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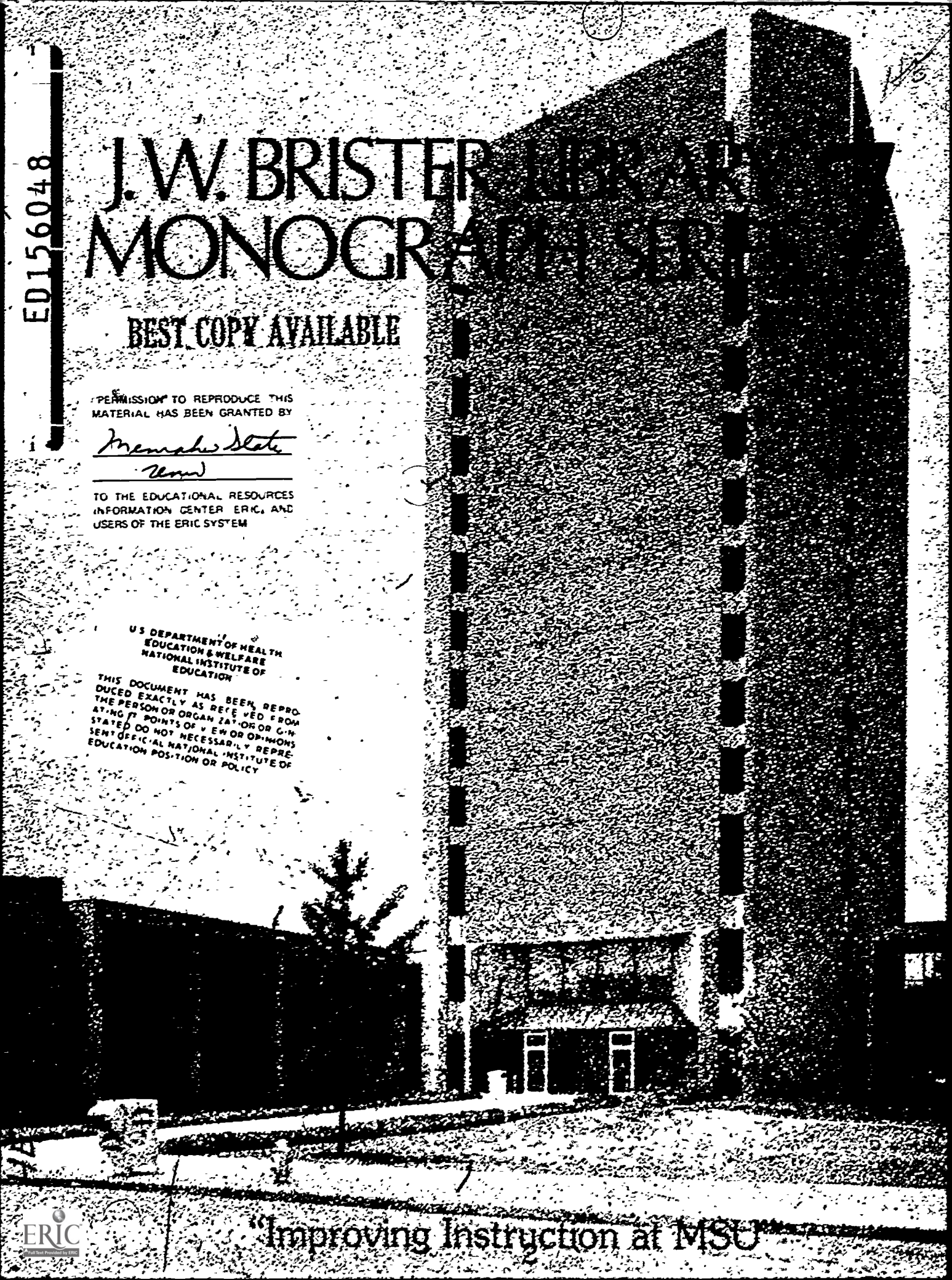

"Improving Instruction at MSU"

IMPROVING INSTRUCTION AT MSU

Edited by

G. Douglas Mayo

Memphis State University

Memphis, Tennessee

An Equal Opportunity University

17th ANNUAL FORUM

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

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Montreal, Quebec

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(continued on inside back cover)

Annual Forums on Institutional Research

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Preface and Acknowledgements

This issue of the Association for Institutional Research Forum *Proceedings* represents a point of demarcation in the history of the publication activities of the Association. As the last of its type, it marks the end of a series that began in 1963.

Beginning with the *Proceedings* for the 1978 Forum in Houston, this publication will more closely correspond to the generally accepted meaning of the word *proceedings*, as it will be a chronicle of the salient events at the Forum rather than a collection of selected and reviewed papers.

The *Proceedings* have, in the past, served a most useful purpose in providing an accumulating base of professional writings for this growing field. Results of selection procedures have varied over the years, from inclusion of all papers presented to recent rejection of approximately 40 percent as the rising costs of publication correlated with an increasing volume of papers of steadily improving quality. Clearly, many papers in recent years have had to be excluded that would have been published in earlier issues. This is, of course, regrettable, yet it is, at the same time, a sign of growth and maturity of our profession.

At this writing, the content and format of the new *Proceedings* series has yet to be fully determined and the varied new opportunities and forms of publication for papers presented at the Forum are just being formalized.

This Preface is an especially appropriate place to acknowledge the past contributions of *Proceedings* editors who gave, without remuneration, countless hours (and too many evenings and weekends) to one of the most thankless tasks in all of professional life. These editors, beginning with the editor of the very first *Proceedings* in 1963, L. Joseph Lins, include also Clarence H. Bagley (1964, 1965, 1966), Galen N. Drewry (1967), Cameron Fincher (1968, 1969), Patricia S. Wright (1970), Clifford T. Stewart (1971, 1972), Robert L. Cope (1973, 1974, 1975), Robert H. Fenske (1976, 1977), and Paul J. Staskey (coeditor, 1977).

The stimulating setting of Montreal and the ambiance of the 1977 Forum resulted in the high quality of papers presented there and make this *Proceedings* an auspicious issue with which to end the current series. The Forum theme, Research and Planning for Higher Education, is reflected in the organization of the papers in this collection.

This is the first *Proceedings* with a coeditor, and the senior editor wishes to thank Paul J. Staskey who, along with Jean Chulak at the AIR executive office, helped make this quality publication possible. In addition, Paul has agreed to carry forward his contribution by editing the first of the forthcoming new series of proceedings.

A final and heartfelt acknowledgement is due the excellent group of reviewers who carried out the difficult task of selection from a truly outstanding group of papers submitted for review. These include W. Sam Adams, W. Keith Evans, Arthur L. Gillis, Paul E. Kunkel, Lawrence R. Ladd, J. Stanley Laughlin, James S. Martin, Marily McCoy, Barry L. Snowden, Joan S. Stark, Lois E. Torrence, and Reidon J. Westen.

Robert H. Fenske
Arizona State University

Paul J. Staskey
Northern Arizona University

1978

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MODELING

EVALUATION

OPENING REMARKS: THE UNIVERSITIES AND INTERNATIONAL DEVELOPMENT

Michael K. Oliver, President
Carleton University

The university has become its own subject of research. You are the people who study it. You have not the same freedom as other university researchers, for you usually cannot frame the questions you answer. Someone else does that—a president or rector or vice-chancellor, or a senate committee, or most often, a government department, a grants committee, or a committee of the legislature. But sometimes (quite often, if you are good at your job) you get to ask your own questions. When that chance comes, it is worthwhile having important questions in mind. This morning, I want to suggest to you some themes that I think are important.

First, I will say something about the internationalization of the university. Secondly, I will touch on the place universities may have in an unequal world where inequalities seem to be growing. Finally, I will turn to some questions of university strategy.

The Internationalization of the University

For a long time after it was invented, the university stayed put. Bologna and Paris were founded in the late 12th Century, Oxford and Cambridge in the 13th Century, and Charles University in Prague a little later. By the fifteenth century, universities had crept over most of Europe. It took two more centuries for them to reach North America. During the nineteenth century, they spread into South and Central America, to the Philippines, to India, to Australia, and to New Zealand. In the twentieth century, they exploded, and now they are almost everywhere. In Africa, south of the Sahara (excluding South Africa and Rhodesia), there were only four institutions of higher education prior to 1950; by 1976 there were 38 universities. Nigeria alone has immediate plans for seven more universities or university colleges.

Why and how do universities come into being, and how do they evolve? To answer these questions for all times and all places would require a boldness in generalization that most of us luckily lack. Nevertheless, I was intrigued by Frank H. Bowles' lesser, but still somewhat breathtaking, theory of educational development applying to developing nations on all continents. The five stages he identifies may, indeed, be relevant to the older, slower patterns for university evolution of the past.

Stage I sees the evolution of a national system of education which must precede the establishment of universities. Primary schools, post-primary vocational schools, teacher-training schools, and secondary schools are created. In all but a handful of cases the schools act more as sieves to strain out an elite than as propagators of learning to a mass public. At the end of six to eight years of primary school; examinations determine the small fraction who will go on and sort out the survivors into the privileged few who will go to secondary school (which is both a vital direct route to national leadership and, for a tiny handful, the means of access to overseas universities), the less fortunate who will take one to four years of general education to become teachers, and the least fortunate who find their way into undermanned, underequipped, low prestige technical and vocational schools.

