FINANCING AN ACADEMIC COMPUTER LABORATORY

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Introduction

Since 1975, the Department of Mathematics and Computer Science of Lewis University has operated an Academic Computer Laboratory that has supplied academic computing services to the university; the university is a small, private school of approximately 2500 students. A data center on the campus does the university data processing work. This paper examines the costs associated with running such a departmental computer laboratory over a five year period, the revenue generated exclusive of tuition to justify that substantial academic computing cost, and the anticipated future development of this very successful dedicated minicomputer laboratory.

Expenses

In the spring of 1975, the University began a computer science major and installed a Computer Laboratory that would be dedicated to academic computing and be under the control of the Department of Mathematics and Computer Science. A Director of the Computer Laboratory was responsible for the daily operations of the Laboratory; the Director reported to the Chairman of the Department of Mathematics and Computer Science. The budget for the Laboratory was integrated into the Departmental budget.

Between 1975 and 1978 the Laboratory housed a Honeywell 1642 timesharing minicomputer and ten Teletype Model 31 terminals; this computer was picked up on the last three years of a five year lease from another company. The lease and maintenance costs for the Honeywell 1642 computer between 1975 and 1978 are given in Table I; these costs dwarfed all other non-personnel operating costs. The Honeywell 1642 supported interactive BASIC and FORTRAN program development work; the majority of students in computer courses used these languages. The Honeywell 1642 configuration in the Laboratory had no printer or card reader; an early commitment was made to interactive work in order to minimize lease and maintenance costs. However, in order to do necessary COBOL programming, students keypunched programs in the Computer Laboratory, and then these programs were sent to a data center on campus for batch processing on a larger Honeywell 2000 machine; between 1975 and 1978 other non-personnel expenses in Table I included buying COBOL batch computing time from the University Data Center at a very reasonable cost. In addition, some very limited PL/I, ALGOL, and SNOBOL computing time was also very efficiently bought for advanced computing classes from the Service Bureau Company and Utility Network of America using the communications equipment in the Computer Laboratory; this expense was also included under other non-personnel expenses in Table I. This category of expenses also included teletype maintenance, keypunch maintenance, and paper costs for the teletypes.

In the summer of 1978 a PRIME 300 timesharing minicomputer was installed in the Computer Laboratory to replace the Honeywell 1642 computer. This $104,200 machine was leased for five years; it has 320KB of main memory and supports a rich interactive BASIC, Assembler, ANSI 74 COBOL, FORTRAN, and RPG II. Again, this machine has no printer or card reader; it is currently supporting 16 terminals (new DECwriter II's and Hazeltine 1500's). A relatively large amount of main memory was purchased to enable COBOL to run well interactively; the lease and maintenance costs between 1978 and 1930, again dwarfing all other costs, are given in Table I. Other non-personnel expenses in Table I between 1978 and 1980 include the purchase of PL/I time from outside sources, maintenance costs for the DECwriter II's and staggering increases in paper costs that have motivated encouraging students to do most of their work at video display terminals.

Capital equipment costs for the Academic Computer Laboratory between 1975 and 1980 are given in Table I; these costs have been very uneven over the years--depending on the state of university finances and fund raising efforts. In 1975, $28,379 was spent to purchase ten Teletype Model 31 teletypes, two keypunches, communications equipment, and other equipment needed to start the Computer Laboratory; the teletypes, very durable pieces of equipment, were used continuously by students for three years and then discarded. In 1978, fund-raising efforts and equipment swapping enabled the Computer Laboratory to obtain six DECwriter II printer terminals and six Hazeltine 1500 video display terminals to replace the discarded teletypes. Computer Laboratory site preparation expenses in 1975 and 1978 are not included in Table I; these expenses were borne by university physical plant budgets.

In order to be able to justify an Academic Computer Laboratory it is necessary to minimize the personnel expenses associated with the laboratory. Having very reliable machines dedicated to academic computing (no university data processing work) enabled us to do this. An instructor in the Department of Mathematics and Computer Science teaches one-half time (six hours per week) and is responsible for the Computer Laboratory; student workers are hired to continually staff the Computer Laboratory. These student workers are computer science majors who have been trained in computer classes to take care of the computer equipment; they also act as consultants to the student body in the Computer Laboratory. The Chairman of the Department of Mathematics and Computer Science does the paperwork associated with the Computer Laboratory. Hence, the personnel costs associated with the Laboratory are nominal: one-half of a faculty member and qualified student workers. A dedicated reliable machine, doing no university data processing work and having no card reader or printer, and for which having secure files is not a problem, aid in minimizing personnel.

