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COST STUDIES IN HIGHER EDUCATION

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Higher education is a complex process, difficult to explain and with traditions and procedures varying from campus to campus. Therefore, cost studies require many assumptions, consume much effort, and sometimes produce only qualified results. Yet legislators and others in power continue to ask: "What are the actual costs of instruction in each field?" or, worse, "What are these costs compared to what they should be?"

The primary emphasis in this discussion is on the response of a four-year public institution to an externally mandated cost study. It is offered as a guide to institutional researchers as they work through the cost study maze.

Much is written on cost studies, but the literature is often uninteresting to those whose budget is not on the "chopping block." Fortunately, two sources of information are of current general interest: *A Study of Cost Analysis in Higher Education* (Adams, Hankins, Schroeder & Kingston, 1978) and the NACUBO/NCHEMS finance manuals. Other excellent publications exist on relating costs of instruction to educational outcomes and on improving the efficiency of the educational process. For a guide to these topics, see Wayne R. Kirschling's review of selected literature, "Productivity and Cost-Benefit Analysis" (1979).

A capsule overview of the topic is offered here rather than a duplication of the cited material. Selected observations are presented which will alert readers to types of potential problems. So alerted, the reader can review potential trouble spots in his or her own campus setting and turn to other references for more complete guidance and recommendations.

Why Perform Cost Studies?

Basis for external funding. Most efforts, at least in the public sector, seem geared to an appropriation or budget determination or to the development of a formula-budgeting process. Enrollment declines often prompt a shift from an instructional budget determined on a simple per (FTE) student basis to a budget determined using a fixed base (one registrar's office, a nucleus of faculty for each department, etc.) plus an additional amount for enrollment above base levels. Cost data are often requested by an external funding agency to determine appropriate base support levels.

Internal campus benefit. Decisions on the expansion or reduction of academic programs may prompt requests for cost data. If a budget reduction is required and a program is found to be academically marginal and also high cost, its outright termination may allow other programs to continue unhindered. On the other hand, decision makers may wish to expend available additional funds in areas causing the greatest benefit. A cost study can be one factor in either decision.

Cost studies may have even greater internal benefit during non-crisis periods. A periodic or limited continual cost study process may serve as a monitor of efficient allocation of resources, flagging small problems before they grow large. Voluntary local cost studies can be conducted at convenient times. These can be constructed so that benchmark comparisons may be made with cooperating institutions and can be be conducted in a less threatening manner.

Source of Requests for Cost Studies

National. National cost studies are limited for practical purposes to those using HEGIS data, and they suffer several problems. Comprehensive national cost studies are virtually impossible to construct because responsibility for education rests with state and local rather than with federal government, resulting in a variety of academic programs and accounting systems. Therefore, financial statistics from similar institutions in neighboring states may show large and misleading variations in faculty compensation (depending on whether fringe benefits are included), the scope of programs (depending on whether research stations or extension services are included in the institution's budget), and expenditures per student (depending on how FTE enrollment is defined). Most campus business officers view even the limited HEGIS financial statistics with skepticism. An easy way to convince persons of interstate reporting variations is to discuss the relatively simple concept of FTE enrollment and refer them to a study by Rhodes and Temple (1976) which concluded:

> This research substantiated the primary thesis that a major discrepancy exists in calculating full-time enrollment on a nationwide basis. It raises considerable questions as to how regional comparisons can be made of financial data in higher education when one of the bases (FTE) for the data is not standard. It was also apparent from this study that a simple conversion formula could not be developed which would provide meaningful comparisons nationally or regionally. Furthermore, certain influencing factors make it difficult to determine FTE enrollment within an individual state. For example, some states use different methods to compute FTE in the various types of institutions such as community colleges and four-year institutions. (p. 6)

Several large-scale, non-federal cost studies have been conducted. The "California and Western Conference Cost and Statistical Study" of 1954–55 (University of California, Berkeley) stands as a well-documented early effort. The NCHEMS "Procedures (IEP) for Determining Historical Full Costs" (1977) was more recently used by a number of institutions to exchange information on program costs. The IEP program, in the opinion of the author, fell by the wayside partly because of persistent reporting problems and partly because it ceased to be an informal, voluntary exchange of benchmark data and threatened to become a permanent, detailed study required by state governing boards. National cost studies have been prepared within special fields (legal, education, nursing, etc.) and at the graduate level.

