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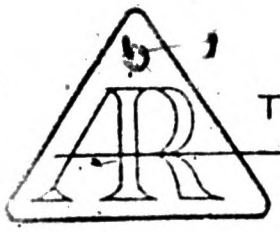
ABSTRACT

The cost-benefit of administrative data at a state college is placed in perspective relative to the institutional involvement in computer use. The costs of computer operations, personnel, and peripheral equipment expenses related to instruction are analyzed. Data bases and systems support institutional activities, such as registration, and aid managerial decision making. Decisions focus on establishing the effectiveness of institutions (e.g., delivering quality instruction) and enhancing the efficiency of resource utilization. Since the data bases were developed to meet federal, state, and institutional needs, they deal almost exclusively with the parameters of efficiency. The data bases do a fair job in providing information of instructional workload but are poor-to-nonexistent in providing data on faculty quality and amount of noninstructional activity. Efforts should be made to augment the data systems to include constructs more directly related to effectiveness. The measurement of activities and outputs must be expanded and become a priority of faculty and their organizations. Efforts also must be extended to develop data exchanges for comparable colleges and curricula. Administrators have started in this direction, but if faculty do not become involved, the results will focus on indices of efficiency and not on the parameters of effectiveness. (SW)



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Data Bases at a State Institution - Costs, Uses and Needs

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The last decade has seen a tremendous increase in the amount of available data in and about institutions of higher education, their operation and the processes which occur within their corporate bounds. This data has the same potential characteristics as information in any environment; it "has value; is a means to knowledge; and is a lever to power (Information Times, 1978)." Principles developed by those involved in its management claim that it can be:

"- Identified, measured, and costed at each process step.

- Planned just as other resources are.

- Budgeted as line items rather than as overhead.

- Managed by balancing the value received against cost incurred."

While these principles sound encouraging, Ellzey (1978) reminds us that "The problem of communication between managers and data processing shops has existed for many years, and by all indicators, the problem will seek solution for some time." He also notes the "Experience tells us that sheer volume of information and large numbers of people tend to create a negative result in the quality of information passed." This problem of quantity has received recent recognition by Scott (1978) who noted that 439 separate statutory authorities affecting postsecondary education have placed a great deal of strain on our institutions. One can safely assume that date are required for each authority. Compounding the quantity of data required by federal authorities are the data requirements of regional, state, and internal agencies. Also involved are data bases maintained for the operation of the institution, e.g. student registration, student fees, etc.

What has been the result of the increasing demands for data on post-secondary education? Despite the "principles" of information resource management on the feasibility of measuring the costs and value of information, traditional wisdom has long held that it is not possible to fully and accurately determine the cost and value of information. After an appropriate time of investigation, I believe that there is a very solid basis to this specific component of wisdom. The following, I fear, is a picture of an iceberg - to conclude that it describes the extent of costs and benefits to data bases is to make the same conclusion made by those on the Titanic. The cost-benefit of administrative data is first placed in perspective relative to the institutional involvement in computer use. Next a state system for maintaining institutional activity is viewed from the costs and benefits associated with the institution.

Based on limitations of time and effort, the discussion of costs-benefits of administrative data is restricted to instruction. The major aspects of these costs include cost of computer operations, personnel costs, and peripheral equipment expenses. Our institution uses an internal accounting system to prorate direct computer expenses to the various departments and agencies using the facility. The results of these accounting charges are shown in Table 1.

(Table 1 about here)

While these are internal bookkeeping charges, there have been several studies to keep the charges representative of actual expenses of operations. Several very interesting facts are obvious. First the relative direct computer costs for major administrative users is going down from 39 percent in 1974-75 to about 33 percent in 1976-77. This has occured as the institution

grew from 17,470 headcount in Fall 1974 to 19,314 in Fall 1976. The absolute dollar amount also went down in 1976-77. One can also note the relative size and trends of the various users. The trend of increasing to a point and then a decline - as for Admissions and Registrar - is a typical trend for the development and then implementation of data bases. Of particular interest are the trends for the Information Management System (our mechanism for data maintenance) up 5 fold; Systems Development (those who develop computerized data systems) which increased by one half; and Institutional Research (those who do reports) which has tripled. The cost of developing data bases has stabilized. The cost of reporting is continuing to grow.