Stage II is marked by the establishment of higher education, usually through some of the secondary schools becoming first colleges and then universities; some of the teacher-training institutes becoming teacher colleges; and more rarely, some of the technical and vocational schools becoming engineering institutes. Universities at this stage are staffed largely by insecure, uncommitted expatriates jostled by young nationals who seek their posts; they are derivative and traditional, embodying, of course, someone else's traditions; they are primarily teaching institutions for the public service, medicine, law and engineering, and they rapidly create disillusionment. Students are disappointed by the incapacity of the national economy to absorb them at levels that fulfil their expectations; faculties feel they are insufficiently recognized; and governments which hoped for instant effects on growth and productivity grumble when, instead, they find that universities are endlessly expensive, centers of student disruption, and sometimes, in the early days, less efficient producers of skilled, high-level manpower than the elite secondary institutions they replace.

Stage III, Bowles suggests, arises out of the recognition of the rigidities of the systems of formal education created in Stages I and II. Something must be done about the drop-outs, or the forced-outs, from the formal system. Something must be done for the rural areas, because the schools serve the cities and towns almost exclusively. Attention turns to non-formal education, especially in rural communities: to the provision through short-term programs of literacy and simple skills in improving farm yields, in child care, and in family nutrition.

Stage III merges into Stage IV as the system of formal schooling begins to adapt itself from an elite education to a mass education role and to take on the functions provided by ad hoc programs in Stage III. The schools begin to learn from years of sad experience to retain students at least to the level of functional literacy, to adapt themselves to a wider range of social needs, and to fit a much higher proportion of the population for mass political participation. The strategies of Stage IV are automatic promotion, free passage to secondary school, open entrance for older students, use of media recognition of non-formal methodologies—the changeover of the system from a giant sieve to a network of learning centers.

Finally, at Stage V comes the adaptation of the university. It moves in two directions from its early role of training the few for a limited range of professions and for public life. First, it enlarges its role by expanding program ranges and by university extension work, reaching out to a broader constituency as the schools did in Stage IV. Secondly, it develops a research capacity adapted to national development goals and, through its own graduate programs, reduces its dependency on overseas institutions and foreign models.

I have belaboured Frank Bowles' development schema, giving you an oversimplification of an oversimplification, for two reasons: first, because it helps in sorting out thinking about how the international spread of the university takes place and gives insight into how interuniversity relations have developed up until the present; secondly, because it lends itself to speculation about where universities may, and perhaps should,

go in the future. Let me say a word on the first point now and return to the second later.

If one tries to put together the moving picture of the university's evolution in the developed world with the pattern of its growth in developing countries, the images merge together in a clumsy minuet. European universities by the mid-20th Century were reaching the end of a complex cycle and preparing to dance a new figure when the developing countries' universities began a rapid recapitulation of the early steps, repeating most of the mistakes and adding some of their own, but subtly changing mood and movement. The European, and especially the British and French, universities had done little to modify their traditional role of grooming a governing elite by the time they were exported to colonies and former colonies. The main change they had made since the late 19th Century was to stress research, particularly in the sciences. In so doing, perhaps professors became as dedicated to reproducing themselves in their students as to producing practitioners of the liberal professions, administrators, and political leaders. The newer research emphasis was not immediately exportable to Third-World universities, but to the extent that it modified the university curriculum, it probably worsened the fit of university programs to the developing nations' needs. By the time domestic change and American example produced broadened, less elite-centered university patterns in Europe, the old mould had impressed itself deeply on the emerging institutions of the Third-World, and the process of rubbing down sharp contours stills goes on.

It is perhaps worth noting, because I want to return to the point later, that the influence of British and French universities on the Third World, and especially on Asian and African institutions, was greater than that of North American, or Russian, or more recently Chinese universities, not only because it came earlier but also because it was based on university-to-university links. Except in isolated cases like the Philippines and pre-revolutionary China, American university influence was channelled through government programs of aid. In the United States, as in Canada, university people found their way into the Third World as part of a technical assistance program, and with some notable exceptions, institutional involvement was much less intense. The other side of the flow—Third-World students moving to North American or Soviet universities for undergraduate and graduate studies—tended also to be less institutionally involving. I doubt whether, even now, Harvard, or even a specially created institution like Patrice Lumumba University in Moscow, can match the influence exerted on Third-World attitudes by Oxford or the Grandes Écoles of France, let alone Harold Laski's London School of Economics in the late 1930s and 1940s.

Very recently, the willingness of the British, Dutch, and West German governments to fund university-to-university contacts between their own institutions and those of the developing world seems to be weakening. I find this distressing, not because I believe these contacts have uniformly been useful and beneficial, but because the very fact of such linkages, with minimal government control, may become crucial to coping with looming world problems.

Universities and the New International Order

Let me turn now to some of the huge problems we are going to have to manage. Radical inequality cannot be perpetuated in a world of closer and closer interconnections when people have been *told* that things are going to change. The unequal status of remote peoples or groups, of whom one sees or hears little and who seem quite different, may be tolerable. When the wealth and ease of others are daily before one's eyes, inaccessible yet part of one's expectations, they become intolerable.

During the 1950s and 1960s, the expectation that underdevelopment could be turned into development, that conditions of life would steadily improve, was solidly implanted. International aid was to be instrumental. Strategically placed, such assistance would bring economies to the take-off point where growth could proceed on its own. Obviously, these expectations were false in all but a few instances. The gap between rich and poor countries widens, as does, in the poor countries, the gap between rich and poor people. We have begun to look at economic aid more closely and to see how pitiful it is in comparison to the economic forces that perpetuate inequality. Let me give just two examples.

1. The U.S., Britain, Japan, and the European Economic Community spend between $21 and $24 billion a year on direct and indirect support of their own primary commodities that could be imported from the Third World. They spend about $12 billion on net official development assistance.

2. By the time they are processed and retailed in the developed countries, the value of Third-World commodities is about $200 billion. Third-World countries receive for these commodities about $30 billion.

Figures are dull. The point is made as well in verse. These lines came from Arthur Hugh Clough, who lived in the 19th Century, when economic aid was personal, not national, but probably just as useful.

"I sit at my table, en grand seigneur,
"And when I have done, throw a c ust to the poor;
"Not only the pleasure, one's self, of good living
"But also the pleasure of now and then giving.
"So pleasant it is to have money, heigh ho,
"So pleasant it is to have money."

It may become less pleasant before long; but that is not the point I wish to make.

A key characteristic of the international development philosophy of the 1950s and 1960s was that it made attaining a reasonable level of world well-being a goal that could be pursued through *national* policies. The developing countries needed an effective national plan; the developed countries did their share through bilateral aid policies or, to a lesser extent, through national contributions to multilateral aid and technical assistance agencies. The experience of a fluctuation in international commodity prices which throws a development plan into complete confusion and wipes out in a few months the effect of years of economic aid shakes profoundly one's faith in national policies. The realization that a new international framework is needed; that international institutions to cushion the effects of monetary fluctuations, stabilize commodity prices, and take the developed-world bias out of international trade are urgently required—these are the insights of the seventies. Only the wildest optimist believes such institutions will evolve very quickly. But all of us who retain some hope must ask whence they might arise. It becomes important, I suggest, to seek out institutions around which the ethics of internationalism might cluster, which are common to all countries, which are capable of creative imagination, which can rapidly share ideas and transmit critical judgments with concern and yet without great resentment.

To no one's surprise, I am thinking of universities. What are their chances of evolving, in the developed and underdeveloped countries alike, to a common Stage VI where they continue to serve national development goals but increasingly contribute to international development? What are their assets and liabilities as the hatching ground of a new internationalism?

First the assets. Universities share an approach to problems deeply rooted in reason. They have common standards

for testing the quality of evidence and the logic of argument. In short, they communicate discipline by discipline, with reasonable ease. These statements are truer for the physical and biological sciences than for the social sciences, unfortunately, but even in the latter case, the situation is probably improving. Since their *raison d'être* is continual enquiry, universities are uncomfortable in the role of dispensing received doctrine. Even in states where governmental authority is exercised most directly, the university is seen as an unreliable instrument. Professors cannot do their jobs unless they have access to the literature of their disciplines, and the necessary presence in university libraries of unorthodox ideas is unsettling. To some extent, university autonomy must exist, and although it can be very severely restricted for long periods, the inherent tendency of the institution is to reassert its claim to freedom of enquiry and to reestablish intellectual contact with other universities. Perhaps it is also worth mentioning the obvious point that the style of university interrelationships is nonviolent and economically nonexploitative. Professors make reputations by being intellectually, not physically, overpowering; universities are usually not expected to make profits (the private universities of the Philippines, with shares listed on the stock market, are an extraordinary exception). Finally, universities work on a longish time-scale, as governments which contract for university research continually discover to their great irritation. The process of thinking through the problems of a new international order, though urgent, is probably best tackled by those who are not encumbered by the need to make day-to-day decisions.