State-level cost studies. State legislatures, with almost tidal regularity, can be predicted to commission statewide master plans and/or cost studies for higher education. The 1978 Maryland master plan reviewed previous similar efforts conducted in 1924, 1931, 1937, 1947, 1955, 1960, 1962, and 1975, for an average of about seven years between studies. This periodicity is caused not only by the turnover in legislative seats but also by basic changes in society and the resulting impact on higher education—for example, the G.I. Bill influx, the "baby boom," the demand for community college services, and the current problem of high inflation coupled with projected enrollment declines. The current problem stands apart from most previous concerns in that it involves severe projected enrollment declines, a situation not experienced since the early 1950s.

The importance of the difference is that during periods of increasing enrollments, per-student appropriations or revenues based on average costs, when incremented to meet increased enrollment, sometimes exceeded the marginal cost of those additional students—that is, revenue sometimes increased faster than expenses. Higher education was generally content to receive, for example, $300 per additional student when the actual cost of squeezing that student into the classroom may have been only $200. Such a favorable condition occurred only when (a) revenues increased concurrently with enrollment and (b) when increased costs (diseconomies of scale, such as having to build a new classroom) did not occur. When these favorable conditions did exist, funds were available for new programs and campus morale was generally high.

Now that enrollments may decline, higher education is no longer enamored of the per-student formula-funding concept. Campus officials now claim that the growth process is not easily reversed, that fixed or

base support costs exist, and that the funding of higher education should *not* be tied to a simple per-student or credit hour formula.

Legislators, although generally receptive to the problems of education, are not always totally familiar with higher education finance and may, understandably, ask for further information before changing budgeting procedures. Legislative staff and staff of statewide coordinating agencies for postsecondary education have grown rapidly during the past decade, and it is only reasonable for legislators to ask these offices to prepare cost studies and to make recommendations concerning appropriations.

The task of translating complex issues of higher education finance into terms understandable to laymen and into documents short enough to be read presents a significant challenge to both state-level staff and institutional representatives. For example, the question, What are the costs of graduate education? is complicated by the symbiotic contributions of graduate students to the teaching of undergraduate courses. One is reminded of a cartoon on the wall of an ACE office which reads, "For every problem there is a simple answer—and it's always wrong."

Internal requests for cost studies. Academic or financial vice presidents are usually the requesters of internal cost studies, although individual departments which feel underfunded may also suggest that a study be undertaken. The organizational structure of the campus will likely govern the response, but, if possible, the office of institutional research would be wise to anticipate other general studies (for example, accreditation, internal evaluation) and design the cost study to complement these other projects. Internal cost studies can also become very important during faculty retrenchment proceedings. Not only can they aid retrenchment decisions but, if formally documented, they can also be used as court evidence to deny allegations of arbitrary or capricious action.

Basic Considerations Involved in Cost Studies

Many concepts should be considered before beginning a cost study; the following list, while not complete, includes those the author has experienced. Other items, such as whether to include vocational or continuing education courses and costs, will arise depending on the type of institution being studied and the purpose of the study.

Direct and indirect costs. Direct costs possess an obvious direct relationship to the instructional product and can be defined as those costs which would be directly and immediately affected by enrollment changes. A pragmatic definition might be that direct costs are those, such as faculty salaries, which are paid from the instruction portion of the budget (in the standard NACUBO chart of accounts). Indirect costs are those for which enrollment changes would have a delayed effect or for which there is not an obvious, precise tie between a particular course of instruction and the cost in question. Library expenditures are paid from the academic support portion of the budget, and it would be difficult to determine which library salaries or acquisitions, although generally necessary, relate to a particular course. Thus, library expenditures are an example of indirect costs.