A second major institutional cost of data is the amount spent for classified data management personnel (systems analysts and programmers). Key punch operators are most likely replacing other clerical personnel and the costs for machine operators were accounted for in the machine use costs in Table 1. It is almost impossible to identify the functions and hence the related costs of non-classified personnel. The following shows the growth in the number and expense of systems analysts and programmers as split into two groups; those involved in supporting administrative data bases and those in other efforts. Computer center analysts and programmers were prorated based on the proportion of direct charges.

(Table 2 about here.)

Where the cost, absolute and relative, of computer operation has stabilized at about one-third of the operation, the personnel cost in this specific area has increased about $115,000 per year over the last four years. The

costs have quadrupled from $128,000 to $560,700 in six years. Administrative data bases are now the reason for two out of every three dollars spent for those who develop and maintain computer systems. As previously noted, these expenses do not include many of the users of the data or even the data synthesizers. There are at least $100,000 spent on those I know who are not on this list but who earn their keep by providing data.

If personnel cost of data are confusing, equipment costs are imponderable. There are so many ways of obtaining the equipment (e.g. time lease/purchase; third party purchase; rental, etc.) that I feel most comfortable estimating the value of the terminals, etc. we use in our data base management. There are about 41 terminals which are connected to the IMS system and about 20 more which access the remainder of the system. In addition, there are control units linking these terminals to the main frame. This comes to about $260,000 before one includes disks, tapes, keypunches, etc.

A summary of machine and personnel costs produces a total university commitment of about two million dollars a year. Certainly this expense has provided many things of great value, our students no longer stand in lines for three days to register, grades come out in several days, the federal government audits out contracts with no ill effects, etc. In addition, these data bases support data reporting to internal management and to external agencies. Although it is difficult, if not impossible, to cost out reports such as those to NCES, AAUP, etc., we have been able to take a look at the cost of reporting data to our state coordinating agency. These data are reported through a set of software consisting primarily of the IEP system from NCHEMS and supported by about 4.5 million data elements per year. A recent survey conducted by Mike Staman at Christopher Newport provided the following

information from seven of the 14 public colleges and universities in Virginia. The results to questions on the startup and operation costs in terms of personnel and computer costs are shown in Table 3.

(Table 3 about here.)

Remember that these costs are only for the implementation of the IEP system, they do not include the cost of developing and maintaining the data bases which support the Student and Personnel Data Modules. The annual price tag runs from about $8,000 in a small institution to about $45,000 in a large institution. Table 4 shows these costs expressed in terms of enrollment.

(Table 4 about here.)

Taken to the state level where there was an enrollment of about 100,000 FTE students in 1977-78, this represents an institutional expense of about one quarter of a million dollars. It would be presumptuous to speculate about the benefit of these data to those at the state level. At the same time the respondents agreed on several germane conclusions. Six out of seven reported that the enrollment information was appropriate for external reporting but five out of seven felt that the costing information was too detailed for external reporting. There are too many unanswered questions at the current state of the art to have faith in detailed per unit costs. Even more germane is that six our of the seven said that the enrollment and costing information either required reorganization or was of no value at all for internal use. For example, the IEP student data are snapshots which do

not represent accurately the instructional activity of the faculty.

On the positive side, about one half of the respondents noted that IEP had helped improve the accuracy of their data but one has to wonder if the monies could have been spent more effectively if each institution had been allowed to develop a system which met its unique needs.