On the negative side, it may be argued that universities, because of their historic role of producing privileged elites, are ill-adapted to contributing to the solution of problems that have their roots in inequality. As agencies for national development in the Third World, they are widely perceived as less effective than they should be because of their mandarin disdain for manual work and their remoteness from the facts of poverty. It is difficult to believe that professors and students are in close touch with rural despair when, for example, it costs thirty-five times the annual per capita income in Kenya to educate a student at the University of Nairobi. If however, as Bowles suggests, universities as they mature sharply reduce their elitist character and take on roles that relate more closely to broad national development, then at the same time they may be fitting themselves better to aid in international development and in the reduction of international inequalities.

Strategies

On balance, it seems plausible to claim that universities can make a strong contribution, perhaps a unique contribution, to the evolution of a new international order. But it probably will not happen automatically or without a conscious effort on the part of universities to assert their international, as well as national, character. (I am very conscious of speaking to you as a university president from a country in which the level of government responsible for international affairs has just opted out of direct financial support for universities, except in research, and from a province which was the first in Canada to impose differentially higher fees for foreign students.)

Let me conclude by sketching certain strategies which may enhance the universities' chances of playing a more constructive international role.

1. *Reinforcing international disciplinary networks.* These are well-developed in the natural sciences, much less so in the social sciences and humanities. Most discipline groups receive support from UNESCO, but not enough. No chance should be lost to urge on UNESCO the need to pay more attention to developing these networks and, particularly, to extending them effectively into the Third World, rather than allocating resources to its own already unwieldy bureaucracy.

2. *Creating and adapting interinstitutional links.* Here I would stress particularly the advantages to the purely internal health of the developed countries' universities of increasing the international mobility of professors and administrators. Most European and North American universities expanded enormously during the 1960s and took on a large contingent of young staff. Growth has now slowed or stopped. New appointments come rarely, and the need to replace those who are there will not come until far-off retirement dates are reached. The prospect of university staff growing old and stale together is unappetizing, but it will happen unless interinstitutional rotation is better organized.

Exchanges between developed-country universities and Third-World universities are as difficult as they are important. The nature of viable interrelationships varies with the stage in development through which the developing country's university is passing. New or young universities will require expatriate staffing simply to mount effective undergraduate teaching. Part of this need can be met by agreement for "secondments" with established First- or Second-World institutions, and this may be preferable to the direct hiring of individual expatriates. The flow of interrelationship between institutions in these circumstances will tend to be largely one way for an initial period, although it is vital that it should not be exclusively so. For this reason, such linkages fall easily into the inadequate category of technical assistance and contribute only slightly to the working out of new kinds of international relations. In many Third-World universities, however, Bowles' Stage V is being reached. Research capacity has been created and the possibilities of joint research projects with developed countries' universities are real. Inevitably and properly, such joint research will have to relate primarily to the national development needs of the developing country, but it is reasonable to expect that shared insights into these needs will contribute to an understanding of the requirements for a new international scheme of things.

Here a caveat must be entered. It is all too easy for an entrepreneurially inclined university in a developed country to maneuver a request for, or vague support for, joint research funding from a university in a developing country simply as a means of getting its own interests, and its own people, financed. It is precisely this kind of sham that has made the governments of some developed states shy away from supporting university-to-university projects. If our universities are to fulfil the constructive international role we have outlined, their new relations with Third-World universities must be based on reciprocity and partnership.

3. *Funding of international links.* This, amongst universities, especially those based on common research endeavors, must come largely from the developed countries, and pressure must be exerted not only on aid agencies to finance such ventures but also on national research-granting bodies.

If I have stressed the need for universities to develop policies that facilitate interinstitutional links, it is not only because I consider them important but also because of the audience I am addressing. All of you are deeply involved in analyzing the operations of your universities. Your influence on policy can be strong. I urge you to use it to encourage your institutions to play the vital role in international development of which they are capable.

INSTITUTIONAL RESEARCH 1977: PROGRESS AND PROMISE

James W. Firnberg
President, The Association for Institutional Research

Election to the presidency of a professional association incurs a few duties and responsibilities, a bit of privilege and honor, and a license to speak one's piece in the form of a presidential address. Wisdom dictates that the license be granted at the close of presidential tenure and not at its beginning. Ritual demands an evaluation of the progress the association and its members are making, and associational vanity requires an outlook for the future. Self-preservation suggests that it all should be done quickly and briefly.

Let's begin with two statements by well-known and friendly critics. Some few of you may recall Lewis B. Mayhew's keynote address to the 1966 Forum. His candid view raised some eyebrows and dropped into our laps a call for progress with his statement that: "Institutional research although now well regarded, becoming affluent, and well supplied with technical devices, has yet to make a major impact on the main course of thinking about higher education."

Five years later, Paul Dressel (1971) re-emphasized Mayhew's assessment and added his own challenge: "The Association for Institutional Research is neither large enough nor prestigious enough to give the institutional researcher any great professional stature by his activity in it."

The candor of these remarks may have alarmed some, but, nevertheless, they did focus the spotlight upon two compelling facts of life: (1) that those of us in the field can ill afford to rest on our laurels, and (2) that the excellence in institutional research already achieved must be combined with a determination for even greater accomplishments in the future. Has institutional research had an impact on the major course of thinking about higher education? And, can the Association for Institutional Research provide the professional status and leadership needed to do so? The answer in 1977 should be that both institutional research and the Association for Institutional Research are alive and well—and continuing to grow and mature. Neither is what it has been—and both are becoming what they should be.

With this forward in mind, let's take a sweeping look at institutional research—at where we have been and where we intend to go, at the progress of the past years and the promise of the future.

As institutional researchers, we may point with modest pride to several obvious successes. Perhaps the most significant of these is the collection and analysis of institutional data. We have achieved a degree of sophistication in the collection and analysis of data dealing with student enrollments, space utilization, faculty work loads, costs, and other information needed for planning and management. The recommendations of the Henle Report, issued by the National Science Foundation in 1967, are now, for the most part, a reality. There is little doubt that we have succeeded in developing Systems for Measuring and Reporting the Resources and Activities of Colleges and Universities.

Success in the collection and analysis of data points to success in the development of methodology for institutional management and administrative decision making. Here, some critics may believe that we have gone overboard and quantified too much without qualifying often enough. Critics may also be found who contend that we have been able to compile volumes of facts and figures but have not succeeded in using the information which the facts and figures contain.

The managerial revolution described by Rourke and Brooks (1966) has succeeded reasonably well without imposing upon academe the narrow technocrats that were first feared. Yes, we have used our "burglar's tools" and quantified almost every conceivable aspect of our organizations. However, the central thrust of the managerial revolution has involved an informational revolution in which we are now moving, from the mere collection and analysis of data to fair information practices and the full utilization of data and informational resources.

As Bernie Sheehan so aptly stated last year, in many instances these efforts "to know thyself" have enabled others to know us—and to know us perhaps too well. The mere fact that we have compiled and used facts and figures has invited their use not only by ourselves but by those outside our institutions. In he wake of our attempts at efficient management, these facts and figures frequently are used against us.

By and large, institutional researchers have been sensitive to the changing demands and expectations for our institutions of higher learning. A university's function and purpose changes as the desires and needs of society—and a sub-set of society, the students—for new and diversified curricula change. Decisions which effect these needs and desires must constantly be revised and re-evaluated in light of these changes. Student preferences or interests in certain fields of study are reflected in declining or increasing enrollment figures. In some cases, we have been able to anticipate changes in student preferences; in other cases, we have not. For example, at my institution we see an increased enrollment in the health-related professions. Ten years ago, this field was checked primarily by premed and predental students. In 1966, just over 10 percent of the freshmen students on our campus indicated an interest in health-related fields. In 1976, this figure had risen to over 20 percent. What were we able to forecast about this change? Were our projections sophisticated enough to know this in advance? Could we handle this particular transition efficiently and effectively? Were we able to adjust class sizes, course schedules, faculty assignments, facilities; and budgets to accommodate the demand?

The changing interests of students can change the entire nature of higher education. If we analyze the enrollment trends at many institutions, we find dramatic moves away from the traditional disciplines, the liberal arts, sciences, and humanities, but an increased interest in occupationally oriented curricula. Given such moves, what is the fate of the traditional disciplines? Will colleges of liberal arts survive the 1970s, the 1980s? Are colleges to become institutions of higher training rather than institutions of higher education? Have we as institutional researchers even asked these questions?

The next decade will not be easy for institutional researchers, but it may well be the decade in which institutional research proves its mettle. The traditional college-age population of 18- to 24-year-olds is expected to decline in the 1980s, and how

well institutional researchers can help institutions adjust may well prove their value in institutional planning and management.

The uncertainties of change are a persistent problem in institutional research. No longer can we rely on old methods and concepts of institutional adaptation. We need to formulate an awareness of change that is systematic, critical, and innovative. It is essential that we make broad, in-depth analyses with respect to institutional change and meet the requirements resulting from these analyses.