The very nature of indirect costs poses cost allocation problems. Should the total library costs be charged equally to all student credit hours (SCH) generated? Or should a weighted SCH formula be used to assign a greater cost to graduate and upper division SCH because students at these levels may use the library more frequently? Or still, should a larger share of library costs be allocated to science and engineering SCH because acquisition and periodical costs in these areas may be much higher than in others? Similar questions arise for other types of indirect costs and should be considered before the data collection process begins.

Why bother with indirect costs if their allocation depends so heavily on fairly arbitrary assumptions and if these costs represent a minority of the total budget? Many studies do, indeed, exclude indirect costs. The answer depends on the purpose of the study and whether or not it is important to show the total costs of instruction.

Breaking costs down by field. What does it cost to teach physics courses compared to history courses? is a type of question frequently asked. The separation of costs into relevant fields or into departments is seldom a problem for an individual campus. A few oddities may arise in interdisciplinary courses or in courses taught in conjunction with other institutions, but these generally involve small sums and yield to reasonable estimates. A greater challenge exists in conducting a study comparing costs among institutions. Each campus will prefer to report costs according to its own chart of accounts and internal organizational structure. Thus, one campus may report costs per SCH for a department of history, sociology, and philosophy. A second campus may report costs for a department of sociology and psychology, while a third, larger campus might report separate costs for fields (e.g., social work) within the broad field of sociology. Any attempt to compare costs per SCH in sociology at these three campuses must resolve the problem of differing budget and organizational structures.

Allocating costs by level of instruction. Faculty salaries constitute the prime instructional cost and the greatest source of discussion on cost allocation. If a professor teaches twelve *credits* in a given term, equally divided among the lower division, upper division, and graduate levels, should his or her salary be allocated in equal thirds? Or should that salary instead be allocated on total *clock hours* spent on each class? Or should it be allocated on the *effort* each class required? If credits are used as an allocation base, how should independent study and similar credits be adjusted to compare to "regular" classroom credits? The NCHEMS reports on faculty activity analysis (Romney, 1971) and other documents discuss this issue at length.

Pragmatic reasons suggest allocating salaries by course credits. Yet, within this method further problems may arise if campus registration records for a given course cannot be easily tied to an individual faculty member and his or her salary. The difficulty can be extreme in a large university where instructors' names are not part of the registrar's computerized records, where courses are informally subsectioned at off-campus locations, where courses are team taught, and where faculty salaries are frequently split funded.

Often "free" courses are apparently taught by guest instructors whose regular positions are fully funded from other sources and whose salaries do not appear in the instructional budgets. Instances of faculty members being paid instructional salaries but showing no teaching loads are more politically dangerous. These faculty could be on sabbatical, be the heads of large departments, be the lab supervisors and curators of biological specimens, or be regularly funded on small, part-time, instructional appointments (as are some administrators) but teaching on an irregular basis.

In addition to the potential for misunderstandings, the collection of vast amounts of individual teaching data to allocate individual faculty salaries among levels creates a significant work-load expense. A recent experience of the author (Hample, 1980) showed that simply allocating each department's total salary expenditure by the total credits taught produced a 60% savings in cost-study effort compared to using individual faculty data, with a negligible change in the costs per SCH.

Relating costs per SCH to costs per student per quarter: The ICLM. Many cost studies end when costs per SCH have been calculated. Results of this type show costs of instruction provided by each department but tend to overemphasize differences in costs by department and by level. Using the Induced Course Load Matrix (ICLM), proposed by Suslow (1976) and developed by NCHEMS, initially can require nearly as much effort as calculating costs per SCH, but its use is worthwhile not only for correcting this overemphasis but also as a tool to point out the interdependence of otherwise competing departments.

Bare costs per SCH, although accurate, may have too strong an influence on academic program decisions. Upper division physics instruction may cost three times as much to offer as upper division history instruction. It is fallacious to assume, however, that the production of a physics graduate is three times as costly as that of a history graduate. When we reflect for a moment, we realize that both types of student take a wide variety of courses, of which less than half may be in their own major fields. Thus, each student consumes a variety of expensive and inexpensive courses, with an average cost between the two extremes.