This discussion brings us to the second theme of this effort - the benefit of data bases. As earlier indicated, I feel that our data bases and systems do a good job in supporting institutional activities such as registration, costing grants, etc. A second aspect of the question of benefits is in terms of supporting managerial decision making. One can split these decisions into those which focus on establishing the effectiveness of our institutions (e.g., delivering quality instruction, research, and public service) and those which seek to enhance the efficiency of resourse utilization. Decisions at the operating level (e.g., the History Department) are predominately concerned with effectiveness, as one moves to higher levels of aggregation, efficiency becomes more crucial. Since our data bases were developed to meet federal, state, and institutional needs, they deal almost exclusively with the parameters of efficiency. For example, there are two major constructs of faculty efforts; student credit hours which measures the efficiency of output and faculty contact hours which focuses on hours spent with students. It should surprise no one that we report cost per SCH to several places past the decimal; an accomplishment which impresses very few department chairmen.

In short, the potential benefit of our current data bases is limited by the fact that they do not include needed information. A recent study of decision-making at the college level emphasizes this fact. The dean makes three major types of allocation decisions; new positions, raises,

and other operating expenses. The information desired for allocating new positions includes data on relative instructional workload, faculty quality, and amount of non-instructional activity (e.g., research, public service). Our data bases do a fair job on workload, they are poor to non-existant on the other factors. Information needs for adjustments to salary raises focus on the questions of the reasonable amount faculty in specific should earn given their quality. Here the benefit of our computerized data bases depends on the ability to find comparable institutions with which to exchange data. Few of these arrangements exist since most of our current data exchanges are based only on the fact that institutions are supported by the same funding agency. In the third area, deans tend to allocate operating expenses on a "cost plus" basis and in this area, our historical data bases are strongly supportive. One can only guess at their value if one were to do a zero based budget procedure.

As one goes from the college to the institutional level, I think our data bases and systems are on the threshold of providing a great benefit to our decision makers as they face decisions on the efficiency of institutuional operation. The bases, however, must become more inclusive and more dependable. The question of activity and allocations relative to comparable institutions is even more important.

Where do we go from here? First and foremost, we must augment our data systems to include constructs more directly related to effectiveness. Efforts in measuring activities/outputs must be expanded and must be a priority of faculty and their organizations. Administrators at all levels also have a responsibility for this change but we are NOT experts in questions of effectiveness. Faculty must be directly and heavily involved. Do not wait until state level data bases include output measures which are

shallow and synthetic before you start work. A good place to start looking for relevant outcomes is the work by Leming and others at NCHEMS (1978) but two facts must be accepted. First the concepts of effectiveness vary from discipline to discipline and institution to institution. We can retain all of the two thousand plus, outcomes measures in our data bases but must select the four or five which are most relevant for each major area requiring support. The second point is that in the assessment of effectiveness statistics must be integrated with a much larger qualitative component of judgement than the current practice of assessing effectiveness. The evaluation of outcomes is no more a measure of effectiveness than the score on an IQ test is the measure of intelligence. If we assume that the measurement of outcomes will directly reflect effectiveness, our new indicies will deserve the same fate as the IQ test received.

Efforts also must be extended to develop data exchanges for comparable colleges and curricula. Here again administrators have already started in this direction yet if faculty do not become involved the results will focus on indicies of efficiency and not on the parameters of effectiveness. A final point is that we must resist the tendency to delude ourselves and others with precise detailed statistics - the state of the art does not warrant serious consideration of the cost of teaching freshmen english to lower division majors in chemistry. Those who would use our data bases for this purpose create a negative benefit.

Table 1

Operating Costs Charged to Major Administrative Users for Computer Resources (Academic Year 1973-74 to 1976-77)

Agency	1973-74	1974-75	1975-76	1976-77
Prorated Costs	2,269,922	2,694,465	3,815,211	3,686,428
Admissions & Registrar	422,668	482,540	574,105	436,757
Graduate School	8,778	23,160	45,589	51,202
Library	60,073	91,223	103,082	90,995
University Development	19,992	16,525	25,958	28,447
Personnel	88,804	91,843	143,969	87,212
Accounting	120,759	169,053	190,127	237,115
IMS	12,160	48,731	60,546	61,923
Systems Development	-	74,917	109,317	106,991
Institutional Research	24,011	25,807	58,974	76,248
Other (B&G, Purch., Facilities, VP Stu)	30,954	36,878	46,146	47,688
Total Major Administrative Users	788,199	1,060,677	1,357,813	1,224,578
Administration as % of Prorated	34.7	39.4	35.6	33.2