This emphasis as well as stabilizing or declining enrollment should give cause for alarm since many of us are funded by enrollment-driven, number-conscious processes. More students mean more dollars; less students mean less dollars. If we continue to be funded in this manner, enrollment decreases will reduce our budgets more rapidly than we can reduce our costs. If budgetary pruning becomes a necessity, who is in a better position than we to study and recommend where, when, and how this pruning should take place? If we do not take steps toward selective pruning, we should not be offended when across-the-board cuts or wholesale trimmings takes place. As early as 1971, Clark Kerr warned that: "Cost-effectiveness of operations will be more carefully examined. If this is not done internally, it will be done externally by the 'new experts' working for legislatures and governors."

The planning functions of the institutional researcher should receive special attention from both the profession and the Association for Institutional Research. Even institutional researchers have been reluctant in the past to accept the responsibilities of planning, they no longer can dissociate themselves from the planning function. Some may disagree with this viewpoint, but suggestions as to which course of action is to be followed should be made from the objective viewpoints of the institutional research officers who, because of the information they have gathered and analyzed, are probably the most knowledgeable people around on the subject. Institutional researchers should bridge the gap, through effective communication, between faculty and administration, between opposing administrative forces, always with the best interests of the institution in mind.

Along similar lines, institutional research must increase involvement with decisions made at the departmental level. The department chairperson is low on the hierarchical totem pole of a college's decision-making process, but it is at this level that "gut decisions" are made. Almost daily the department chairperson confronts problems relating to faculty size and qualification, faculty work load, facilities, and programs, and at this level the quality of an institution is determined.

The intitial step in any systematic process is crucial to success. Efficiency and quality at the departmental level are essential. We must gear our efforts, therefore, to helping to improve the quality of decisions at that level and to facilitate the larger decision-making process of the institution. We must remember that it is a relatively simple task to aggregate departmental data to the college or division level and from there to the institutional level. It is impossible, on the other hand, to go in the other direction.

While we are providing the department chairperson with information and reporting findings on this level, and in all aspects of institutional research, we need to become more aware of the importance of effective communication, which would include disseminating information among ourselves; a comprehensive system of reporting our findings; and a system to provide feedback for evaluation of our research. Interinstitutional data exchange (formal and informal) is another form of communication that is important. If it is useful to make comparisons within an institution—comparing, for example, sociology with history—wouldn't it be more beneficial to compare history in one institution with history in another similar institution?

The increasing role of institutional researchers in the formulation of policy and planning may include an involvement in politics to achieve desired goals and objectives. I realize that *politics* is a dirty word to many, but it is a realistic and logical offense. So many decisions relating to colleges and universities in the public sector—and even those in the private sector in the United States, Canada, South America and Europe—are political, that it is almost a necessity that institutional research officers play an active role in the political struggles that directly pertain to their institutions.

Another concern of the institutional researcher should be the need to minimize external influences affecting institutional autonomy. I see these external influences as one reason why we have not accomplished all for which we may have hoped.

Earlier this year, The Chronicle of Higher Education published a *10-Year Index*. Under the topic heading, Governance, there are scores of articles dealing with external influences on institutions. A brief listing of some of these follows:

Colorado regents clash on academic freedom, tenure, patriotism

Dean fired, dispute erupts in Texas

Judge rules that SUNY at Albany trustees must approve the way student fees are used

Grand jury to investigate Ohio U trustees

Vermont court backs trustee control of student activity fees

Maine governor asks for resignation of entire U of Maine board

Ohio governor aims to cut regent's power

West Virginia governor rescinds authority of board of regents

Governor Brown's effect in California.

At this point, we dare not slight federal bureaucracy. The burden of federal paper work has come under considerable scrutiny over the past year, and several national panels, committees, and task forces have been delving into the question. AIR has had considerable input into the issue, and it should be one of continuing concern.

As institutional researchers, we were beginning to bring technical knowledge to bear on internal problems and pressure when external pressures and influences became almost unbearable. A point of sophistication had been reached in the management of higher education that produced sufficient data and analysis for internal problem solving and decision making. Rather than confine this information to internal use, institutional researchers are called upon to facilitate its external use.

I recall when I went into institutional research thirteen years ago that our major function was external reporting. After some period of time, we were able to routinize this external reporting function and concentrate on the development of data systems to support internal decision making. We have almost come around a full 360 degrees. Just to give you one example, during the twelve months from October 1975 to September 1976, our office had the equivalent of one staff member working for agencies outside the university system. Most of the HEGIS Reports, EEO-6, salary reports, and so on are computerized, so the completion of a report is almost a matter of transferring data from a printout to a printed form. In some institutions, particularly the smaller ones where the availability of computers is not so great, I would venture to guess that at least one person is involved in external reporting. Extending this notion across the more than 3,000 institutions in North America, the costs would be staggering—particularly when you add in data processing time, other time outside the institutional research office, and time to develop data bases to support

reporting. A cost/benefit analysis of the larger process could be interesting.

Now that we have discussed external aspects, we should also devote some attention to internal evaluation which is another challenge of institutional research. Everett Hopkins, speaking at our 4th Forum on The Role of Institutional Research in the Evaluation of Policy, asserted that "internal evaluation is not only a legitimate function of institutional research, but it is a necessary one." I believe it is one of the most essential functions of institutional research. The old proverb, "physician, heal thyself," is certainly applicable here. Inasmuch as we are able to set our own house in order, others will be able to follow our example.

The challenges facing institutional research in the future are formidable ones. It will take our patience, knowledge, and energy to meet these challenges. Our efforts must be channeled into (a) helping define the objectives of colleges and universities, (b) continuing to analyze the decision-making process, (c) taking a more active role in the creation of policy and institutional planning, (d) exploring the elements of change in institutional systems, (e) developing more effective means of communication, (f) minimizing external influences in higher education, and (g) maintaining involvement in internal evaluation.

We have come a long way since Mayhew and Dressel made their observations, but we still have a long way to go. The future of institutional research is dependent on all of our efforts to engage in new and innovative research that will make what Mayhew (1966) alluded to as "a major impact on the main course of thinking about higher education" (p. 1). If we have not made such an impact in the past, we should not be hesitant to strive for impact in the future. Institutional research has a short history, but some of us believe it has a promising future.

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A CHIEF EXECUTIVE OFFICER'S VIEW OF INSTITUTIONAL RESEARCH

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One needs to begin a discussion of the chief executive officer's view of institutional research with a statement of the overall purpose of institutional research in a college or university setting. In my view, the purpose of institutional research is to improve the quality of decision making at all levels within the institution, but especially at the central administrative level. In attempting to fulfill this purpose, institutional researchers are forced to cope with three major dangers: first, the temptation to conduct excellent studies on the wrong topics; second, the temptation to conduct inadequate studies on the right topics; and third, the threat that superior studies on the right topics will, in fact, never be used to improve the quality of decision making.

In order to cope with these three problems, the challenge facing the institutional researcher is also threefold. First, the institutional researcher must somehow work sufficiently closely with the chief executive officer and other key members of the central administration to be in a position to identify both the short- and longer range problems that face the institution and to identify the decisions that will need to be made with respect to these problems. The second challenge, of course, is to devise a research methodology sufficient to attack the problems in decision-relevant terms. Required here is the professional expertise of the institutional researcher. And finally, the institutional researcher shares the responsibility, along with the chief executive officer—the president or the chancellor—to get the results of institutional research into the mainstream of decision making.

The problems confronting institutions in the years ahead will undoubtedly vary from institution to institution. At the same time, there are four problem areas that are likely to be common to most colleges and universities. The first is that changing demographic figures, including a decline in the conventional college-age population, are likely to present most institutions with the problem of maintaining enrollment stability. Enrollment stability will be a manageable problem in the years immediately ahead, but during the latter part of the 1980s, it may be a problem of overriding concern for many institutions.

Secondly, related to the problem of enrollment stability will be the challenge of maintaining financial stability. Inflationary pressures have hit colleges and universities with special severity. These pressures are likely to continue. Faced with the prospect of stabilized or even declining enrollments, one of the major sources of income for many institutions, tuition revenue, is likely to become a less reliable source of financial support.

A third problem area that will be common to most institutions is the challenge of maintaining institutional vitality. I refer here to maintaining faculty vitality, a curriculum that is alive and up-to-date, and an attitude within the institution conducive to intellectual commitment and accomplishment. The prospect of stable or declining enrollments, along with financial stringencies, is not the climate in which most colleges and universities have nurtured institutional vitality during the last two decades. Quite to the contrary, institutional vitality has been nurtured in most colleges and universities in the context of growth and rapidly expanding resources. New patterns for maintaining institutional vitality in the absence of enrollment growth and with the reality of growing financial stringency will be needed.

Finally, a fourth area of concern likely to face most colleges and universities is that of maintaining collegial stability. Colleges and universities face their own pressures and problems. They are, however, also a part of the larger society, and the strains and stresses in our society spill over onto the campus. Energy, the economy, the availability of jobs—these and other societal issues are likely to place increasing strains on collegial stability, that is, the cohesiveness of the academic enterprise as we know it.

