, CT
* Carleton College, MN	Cornell College, IA
Coe College, IA	* Denison University, OH
* Cornell College, IA	* Depauw University, IN
* Denison University, OH	Dickinson University, PA
Depauw University, IN	Earlham College, IN
* Earlham College, IN	* Gettysburg College, PA
Franklin and Marshall College	Goucher College, MD
* Gettysburg College, PA	* Hanover College, IN
Hanover College, IN	Hollins College, VA
Hillsdale College, MI	Holy Cross College, MA
* Holy Cross, College of the, MA	Hope College, MI
* Hope College, MI	Kalamazoo College, MI
* Kalamazoo College, MI	Kenyon College, OH
Kenyon College, OH	* Knox College, IL
* Knox College, IL	* Lake Forest College, IL
Lake Forest College, IL	Lawrence University, WI
* Lawrence University, WI	Macalester College, MN
Macalester College, MN	Millikin University, IL
* Millikin University, IL	Muhlenberg College, PA
* Monmouth College, IL	Randolph Macon Womens College, VA
* Muhlenberg College, PA	* Ripon College, WI
New Rochelle, College of, NY	St. Catherine, College of, MN
* Ripon College, WI	St. John's / St. Benedict, MN
* Russell Sage Women's College, NY	* Saint Mary's College, IN
* St. Catherine, College of, MN	St. Norbert's College, WI
* Saint Mary's College, IN	* St. Olaf College, MN
* St. Norbert's College, WI	Salem College, NC
* St. Olaf College, MN	Skidmore College, NY
Skidmore College, NY	Stonehill College, MA
* Stonehill College, MA	Washington & Jefferson College, PA
Washington & Jefferson College, PA	Washington & Lee University, VA
Wheaton College, MA	Wells College, NY
* Williams College, MA	* Wheaton College, MA
* Wittenberg University, PA	* Wittenberg University, PA
Wooster, College of, OH	Wooster, College of, OH

* marks the colleges which provided financial data

Appendix 2 (1997-98 Visits)

		First Decile	First Quart	Median	Third Quart	Last Decile	Mean
1.	Enrollment	720	1160	1600	2158	2905	1694
2.	Number of Public Access Micros	72	90	126	172	248	142
3.	Mac % of Public Access Micros	9	16	42	60	76	38
4.	Number of Students per Micro	7	9	11	15	21	12.4
5.	PA Micro Hours/Student/Week	5	6	10	12	16.5	10
6.	CS Faculty FTE	1	1.5	2	3	4	3
7.	Admin Comp Center Staff FTE	1	2	4.5	6	11	4.9
8.	Acad Comp Center Staff FTE	4	5.5	7	12	14	8.6
9.	Acad Staff % of Total CC staff	48	50	70	75	80	63.5
10.	Number of Students per CC Staff	75	100	120	167	219	125
11.	Number of Faculty per Acad CC Staff	11	13	17	21	29	16.8
12.	Graduating CS Majors (0 if no CS Major)	0	3	6	10	13	6
13.	% CS Graduates of Student Body (" " ")	0	0.2	0.4	0.5	0.9	0.4
14.	CS Graduating Majors per CS Faculty(" ")	0	1.5	3	4.3	5.5	3
15.	Percent of Students Owning Micros	13	25	40	64	80	46
16.	Year Residence Halls Networked	94	96	97	98	99	97
17.	Desktop Replacement Cycle (Years)	3	4	4	5	7	4
18.	Student Comp Center Workers	14	22	30	40	60	31
19.	Student Assistant % of Student Body	1	1.5	1.9	2.6	3.3	2

Financial Data for 14 Schools (I was unable to obtain this data at the other schools)

		First Decile	First Quart	Median	Third Quart	Last Decile	Mean
20.	Enrollment	880	1160	1415	2195	2604	1658
21.	Total E&G Expenditures	13750	21300	27600	40000	47450	30000
22.	Library E&G Expenditures	333	696	1000	1295	1925	948
23.	Computer Center E&G Expenditures	246	311	649	1001	1295	685
24.	Library Percent of E&G Dollars	0.65	2.95	3.35	4.05	4.3	3.2
25.	Computer Center % of E&G Dollars	0.75	1.35	2.45	3.2	4.1	2.4
26.	Library E&G Dollars / Student	97	497	585	816	923	592
27.	Computer Center E&G Dollars / Student	95	278	496	672	644	437

Values in lines 21, 22, and 23 are in thousands of dollars.