The ICLM computer program displays, for the average student in each major, the average amounts of course work taken in his or her major and other fields. These average course loads can then be matched against costs per SCH to obtain an itemized list of individual course costs (usually based on fractions of a course) and an all-course average cost for each major.

The use of the ICLM program corrects a second overemphasis on differences among costs per SCH. Just as students cross academic fields in course selections, causing more moderate differences in student major average costs, they also cross academic levels, causing more moderate differences among lower division, upper division, and graduate costs.

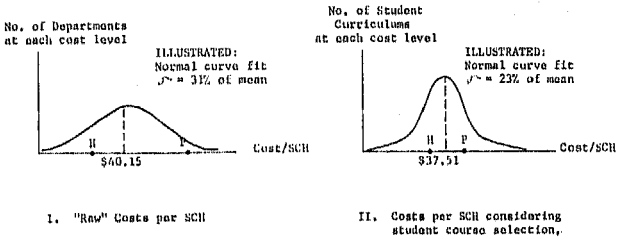
How strong is the moderating effect of considering student course selection in other fields and other levels? In one study (Hample, 1975, p. 99), arithmetic means and standard deviations were computed both for "raw" costs per SCH by department and for costs per SCH considering average course loads of each student major. The standard deviations of the raw costs were roughly equal to one-third of the mean (indicating wide variation) at all three levels of instruction as shown on the first line of Table 1. The consideration of student course selection reduced this fraction, as shown on the second line of Table 1, particularly at the lower division level where students take a wide variety of courses.

TABLE 1
VARIATIONS IN COSTS PER STUDENT CREDIT HOUR (SCH)
Standard Deviations as a Percent of Arithmetic Means

Types of Costs	Lower Division	Upper Division	Graduate
"Raw" costs per SCH data	30%	31%	39%
Costs per SCH using the ICLM*	12%	23%	38%

*Induced Course Load Matrix

The 31% entry in the table indicates that the first standard deviation measure variation (in a sense, a boundary) lies at 31% of the average department cost per SCH. The corresponding entry of 23% indicates that the variation among fields is much less when student course selection is considered. Figure 1 expresses this statement graphically, showing that (for the upper division level) costs in different fields are more closely grouped when the ICLM is used to consider course selection.



I. "Raw" Costs per SCH

II. Costs per SCH considering student course selection.

Figure 1. *"Spread" of upper division costs (only) per student credit hour under two methods.*

The average upper division costs in Figure 1 would be the same if the ICLM were restricted to only upper division *courses*. By considering course selections of upper division *students* who usually register for some less costly lower division courses, the average cost per SCH is lowered slightly.

The previous hypothetical example, in which raw upper division physics (P) courses cost three times as much as history courses (H), could be viewed as two widely separated points on the line in Part I of Figure 1. When student course selection is considered, these differences are compressed and the separation between the corresponding points in Part II would be much less.

The compression from 31% to 23% suggests a rough rule of thumb which might be employed by those unable to use the ICLM itself. The difference between upper division Method II costs (considering student course selection) should be only about two-thirds (23% ÷ 31%) of the difference between the corresponding raw costs of Method I. The rule of thumb for lower division costs would be two-fifths, while virtually no adjustment would be necessary at the graduate level.

In an actual case (Hample, 1975), raw costs for upper division physics *courses* ($71.03) were 2.8 times as much as those offered by the Department of History, Government and Philosophy ($25.71). Our rule of thumb suggests that the cost of educating an upper division physics *student* should be only about ⅖ × 2.8 (or about 1.8) times the cost of educating an upper division history student. The actual ratio, using Method II, was 2.0 times as much.

Thus, while raw costs per SCH are adequate for making program decisions at the graduate level, differences at the lower division and upper division levels are overemphasized. The rule of thumb is rough and may not generalize to all institutions but will, at least, point in the right direction. Where possible, the use of the ICLM is recommended.