What do these four problem areas suggest for the role of the institutional researcher? More than ever before the institutional researcher must be a highly skilled individual with a clear sense of professionalism. He or she must be knowledgeable and accepted by many different members of the academic community, including the faculty, the student body, and the administration. In order to understand the needs of the chief executive officer and the central administration generally, it is essential that the institutional researcher be subject to the widest possible spectrum of contacts and understandings. It is this comprehensiveness and the related demand to relate to multiple constituencies that is characteristic of the role and responsibility of the president or chancellor. To be helpful in the decision-making process, the institutional researcher must not only appreciate the comprehensive perspective of the chief executive officer but must apply this comprehensive view to the study of institutional problems and in the testing of realistic options.

From the perspective of a college or university president, there may never have been a more difficult and demanding period in American higher education in which to provide creative academic leadership than in the decades immediately ahead. College and university presidents need your help. Excruciatingly difficult decisions will need to be made. Hopefully they will be made on the basis of the most enlightened and sophisticated analyses of problems and alternative solutions that we can make available to them.

As you look ahead to this challenge, I urge you to get to know the chief executive officer of your institution. Understand better than you do now the problems and pressures he or she faces. Work deliberately to win confidence and respect. And, of course, lend all the help and support you can. Clearly, it is needed. This will not only make your role within the institution more satisfying and productive, but, hopefully, will also lead to stronger and more responsive educational programs and institutions in the years ahead.

CENTRAL AUTHORITY VERSUS CAMPUS AUTONOMY: THE GREAT DEBATE

Emmett B. Fields
President, State University of New York at Albany
Robert B. Mautz
Regents Professor, The University of Florida
Ben Lawrence, Moderator
Director, National Center for Higher Education Management Systems

Mr. Lawrence:

There is almost universal agreement that institutional autonomy is a cornerstone concept for maintaining diversity and quality in American higher education. At the same time, we recognize that state governments are properly concerned with the efficiency and effectiveness of public institutions, and, indeed, states have a social obligation to encourage these virtues in private institutions. The issue is joined when state regulation, and sometimes outright control, over many aspects of higher education appears to encroach on institutional autonomy. State regulation or control is defended as a proper means for making sure that publicity supported educational programs are, in fact, responsive to societal needs. But this regulation and control often is seen at the institutions as an infringement on justified and needed autonomy—a threat to diversity and quality and to all the social needs that depend on them for fulfillment.

There are reasonable limits to institutional expectations for autonomy—and reasonable limits, as well, to state regulation and control. Within the context of that general recognition, some specific issues are currently being debated.

Regarding diversity, for example, one question is whether it must and should be left to autonomous institutional program decisions or whether there should be a centrally devised, statewide plan for diversity in higher education. How does one plan for diversity at the state level? Many institutions, looking to experience, are convinced that diversity is a by-product of institutional growth and that it is motivated in large part by the institution's own aspiration to improve quality. But when resources and demand will no longer support generalized growth in higher education, how can the state make sure that diversity is not being maintained at the expense of wasteful duplication?

Another specific issue is that of admissions standards. Has an institution receiving public funds the right to refuse to accept transfers of credit to meet its degree requirements or to refuse to grant credit on the basis of college-level examination performance? And of course, admissions requirement issues generate equity questions—questions about which society is becoming increasingly sensitive and politically aggressive.

Mr. Fields:

The theme of today's session points clearly to the new reality in public higher education, at least the new reality in the United States. We live amidst the product of our recent history, which has established a hierarchy of educational authorities in place of the simple ones of an earlier time. The chain stretches from the individual colleges and universities marked still by traditional views of self-governance, through the central offices of numerous university systems working out the means by which they will control their many campuses, beyond, perhaps, to state coordinating boards busily perfecting their mechanisms of authority at a higher level of aggregation, and even out to other state agencies which ostensibly have nothing to do with higher education but which have some degree of dominion over it. The details vary from state to state, but the general pattern is, indeed, the new reality. Hard financial times have fed its growth and now insure its perpetuation.

The polarities in which we university people often talk out our tensions, in this case the polarity of central authority versus campus autonomy, frequently betray by their very wording that none of us serious believes in the extremes of the issue. In the western world, the images evoked by words like *central authority* at once run afoul of a rich litany of individualistic values that warn us to be wary of resting a case at that extreme. We are suspicious of organizations, even those called states, if the organizations are allowed to infringe the freedom of individual citizens to arrange their own affairs within the gentle confines of society's legislated or commonly held norms of social behavior. Similarly, we use terms like *campus autonomy* knowing full well that, if taken at our literal word, the attainment of autonomy would give us far more freedom than we seek. The extreme of campus autonomy could exist only in a condition of divorcement and disinterest between the university and its public, which would then no longer be a sustaining public. So truth and wisdom do not lie at that end, either. Good public policy lies between, in some appropriate balance of freedom and constraint—freedom which does no injury to the larger social order and constraint which draws back well short of totalitarianism. The rights of a campus should not be equated with the rights of the individual, of course, but this difference merely complicates the philosophical issue and does not change its nature.

So, I begin by rejecting the theoretical extremes. Even the most militant champion of campus self-governance must recognize that society cannot survive without mechanisms of control for the institutions it finances in the public interest, and even the most aggressive of centralizers must know that the people on the educational firing line are in the position to be most sensitive to the workings of the enterprise.

This is not to say that we have no important issue here, however. On the contrary, today's theme offers access to a grave set of problems. It is my belief that the emergent chain of overlapping authorities which now struggle to govern and direct our public colleges and universities in the United States is heavy with threat to the purpose and the proper working of the educational enterprise. The somber accent of our times is on the social control of institutions of learning and not on the liberation of learning itself. My sense of things is that we must somehow reverse the emphasis without losing sight of the necessity for social control.

How? I doubt that the riddle we face is, in any fundamental sense, a problem of theory. We will not find solutions

in a perfected theory of the state, or in a more refined model of the accountable social organization, or in ever more intricate explications of the principles by which centralized and decentralized authorities might be caused to work harmoniously together. Our theories are good enough for now.

There is more progress to be made, I suspect, in taking a freshly analytical and behavioral look at the governance or central mechanisms themselves—the agencies which stand between the campuses and the ultimate executive and legislative authority of state government—with a view to discovering whether they are achieving the purposes for which they were created and with the additional view of identifying any educational debilities their rise may have caused. University systems are a sufficiently old phenomenon by now to have amassed a great wealth of data for the analysis of their behavior, and the same can be said for state coordinating boards and state departments of education. The literature delving into these sources to date tells a good many success stories, but there are tendencies in the picture that offer grounds for concern.

Bureaucracies that are formed to meet state purposes seem to have a way of developing their own internal dynamics without apparent relation to the philosophy of the state that forms them and with unexpected results. This is not a lament to the arrival of the 20th Century because I happen to believe that the instrument of bureaucracy is one of the most powerful inventions of modern civilization. It makes possible the efficient performance of massive labors, and abandoning it and its benefits would be unthinkable. We appear to be turning a corner in the American perception of government, however, and there are more critics of large-scale bureaucracy today than at any time in our history. Included among them are many liberals whose fathers were disposed, I suspect, to disparage advocacies of small government. Included, also, are many spokesmen for higher education who feel themselves to be drowning in a sea of governmental regulations. Similar anxieties arise from other sectors of public life, and the Carter administration is responding with efforts at some major reorganizations and simplifications of the federal establishment. Here is the grand symbol of change. We find ourselves speculating about how long the mood will last, what will come of it, and even whether it is possible to hope for change. We thus confirm a general recognition, pointed out long ago by Max Weber, that bureaucracies do respond to their own resistant and durable dynamics. For all we know, they may be beyond the control of anyone.

Let me identify quickly a few elements of the bureaucratic dynamic with which we must all have had some experience. Bureaus work with items which can be categorized by type, according to their common and objective features, and can thus be dealt with by routine processes which avoid the demands of dealing with every item *de novo*, as though it had no counterpart. Personnel officers categorize jobs according to the skills required and workers according to the skills they possess. The central offices of university systems categorize things called campuses and formulate general policies which apply to all equally, in accordance with their shared attributes. And so on. Inherent in the process is the possibility, perhaps even the virtual necessity, of ignoring whatever unique attributes a unit may possess in order to keep it contained within the category, because if it cannot be thus contained, it cannot be dealt with in routine ways.

Arguments inevitably ensue, of course—the spokesmen for the unit saying to higher authority, "You do not understand us," meaning that unique attributes are being ignored, and higher authority answering, "We do, too," meaning that they have gone as far as they can without blurring the requirements of the category. One conscientious way in which this kind of conflict is handled is to examine the characteristics being claimed as unique to see whether they are prevalent in several units of the category, if not in all, so that a subset can be recognized which will sustain a limited amendment to the general policy of the category. It works in a sufficient number of cases so that we observe in bureaucracies a tendency for policies, even if simple at the outset, to grow into elaborte regulatory codes.