Revenue

In order to justify the substantial lease and maintenance costs of a minicomputer dedicated to academic computing, two kinds of revenue exclusive of tuition and fund-raising have been generated since 1975: course fees on courses using the minicomputer and revenue from a timesharing business run by the Department of Mathematics and Computer Science in which computer time is sold to sources outside the university. Table II gives the revenue from these sources. Computer course fees in computer science courses were $25/student from 1975 to 1978, $35/student from 1978 to 1980; and will be $45/student in the fall of 1980; students get their money's worth in computer usage. In addition, $5/student is charged in economics and chemistry courses that use the computer in a computer-assisted environment, running canned programs. There are also many academic situations in which the computer is casually used by faculty and students, but no fee is charged.

Between 1975 and 1978 substantial amounts of money were generated by selling computer time to sources outside the university; this continued to be done on a piecemeal basis after 1978, but revenue was practically nil. A combination of factors spelled the demise of this mini-timesharing business: more ports for computer terminals were needed for internal use, thus eliminating ports for terminals for external customers; computer time was being sold without significant customer support; communications costs were increasing; customers wanted more substantial hardware and software capabilities; and customers began buying their own micro and minicomputers. Selling computer time per se is relatively easy to do; providing customer support and reliable machine operations is more difficult to do. The timesharing business justified the cost of an academic computer in the early years of 1975 to 1978; computer course fees have picked up the slack in that business in recent years.

Fund-raising efforts with regard to academic computing have also been very successful in recent years. Caterpillar Tractor Company donated $11,800 in 1979 to purchase new DECwriter II and Hazeltine 1500 computer terminals and $10,000 was received from the Nalco Chemical Company in 1980 for computer terminals. Other small donors have also given computer terminals in the past two years. Once an academic computer laboratory dedicated to academic computing is well-established and seen to be in constant use, it becomes easier to raise funds to support such a worthwhile academic endeavor. The value of an academic computer laboratory is easy to show to prospective donors.

The Future

An academic computer laboratory dedicated to academic computing has been very successful at Lewis University; such a laboratory can only be expected to expand in future years. In 1980-81 we expect to upgrade to a PRIME 400 Timesharing Minicomputer with 32 terminals and 500KB of main memory; the

machine would be BASIC, Assembler, FORTRAN, ANSI 74 COBOL, RPG II, and PL/I. A database management capability on this machine is also being considered; graphics capabilities on this machine or on Apple II microcomputers interfacing with the PRIME 400 are also being studied. All program development work will continue to be done interactively; more Hazeltine 1500 video display terminals and the faster DECwriter III printer terminals will be purchased--it is advantageous to standardize equipment purchases as much as possible. Computer terminals will be put in secure locations remote from the Computer Laboratory for more convenient student usage. The word processing capability of the computer is already being used extensively within the Department of Mathematics and Computer Science; when possible, some faculty secretaries may be given excess computer terminal capacity in order to use this powerful word processing capability of the computer. A doubling of computer terminal capacity and upgrading of the computer every few years seems realistic since faculty, student, and secretarial use should increase dramatically each year.

The costs of the lease and maintenance of an academic computer are currently being borne by computer course fees; the shortfall in meeting these costs is about $15,000 in 1980 and should be about $20,000 in 1981. This represents a nominal cost for having an academic computer laboratory supplying academic computing power to a small private university. It is a small fraction of the costs of administrative data processing work. The personnel costs of one-half of a faculty member and qualified student workers are as minimal as can be expected to run an academic computer laboratory. As long as the total cost of having an academic computer laboratory is kept nominal in relation to the academic benefit realized, an academic computer laboratory can continue to successfully exist.

Summary

This paper has examined the costs associated with running a departmental computer laboratory dedicated to academic computing over a five year period, the revenue generated exclusive of tuition to justify that substantial academic computing cost, and anticipated future development of this very successful dedicated minicomputer laboratory. Lease and maintenance costs have dwarfed all other costs during this time period; capital equipment costs have been uneven over the years--depending on the state of university finances and fund-raising. Personnel costs to run the laboratory have been minimal: one-half of a faculty member and qualified student workers. Revenue to justify the laboratory has come from a timesharing business and computer course fees. The shortfall between costs and revenue has been nominal in relation to the academic benefit realized. The future includes a computer upgrade and doubling of computer terminal capacity every few years due to increased demand.

References

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Table I

Computer Laboratory Expenses

	Computer Lease Costs	Computer Maintenance Costs	Capitol Equipment Costs	Other Non-Personnel Expenses
1975-76	$1,613/month	$750/month	$28,379	$2,800
1976-77	$1,613/month	$818/month	$1,245	$4,200
1977-78	$1,613/month	$892/month	0	$4,200
1978-79	$2,269/month	$782/month	$17,030	$2,250
1979-80	$2,269/month	$782/month	0	$3,750

Table II

Computer Laboratory Revenue Exclusive of Tuition

	Timesharing Business	Computer Course Fees
1975-76	$24,956	$7,400
1976-77	$20,768	$8,575
1977-78	$12,000	$12,580
1978-79	0	$17,765
1979-80	0	$20,580