As a side benefit, the Induced Course Load Matrix is also useful if Department A suggests closing or reducing Department B. The ICLM easily shows the number of Department B majors who are taking Department A courses and without whose presence Department A would face a loss of SCH production with resulting budget reductions. At times, this piece of information can effectively quell interdepartmental bickering.

Relating costs per SCH to the cost of degrees. The path from costs per SCH to costs per degree is murky with uncharted pitfalls along the way.

Only finished products are counted as production in an industrial cost study; defective units are pulled off the assembly line and the cost of these incomplete products is added to overhead, increasing the cost of the finished products. The higher education process has many incomplete products, in the sense of degree graduates, but they can hardly be considered as defective units in the industrial, cost accounting sense. Indeed, in many colleges, a large percentage of students never *intend* to complete a formal degree. Simply dividing costs by degrees granted, then, is a very misleading, inappropriate method.

One alternative is to compute the number of credits required for graduation in a given field and simply multiply that number by the cost per SCH for students majoring in that field. This generates an estimated cost per degree without the misleading effect of adding costs of non-degree students to those of graduating students. This procedure ignores the fact that students often change majors, but it still works reasonably well at the undergraduate level.

At the graduate level, the method of using the required number of credits falls apart simply because credit requirements often do not exist. A host of other problems appear. Students may skip a master's degree, thereby creating a Ph.D. degree program that is very long and costly when compared to a Ph.D. program that begins with a master's degree. An even longer program anomaly is created when such a student drops out of the Ph.D. program and takes a master's degree. Foreign students often transfer a large number of credits from their home country; often these courses are repeated on the English-speaking, U.S. campus, and both are carried on the student's transcript. The general problem of transfer credits is omnipresent; students enrolling in a graduate area different from their previous field may transfer large numbers of credits which are not applicable to their current degree. Some resolution of the transfer problem can be obtained by arbitrarily judging which transfer courses are applicable, calculating the average number of applicable courses actually taken by recent graduates (both transfer and non-transfer students) and thereby estimating the cost per degree on a basis of a theoretical student entering the program with no transfer courses or other unusual factors. These adjustments and determinations of actual average program lengths will probably require very careful review because of the large variance among individual student programs and the relatively small sample size of graduate degrees produced in any given field during any given year.

Using the Completed Cost Study

Now that the results have been generated, what do they mean? By human nature or by training we judge items in relation to others and immediately search for appropriate yardsticks. Average costs across all fields and across all levels constitute internal yardsticks. The question, How do these costs compare to national norms? cannot, however, be answered. Starting with only the sample problems listed previously, the combinations of possible solutions grow rapidly, and, when combined with differences in similarly labeled academic programs at different campuses, make valid inter-campus comparisons extremely difficult, if not impossible. One suggestion is to avoid direct dollar comparisons but to use relative scales: for example, at Campus X, business courses may cost 95% of the average cost at that campus; at Campus Y, the corresponding figure may be 89% and, if program emphasis and other factors are comparable, some reallocation of resources may be suggested.

Comparisons over time may be feasible and beneficial. Allowances must be made for changes in accounting methods, administrative structures, and academic programs. Periodic cost studies may serve as useful detailed documentation to show that per-student expenditures have declined in real dollars during the past few years. They will also be used by campus administrators if enrollment declines or other factors force program reductions.

As in most other institutional research efforts, the face validity of the report and credibility of the author will greatly affect the use, and hence the value, of the study.

Some Philosophical Considerations

Several issues will be raised with nearly all cost studies. Each of the following synthesized arguments has merit, but no easy solution exists for any of them. (Perhaps readers of this monograph will be willing to share solutions to these concerns in future issues of the *Professional File*.)