It follows that the more complex the governance routines, the heavier are the manpower requirements of the system. This creates the threat of enlarging overhead costs, and it also establishes the ground for a professionalized staff whose careers consist in understanding the codes, managing their data needs, and advising policy officers as to what it all adds up to. Here, I think, is an example of the way in which the self-generating dynamic of bureaucracy can escape old notions of a theoretical nature. The old notion is that line officers in complex organizations are the ones who make the important decisions. But who working in bureaucracies is so naive as to think that we may stop there in our efforts to influence action without also influencing the sheltered staffs to whom line officers turn for guidance? Staffs—the technocrats, as John Kenneth Galbraith terms them, have long since become a new class of workers in the game of power.

I skip quickly over the tendency of bureaucracies to generate colossal flows of paper because it is too widely observed to need comment. When one combines dependency on categorical procedure with curbed attention to uniqueness, with elaborate codes of regulations, with professionalized staffs of code interpreters, with dependency on the written record, it can all become ponderously slow. This might be okay if the world could be slowed down to fit bureaucratic response time, but, alas, the world seems instead to have speeded up. So the frequent complaints of people on the operating line—we will say campus presidents in this case—are that they receive disapprovals that thwart acts they believe to be necessary to the enterprise and approvals that arrive too late to be of much use. At the extreme, there hovers over the bureaucratic scene a spector of entropy in which much energy is dissipated within the system: massive inputs of effort result in dilute outputs in the form of social benefits.

My own state of New York is, to use an Albany euphemism, a *highly regulated* state which manifests its share of these characteristics. The university, in appointing administrative and support people, must contend with a personnel system of seven grades of employees with salary boundaries for each grade. On top of this is an "impaction" rule that requires a new employee to be appointed at a below-average salary for the grade if the aggregate salaries for incumbents average at, or above, the stated average for the grade. Obtaining exceptions is a labyrinthine and unreliable adventure. We find ourselves coping with the internal regulations of no fewer than six state agencies in order to get the actions that are required for the ongoing work of the campus. In instances, the independently developed regulations of two or more agencies have interactive impact on each other that makes it virtually impossible for the university to spend its full appropriation. This would seem to mean that technocratic activity is thwarting legislative determination without anyone's intending it. (Of course, in the recent years of the fiscal crisis the Division of the Budget *has* intended it and has established expenditure ceilings and hiring freezes that have this effect.) We recently did a flow study on all of the campus-initiated actions requiring external authorization somewhere or other and found that the time required to obtain approval to fill a vacant position is, on the average, four

weeks; to purchase major items requiring bids, 15 weeks; to purchase items not requiring bids, four weeks; to travel either in or outside the state, five weeks.

New York can also offer examples of another phenomenon which develops not from the dynamic of any single bureaucracy but from the rivalries between several of them as they contend for power in a time of scarce resources. A serious preoccupation just now on the campuses of the State University of New York (SUNY) is the heavy degree to which educational decision making in operational matters has migrated beyond the confines of SUNY into the domains of the State Education Department or the Division of the Budget. In one important arena, the State Education Department's program of review of doctoral programs, interagency rivalry has produced two years of stultifying controversy with no end in sight. The controversy has been reported periodically in the *Chronicle of Higher Education*, so I need not detail it except to say that the Board of Trustees of SUNY brought suit 15 months ago against the Commissioner of Education and his Regents in order to get a determination as to which of the two legal bodies should exercise the power of deregistering degree programs. The case is now proceeding on appeal, the determination of first instance having gone against SUNY. It is not necessary to know which side of the controversy is right in order to know that it is a controversy, that a lot more than the delivery of education is involved, and that a great deal of energy is going into it on both sides. Meanwhile, back on the campus, we work to improve all degree programs, including the doctoral programs in English and history that became data points in the great authority struggle.

I don't mean to belabor New York, because these characteristics can be duplicated in many states. Despite the complexities of a 64-campus system, SUNY works remarkably well; we find ourselves moving forward even in fiscal stringency, and there are many officers—in SUNY Central, in the Division of the Budget, and in other agencies—who understand the sometimes-mindless tendencies of bureaucracies and work effectively against them. But, there is no denying we are caught in a maze. Even Mark Twain would be sorely pressed to preserve his sense of humor.

What are the prospects for reformation of the educational bureaucracies at this stage of the nation's history? Without posing as a scholar of complex organizations, or even as a fully cognizant student of all that has been written about them, my sense of the literature is that it presents very few examples of bureaus which have turned themselves inside out and moved off in another direction, while reducing themselves in size or scope. Were it not for my normative view that this may be precisely what the times require of them, I suppose I would say that the behavioral studies are all against it.

It is worth observing, however, that the history of the rise of bureaucracies (of all sorts including those having to do with education) has been contained within a long-term period of geographic, demographic, and economic expansion in the West that has no parallel in previous periods of world history. The bicentennial celebration in America has reminded us that our first two centuries were occupied with pressing national boundaries westward and beyond, growing rapidly in population, and becoming a world economic power. Could it be that bureaucracies have been merely reflecting the expansive climate of the larger society in which they arose, that they have behaved in their apparent way because there was no compelling reason for them to do otherwise, and that scholars of bureaucratic behavior have been in no position to discern whether the fundamental forces at work were intrinsic or extrinsic to the organization?

We may be about to find out, because the third American century promises to be quite unlike the first two. Physical expansion for the United States is over, population growth has slowed, and economic growth is predicted to be gradual for the long future. We appear to be passing across a great historical discontinuity which has fallen to our generation of citizens to negotiate. We call it steady-state, and the slogan of the new age is ready at hand: Small is beautiful.

Let me offer the hypothesis—it could be no more at this point—that the growth pattern of educational bureaucracies is largely a result of extrinsic forces, that the agencies can adapt and even shrink in response to external constraints, that they can reform themselves in new directions, and that they can even turn back to the campuses and appreciate the inescapable fact that knowledge never expands by routine but only as novel clues are pursued to the discovery of new truths.

It is a new environment we face, and I am inclined to think that these huge old animals cannot survive in it.

Mr. Mautz:

Dr. Fields has produced an admirable statement. It properly points out that total independence of any individual, organization, or nation is a goal which is not attainable. The corollary is that some regulation and accommodation is essential. He thoughtfully points out that an historical period for the country and indeed western civilization has come to an end. Where we are going is unclear. It is clear that a national debate on goals, means of attaining those goals, and allocation of authority and responsibility in all areas of society is now underway.

I might aid in our thinking if I were to sketch for you my understanding of why centralization of higher education occurred. Everyone understands that the flow of automotive traffic requires control at the local and state level and that to assure that an interstate highway is not a road to nowhere, some coordination, and even coercion, of states is required on the part of the federal government. Roads must meet, they must be able to withstand approximately the same load limit, etc. We all accept without question the necessity for strong federal intervention in the control of the manufacture and sale of food and drugs, and we readily concede the necessity for federal control of the environment in order to eliminate destructive competition between states. Many do not so readily concede the necessity for central regulation of educational efforts and "1202" is a fighting slogan for some. I preface my version of the development of central bodies by commenting that a wise man once remarked that changes for the better inevitably signify the loss of something good.

To state that state-supported universities have traditionally been autonomous is to exaggerate. History is replete with examples of something less than independence. But they were independent of a state governing or coordinating board and had more autonomy than they have today. In their external political relations, for example, they dealt directly with the legislatures. Presidents urged sympathetic legislators to adopt funding requests. The resulting appropriations determined policy, the location and the size of a building, the inauguration or expansion of academic programs, and the competitive relationship of each institution. The affairs of state government were relatively simple. Legislatures met infrequently, budgets were small, and decisions, although significant, were relatively easy to make. Alternatives were clear, and choices were few.

In the decade following World War II, the web became more complex. As the span of its concerns widened, the state assumed a larger role in the daily lives of its citizens. Increasingly, government regulated, subsidized, controlled, policed, and concerned itself with the welfare of its citizens. The government assumed responsibility for the aged, the indigent, the physically and mentally ill. Populations grew exponentially.

The clamor for free or low-cost quality education was extended downward to kindergarten and upward to the graduate school. Society increased its dependence on a technological base which demanded a high level of education and extensive research capabilities. Universities expanded and multiplied. Teacher colleges became universities. Graduate programs proliferated.

As state budgets became larger in response to new and more substantial demands, the old ways of determining the allocation of money were rendered outmoded and inadequate. State legislatures sought improved ways of conceptualizing and addressing the controversial questions with which they were confronted. They sought to deal broadly with the questions of allocation of additional support among categories such as mental health, roads, and education. Within the latter category, the proper balance among funding of kindergarten, education for the handicapped, and graduate and research programs became the focus of decisions. No longer could the legislature deal with the welter of conflicting data and frequently inconsistent claims presented by a larger number of individual and ambitious universities. The division of money among universities became buried in larger questions. Political rather than educational considerations governed hasty and often uninformed decisions with respect to the division of money among the plethora of university petitioners. Planning to accommodate the future was uncoordinated, parochial, or nonexistent. Yet the problem of expansion was the greatest single problem facing higher education.