Appendix 3 (1987 Visits)

		First Decile	First Quart	Median	Third Quart	Last Decile
1.	Enrollment	950	1080	1670	2000	2400
2.	Number of Public Access Micros	11	18	37	55	80
3.	Public Access Dumb Terminals	7	19	26	39	69
4.	Number of Students per Micro	19.6	28.2	50.1	76.9	154
5.	Public Access Micro Hours/Student/Week	0.6	1.1	2.0	3.3	5.0
6.	Students/Dumb Terminal	19.2	32.7	50.1	76.9	150
7.	Dumb Terminal Hours/Student/Week	0.3	0.8	1.7	2.7	4.5
8.	CS Faculty FTE	1.5	2	2.5	4	5
9.	Admin Comp Center Staff FTE	2	3	5	7.5	12.0
10.	Acad Comp Center Staff FTE	0.5	1	2	3	5
11.	Acad Staff % of Total CC staff	13	20	28	38	57
12.	Number of Students per CC Staff	118	167	209	280	611
13.	Graduating CS Majors (26 Schools)	4.5	5	9	11	17
14.	Faculty FTE in CS Major Programs	2	2	3.5	4.3	5.5
15.	% CS Graduates of Student Body	0.3	0.4	0.6	0.9	1.0
16.	CS Graduating Majors per CS Faculty	1.4	1.9	2.6	3.7	5

Financial Data for 25 Schools — Values are averages for 3 years 6/83-6/86

17.	Enrollment	884	1039	1705	2095	2372
18.	Total E&G Expenditures	8436	10659	13629	18411	26740
19.	Library E&G Expenditures	287	393	529	672	1002
20.	Computer Center E&G Expenditures	116	177	231	325	722
21.	Library Percent of E&G Dollars	2.8	3.3	4.1	4.4	5
22.	Computer Center % of E&G Dollars	1.2	1.3	1.8	2.1	3.2
23.	Library E&G Dollars / Student	216	271	311	450	610
24.	Computer Center E&G Dollars / Student	92	117	143	243	370
25.	Hardware Dollars/Student	14	41	81	207	404

Values in lines 18, 19, and 20 are in thousands of dollars.

Appendix 4
Questionnaire

Comparative College Visitation Questions: College Name ____________

I. Data

1. FTE enrollment______ men________ women________
2. CS major? ______ # CS seniors ________ #CS faculty FTE_____
3. Info-Science/MIS major ____ # seniors ____ Minor programs? _____
4. #faculty w/CS PhD _____ # CS faculty w/o CS PhD ______
5. Central or distributed public computer labs ___________

For each public access lab

a. # PCs _______ # Macs ________ # terminals _____
b. # hours/week available (not counting scheduled class hours) ______
c. Networked? ______ If yes - to Internet? ____ LAN only? _____
d. # hours/week supervision: student worker ________ staff _______

6. Is there a fine arts computer facility? ________
7. What type of computer is used for administrative work? ______________
8. What administrative package is used? ________ Central Database? _______
9. # Info Tech staff ______ # acad comp staff_______ # admin comp staff _______
10. Are staffs separate? ____
11. # students bringing computers to campus ______
12. Are residence halls networked to the internet? If so, when did/will it happen ____
13. Does your campus network provide public file space? ____ Software metering?
    Megs of faculty space _____ Megs of student space ______
14. Are students required to own or buy computers? _____
15. Do faculty/staff have access from off campus to college network? ____ How?

II. Open-ended questions

1. If you have a CS/MIS major, which curriculum do you follow? Are you accredited?
   Did other majors decline as your CS/MIS major gained students?
   Did instituting a CS/MIS major lead to increase in college enrollment?
2. Do you have CS/MIS minors? What are the requirements?
3. What are the enrollment trends in your CS courses? In the CS major?
4. How is innovative use of IT weighted in tenure/promotion decisions? Basis?
5. What is the repair policy for student-owned computers? For college-owned computers
6. Is Computer Services a separate entity or is it subsumed into another admin. Unit?
7. What is the policy for maintaining/upgrading computers? Obsolete computers?
8. Do you have a cascade or "hand-me-down" policy for college computers? What is it?
9. What is your policy on laser printing?
10. How are you dealing with support issues across the board?

E&G Budget _________ IT E&G Budget _________ Library E&G Budget ______

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