Table 2

Number and Salaries of Systems Analyists and Programmers

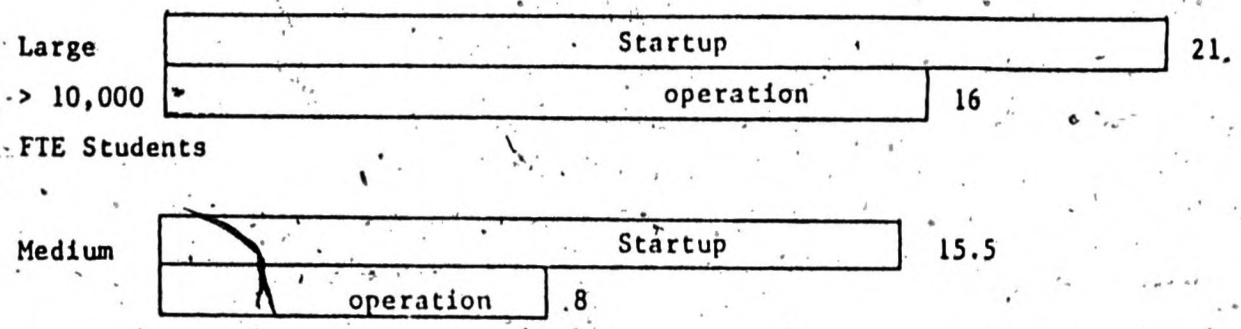
Year	Total Dollars	Number	Administrative Data Support Dollars*	Number	Percent
1971	339,300	29	128,700	11	37.9%
1972	454,600	38	167,500	14	36.8%
1973	464,400	37	163,200	13	35.1%
1974	544,900	43	215,400	17	39.5%
1975	622,400	46	365,300	27	58.7%
1976	693,200	52	440,000	33	63.5%
1977	879,000	58	560,700	37	63.8%

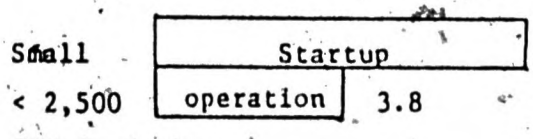
* Estimated from proportion of Staff in this category

Table 3

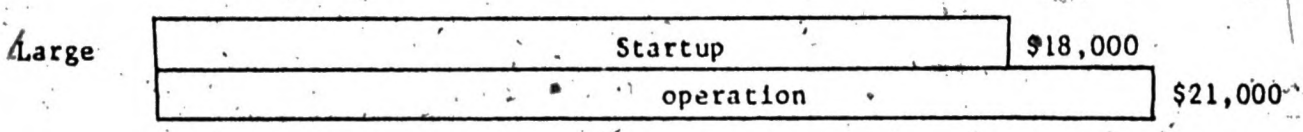
Investment in Virginia IEP

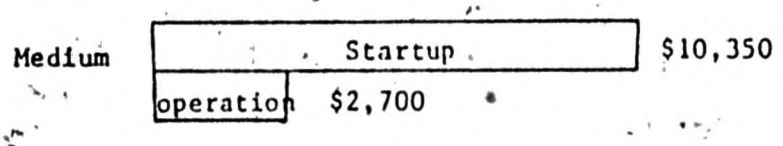
Person months for IEP

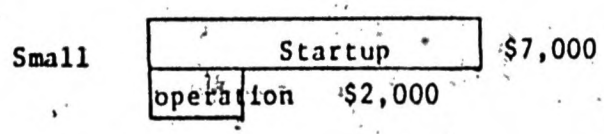




Dollars in Computer Cost







Requirement for time is directly proportional to size and status of budget data base relative to personnel data base.

Table 4

Cost of IEP per 100 FTE Students

For personnel on IEP the following
are typical (15,000 per professional; 7,000 per clerical)

	Cost per 100 FTE			
	Direct Computer	Professional	Clerical	Total
Startup	138.35	177.34	36.53	352.22
Annual Run	100.53	98.18	23.97	222.68

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