The states responded by designating to a single agency responsibility for the planning and coordination of higher education. The legislature was thereby able to deal with the broader conceptual questions of the division of resources between public education and higher education and proper allocation of state revenue to each of these functions. Boards were given authority to recommend the establishment of new institutions and the expansion of existing ones and to plan for the distribution of students and programs among the institutions. The outcome of the struggle between those who feared encroachment by such boards upon traditional institutional autonomy and those who believed in the necessity for such unification was state boards with varied duties and responsibilities. Such boards range from coordinating bodies possessing recommending authority only to single governing boards controlling a consolidated budget for all publicly supported universities. Since mid 1950, however, the trend has been clear and unmistakable: states without such central authorities established them, and those with central boards strengthened their powers. At the present time, 47 states have central boards as contrasted with 17 in 1954.

Clark Kerr, in a foreword to the Carnegie Commission report on governance, listed the advantages of the central office as follows:

1. It concentrates certain external relations, particularly with state and federal authorities, in a single office where they can usually be better performed.

2. It facilitates long-range and overall planning of the creation of new places for students, of the provision of new services to new areas of the state, of the assignment of new endeavors among campuses, and of the continuing differentiation of functions between and among campuses.

3. It makes possible (although by no means certain) the determination of diversity among campuses, as compared with the standardization that results from their competitive limitation of each other in the absence of central policy. Diversity is more likely to flow from central authority than from local autonomy.

4. It facilitates greatly the creation of new campuses, and some of the most innovative have come from within multicampus systems.

5. It encourages better management, with the aid of specialists in the central administration and the exchange of experiences among campuses.

The disadvantages of such offices have been pointed out by Dr. Fields. They result in slower decisions; the process of decision making is more cumbersome; and they are frequently out of touch with the campus and the current practicalities of relationships. The process of centralized planning has inherent in it the frustrations of the aspirations and hopes of some. That is to say, to permit a law college to be established in one university is to deny a law college to X other universities. Centralized offices encourage the production of paper, and their rules and regulations—which are designed to cover averages—stultify the extremes which normally represent experimentation and creativity. Perhaps one advantage is that they shift the ire of faculty from the local administration. Indeed, a wise central administrator discusses with local presidents whether responsibility for an unpopular decision should be assumed by the local or the central administrator.

Dr. Fields noted that many of the problems of centralization stem not so much from the centralization of higher education as from the increasing centralization of government. Rules regarding classification and payment of personnel, rules regarding the siting of buildings and roads, rules regarding the disposition of revenue, rules regarding the purchase of equipment, rules regarding the employment of minorities, rules regarding the equalization of women's salaries—all of these stem not from the state higher education authority but from other state or federal agencies. If my own experience is typical, such rules are frequently made by other state agencies over the vigorous objection of the higher education agency. These state and federal agencies, in turn, represent society's response to the growing interdependence and the complexities of our lives. When population density was much less, it made little difference how you disposed of your refuse. When universities were relatively small, with few employees, and the state itself was not a major employer, personnel policies could be handled on a departmental or college level. The impact of a decision was minor. Now the state payroll is such that uniform policies with respect to pay are essential, as they are in any large organization, public or private. Finally, we have come to use government as a mechanism for achieving social goals. A determination of whether those goals are being realized and whether the various beneficiaries of state and federal providence adhere to public policies demands an overabundance of reports.

In summary, the cry against centralization is in part a protest against the restrictions required to enable man to live with man on this increasingly densely populated globe, in part a protest against the restrictions upon our freedom involved in achieving the social goals which the interdependence and humanity of man and the welfare of a democracy render essential, and in part a protest against the restrictions which accompany the allocation of limited resources. We do not easily concede that "big daddy" knows best.

I mean by this to place in perspective the outcry against controls imposed by a central higher education authority. Who among us has not witnessed that all-too-human tendency to rebel against any authority? Rebellions on a university campus sometimes manifest themselves in the attempts by professional schools, such as law and engineering, to free themselves from the controls of the university. The "we are different" cry can be used not only by the president of the university against a higher authority but by segments of the university against the

authority of the university itself. And who is to say that the rules imposed by a university bureaucracy which controls a campus of 30,000 students (a sizeable city not too many decades ago) are any more responsive to the individual needs of faculty or departments than the rules imposed by a central body responsible for 20 universities and 250,000 students? Is one more remote than another? In our cries for independence, are we not harkening back to a longing for days that were and that cannot be recaptured?

To place a trend in perspective is not to endorse all the details and excesses. The excess of centralized management may stifle the creativity which is the ultimate achievement of higher education. When I was in Russia several years ago, I received an impression of enormous expenditure of human energy and time just to enable the system to work. So much energy was consumed by the operation of the system that little remained for accomplishing productive tasks.

A faculty consists of individuals who are professionals. They insist, and properly so from their viewpoint, on having a major role in decision making which affects their professional activities. Many of them are surprised, and often annoyed, to find that they operate within a large administrative structure which must establish rules in order to function. They are in a sense entrepreneurs with a close personal relationship with the students. Hence, it is not surprising to find impatience with restraints necessary to operate a large institution and an abiding sense of distrust of those who would interfere in any way with the free flow of events. The governance structure, whether at the university or central state office, must take into account the atomistic nature of universities and the true seat of authority. It is interesting that the faculty reaction to increasing centralization has been to seek relief by organizing through unionization. The collective nature of the resulting organization is contradictory to the atomistic nature of faculty decision making. The goal is to pit one large organization, the union, against whatever large organization thwarts the union's goals. The resulting concentration of power pits the tips of serveral large pyramids against each other and may well result in escalating the centralization, the diminution of which may have prompted the union's being.

My conclusion is that the balance of forces point to continuing, and perhaps even more, centralization. We tend more and more to look to the government as the guarantor, or at least the preserver of the good life. The humanists, for example, recently suggested the government had an obligation to provide appropriate jobs for Ph.D.s in humanities. I did not hear much scoffing at this idea in this, the 201st year of our country. But to think that the government would not then regulate salaries, dictate tasks, and finally regulate the supply is—well, the kindest word I can use is "naive."

Centralization will probably continue and even grow. Do we accept this and retreat, grumbling, to our enclaves? Not at all. Vigorous debates should center about goals and the most effective way to achieve those goals. For example, only a central agency can assure that a rational plan exists for extending educational opportunities over a wide geographical area with maximum access. On the other hand, although only the central agencies can assure that enough, but not too many, engineering programs are offered in a certain area, such an agency cannot and should not concern itself with the details of such engineering programs. While the central agency can and should make decisions with respect to the allocation of resources, it should not control the utilization of those resources within the university until the university attempts to thwart a prohibition by offering a forbidden program. I agree with Dr. Fields that there is no debate over the extremes. There is and must be a continued and lively debate over the range between those extremes. Reasonable men can differ on specifics, but no reasonable man can differ on the axiom that no inherent virtue exists in adherence to a philosophy that, on any given specific issue, centralization is automatically good or automatically evil.

THE IMPACT OF PLANNING SYSTEMS ON MANAGING AND STAFFING AN INSTITUTIONAL RESEARCH OFFICE

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Institutional research (IR) offices always have played a role in planning through the conduct of traditional functions such as projecting enrollments, counting students, faculty and staff, and studying attrition. The results of these efforts have provided the basis, either directly or indirectly, for planning conducted in higher education institutions. Within the last ten years, as the National Center for Higher Education Management Systems (NCHEMS) has made itself known throughout the country and *accountability* has become the favorite word of state boards, IR offices have become increasingly involved in planning activities. Most such offices have accepted these new responsibilities as part of their regular work load, utilizing whatever human resources are available.

During the next decade, however, if planning is to play a major role in higher education institutions, institutional research offices must be stafffed with the appropriate level of expertise to support this effort. Therefore, managers of those offices must take a hard look at the demands these future conditions will impose and plan accordingly. How will an expanded role in planning affect institutional research operations? What functions will IR offices be expected to perform? What will it mean in terms of personnel requirements and priorities? What organizational structure will best serve institutional research needs? The following is one perspective on the issues which are likely to confront managers of institutional research offices.

Role and Functions

Conceptually, institutional research offices will be expected to perform four major functions: (1) data exchange, (2) accountability reporting, (3) analytical studies, and (4) planning.

Data exchange. This function includes collecting data and reporting it to various external agencies including federal and state governments, professional associations, and directories. The data are not intended for purposes of assessing the performance of a given institution, but rather as more generalized descriptive information about the institution. While this has been a traditional function of IR offices, the trend over the last five years indicates that there will be a substantial increase in both the amount and detail of data requested. Institutions will have no choice but to severely limit reporting they are not compelled to do, and hard decisions will have to be made concerning which of the so-called non-compulsory requests will continue to be answered. As costs and demands escalate, it will become necessary to carefully curtail the amount of resources expended to support this function.