Musical chairs: Why my costs are low. *The cost study measures "what is," not "what should have been." Our department has been the victim of musical chairs; our time for enrollment growth and improvement came just when budgets tightened. Other departments grew during a better financial period and are now overstaffed relative to current enrollments and to our understaffed level of operation. The cost study tends to perpetuate current inequities without giving a basis for what costs should be.*

Quality: Why my costs are high. *The cost study shows our department to be a high cost area, which I suppose is true, but it neglects the quality of the department. Our faculty have achieved national recognition, are conducting valuable research, and are serving the community as well as the students. You get what you pay for; to dismantle or tone down the activity of our department would be to abandon a valuable key portion of the campus. This cost study is shortsighted because it fails to consider the quality of programs within the institution.*

My field is always a high-cost area. *I can show you studies from other institutions which prove that this field is always a high cost area. It is a fact of life and instruction in our department must be funded accordingly.*

Our department does not have GTAs. *Naturally, lower division costs are less in other departments. Graduate programs in those fields attract students who serve as graduate teaching assistants (GTAs). Of course, if our area were adequately funded, we would be most happy to start a graduate program and adopt this method of operation.*

The study does not have GTAs. *Other departments look more efficient than we do because they are able to hide some of their costs. Those in agriculture can offer faculty members joint appointments between their department and the agricultural research station. Those in health-related or energy-related research areas can easily obtain large outside grant support. Our department is in an area where outside support is very limited and we must depend almost entirely on the institutional budget. Because of this, we lack the opportunity to participate in other ventures and, thus, hide some of our individual costs.*

We suffer from facility and equipment constraints. *The building in which we are housed lacks large, modern lecture rooms, virtually prohibiting us from adopting a more cost-effective form of instruction. It should also be noted that several departments in engineering and the physical sciences have greater computer access which they can use for self-paced programmed instruction. To really measure efficient allocation of resources, you need to look at facility utilization, not just budget expenditures.*

Ours is a special clientele. *Because of the geographic location of our campus (rural/urban/inner city) we attract a unique student body. Further, our program attracts the most exceptional (high/low ability) of these students and seeks to give them the special attention necessary for them to achieve their full potential. It is only natural that this extra effort requires extra resources. Cost studies reinforce the status quo without recognizing our increased commitment to the community and to non-monetary social benefits.*

Enrollments are abnormally low. *Current fads among students in choosing curriculums have temporarily boosted enrollments in other areas while leaving our department with a fixed number of faculty, but fewer students. We realize that our costs are somewhat high, but we are developing attractive new student options which will return us to our normal cost level. Any cut in our faculty or budget would greatly weaken our program just when the enrollment pendulum is about to swing back. The cost study may be technically correct but looks only to the past, not to the future.*

Institutional researchers generally admit that they don't have all the answers. Do they realize that they also often don't see all the problems? They may spend long hours on a cost study and arrive at "obvious" conclusions yet be unaware of some of these objections or arguments, which affected parties may present directly to the president or other decision maker. Although they pride themselves on knowing many aspects of their own campuses they may be unaware of important political pressures or previous commitments. Thus, if their "obvious" conclusions are not followed, they need not feel that the cost study was wasted—it was probably one of several important factors in the decision reached.

Summary

Cost studies are usually requested to guide budget allocations, either from an internal campus need or from outside pressures. Although much effort has been expended by various groups, and although accounting guidelines have been developed, no standard cost procedures or national norms exist. General guidelines can be followed, but variations in local accounting methods, administrative organization, and program emphasis (e.g., non-laboratory vs. laboratory intensive) preclude easy comparisons of costs among institutions.

Many problems requiring individual judgment and adjustments can make cost studies long and tedious work. Even after these problems are remedied, virtually all affected persons will be able to offer philosophical criticism of the procedures employed or the implication of the results.

Yet, the desire for cost information persists. Even without precise detail or convenient comparisons, some indication of relative costs is deemed necessary by most administrators in higher education. With the pressures of inflation and changing enrollment, cost studies will continue to play an increasing role in administrative decisions. The institutional researcher, with a broad knowledge of the institution and, it is hoped, the ability to produce easily understood conclusions on complex topics, is perhaps the best prepared person to undertake this task.

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