Accountability reporting. This traditional institutional research function has expanded rapidly over the last few years. As resources have become more limited, federal and state legislative bodies have increased their demands for far greater amounts of detailed data concerning the performance of individual institutions. While, traditionally, institutions receiving public funds have provided information to their various sponsors, in recent years there has been an exponential increase in the amount and type of data required. At the state level, many institutions which typically provided input-output types of data such as aggregate costs, numbers of faculty, support staff, students enrolled, and graduates, are now being asked to provide detailed information on class size, faculty work load, programmatic costing, and affirmative action practices. While some individuals, particularly those representing sponsoring agencies, will take the position that these new requests for data represent a higher level of sophistication, from the institutional research vantage point it would appear that these requests involve primarily an increase in the array of ratio data being produced that are almost impossible to interpret in any meaningful way. While NCHEMS has made some progress in standardizing definitions, many agencies and institutions are still struggling to produce requested data that can be understood and intelligently used. For example, in Pennsylvania, the four commonwealth universities, after a year of work, have not yet agreed on a common methodology for determining instructional level; therefore, two different methods are used, with the state accepting the cost data as though they are comparable. Though accountability reporting is fraught with problems, only the initial phase of such demands is currently being experienced. To a large extent, these current activities can be defined as the number manipulation activities which, given sufficient time, can be performed. The future information gathering will not involve efficiency measuring of institutional operation, but will examine effectiveness of the institution, a quality much more difficult, if not impossible, to measure. As competition for public funds becomes more intense, all institutions of higher education will be confronted with an increased number of requests to prove that institutional performance is equal to the investment.

Analytical studies. University administrators have traditionally looked to institutional research offices to provide specialized studies to support management decision-making functions. In the future, there will be an increased need to provide appropriate information to institutional management in those areas directly associated with resource allocation. While IR offices still will be asked to conduct studies in such areas as grade-inflation, this type of study will, of necessity, assume a lower priority. Much more critical to the institution will be information to support management decision making in the area of resource allocation. For example, it will increasingly become the function of the IR office to examine proposals to initiate or terminate programs. These examinations will take into account student demand, impact of programs on other departments or schools, faculty requirements, cost effectiveness in terms of both implementation and operation, and physical facilities requirements. Performing analytical studies will require the use of modeling techniques to ascertain the impact of selected actions over time and the effects of various policy alternatives that are available to institutional managers.

Planning. Planning support activities comprise the final function that institutional research offices will be expected to perform in the future. Whether or not the institution has a formally designed planning office, institutional research will

play an integral role in support of planning activities. In both operational and developmental planning, i.e., the one-year and five-year planning modes, institutional research will continue to be responsible for providing analytical studies, enrollment projections, and a quantitative reporting structure for internal decision making, as well as managing central data banks to support evaluation activities. The major challenge facing an office of institutional research will be its involvement in long-rang or strategic planning. Institutions will, of necessity, have to make forecasts not in terms of a two-, three-, or five-year time frame, but in terms of a fifteen- to twenty-year time frame. The IR offices will be asked to assess potential markets, identify new methods of delivering services to these markets, examine the demand and supply of students in terms of occupations and manpower requirements, and assess the impact of these programs on the institution on a long-term basis. In addition, IR offices will be expected to predict funding patterns and estimate future income. Of particular importance will be the ability of institutional research to assist management in interpreting data obtained through various forecasting methodologies such as morphological, scenario, force analysis, contexual mapping, simulation, matrix, delphi, and others.

A major distinction between the activities involved in strategic planning as opposed to activities currently or traditionally being conducted by institutional research offices is the nature of the data that will be utilized. A shift in attention from quantitative data to qualitative data involving societal values, expectations, and needs is required. Most importantly, the traditional analytical skills now must be combined with synthesis skills; that is, the ability to bring together diverse sources of quantitative and qualitative information, bringing new meaning and interpretation to highly uncertain data while always recognizing the risk associated with decision making. It will be the primary function of institutional research to provide the expertise to reduce to whatever extent possible the entropy associated with policy decisions. It is the unique speculative characteristics of the data, and the need to synthesize, that will produce the greatest challenge in the coming years to IR offices.

Personnel Requirements

On the assumption that the above four functions will represent the generic activities to be conducted by an office of institutional research in the future, it is essential that careful consideration be given to the personnel who are selected to perform these functions. During the next five to ten years, it is hypothesized that IR offices will have access to a larger array of data bases containing reliable and valid data that can be manipulated to provide base line data concerning institutional operations. As this occurs, there will be a concomitant shift in staffing patterns. Individuals who are currently performing clerical-type activities will be replaced by information specialists who can relate data needs to the people who operate the computer system and then synthesize the data to provide information required by administrators. Although many IR offices are currently staffed by individuals who are trained in economics, demography, statistics, computer programming, and systems management, it is evident that if institutions are to move into such areas as marketing and strategic planning there will be an increased premium on these skills, additionally requiring the ability to apply these skills to the areas of higher education. Mini-modeling activities will become increasingly important and there will be increasing dependence on interactive computer systems.

While technical skills will continue to be of importance, the higher level of necessary cognitive abilities will bring about major changes in personnel type. Individuals of high initiative who possess the ability to analyze problem situations and to formulate and recommend policies that can improve institutional operations will be required. It is important to recognize that by engaging in the four functional areas, IR offices will be in a unique position to have an institution-wide perspective that is unavailable to any other area of the organization. It is essential, therefore, that as a staff office to university administrators institutional research offices fulfill this role by continually responding to targets of opportunity, recommending changes that have institution-wide consequences, and not waiting until an assignment is given or until somebody asks for a specific piece of datum.

Directors of IR offices will be required to have a much broader perspective in terms of institutional environment. They will have to be not only aware of, but able to understand and be in agreement with, the value systems of the academic mission and the character of the institution, at the same time maintaining a high level of objectivity. In the final analysis, the success of each IR office will be determined by the degree to which it is able to support and interact with the various life-styles, values, and beliefs of the faculty who are performing the primary missions of the institution. Without this understanding, IR offices will be viewed with increasing suspicion, particularly in the areas of policy formulation and strategic planning, and their usefulness as supporting staff to the management team of the institutions will be greatly reduced, if not completely abrogated.

Staff members will be needed who possess a high level of professional activity coupled with an awareness of both the internal and external environment. A major issue facing directors of institutional research offices is how to obtain this type of staff. Do they simply dismiss existing people who don't currently have the required skills and competitively seek on a regional or national basis the best people available? What are their options? Although directors should seek to fill new positions or make replacements with individuals who do possess higher levels of skills than are currently available, they now must develop systematic in-house training programs providing job expansion opportunities, external professional training, and formalized course work offered by their own institutions. Too often, the development of current staff is less than systematically addressed. Directors ease their consciences by sending their staffs to such places as the NCHEMS workshops and other conferences. This hit-or-miss approach does not meet the needs. The Association for Institutional Research (AIR) should not only expand its workshops to include topics suitable for the more sophisticated staff and offer them more frequently than once a year, but it should also develop a more professionally oriented, integrated sequence of learning experiences to provide for the development of its membership. The AIR could draw on the expertise of its membership and experts at institutions across the country to assist in this task. This could be of invaluable service to the membership of AIR and to the institutions to which the members belong.

Finally, in terms of personnel utilization, as staff expertise increases there will be a concomitant increase in staff costs. Since relatively few institutions will be in a postion to employ the total array of talent necessary to meet the requirements that are envisioned by the four areas of operation, alternatives must be sought that can provide resource expertise as requirements demand. There are at least three options available that can be cost effective.

The first of these is the utilization of in-house consultants. That is, the utilization of existing faculty within each institution who have the particular expertise required. For example, most mathematics departments have faculty who have expertise in the area of statistical analysis; computer science departments can provide assistance in the structuring of data bases and information retrieval systems; and many faculty in the social

sciences have extensive experience in the design of survey instruments and the collection and analysis of that type of data. Available at most institutions are demographers and economists, as well as operations research and higher education specialists who can provide on a short-term basis a high level of expertise. Although some IR offices currently utilize these services, it is likely that these internal types of arrangements will expand during the coming years.

Second, and perhaps to a more limited extent, IR offices may find it more cost effective to employ outside consultants for particular types of services, both in consultative advisory roles and in actual subcontract arrangements. This option would provide expertise with no continual commitment of funds.

Finally, an alternative that may merit some degree of attention is the establishment of informal information exchange mechanisms by AIR. Often, a great deal of time and effort is spent in reinventing the wheel simply because there is no ready access to colleagues who are working in similar areas. It might be possible to develop some special interest groups within AIR that could serve as a resource for the exchange of information in specialized areas.

Organization and Management of IR Activities

As offices of institutional research become more heavilty involved in the support of management decision making either through the function of analytical studies or planning, it will become important for these offices to report at a high level within the organization, preferably to the chief executive officer. This will permit more direct lines of communication in the staff support services that the office is to provide the institution, as well as facilitate the office's work in gaining coordination and cooperation with all areas within the institution. As resource management gains increased attention by chief administrators, appropriate linkages and relationships will have to be developed with other offices such as budget and computer services, as well as with the chief academic offices of the institution.

Of major importance to the director of an IR office will be the internal organization and management of the office itself. Again, assuming that the four major functions previously discussed are valid, and also assuming that personnel will be available who can be characterized as innovative experts in their fields, it will be necessary to organize both the activities and the personnel in such a manner as to maximize the productivity and performance of the office and at the same time provide a work environment that is supportive of the individual staff personnel and promotes their professional growth.

While recognizing that there is no single answer as to how an institutional research office should be organized and managed, there are several issues that need to be addressed in considering the IR office of the future. For example, all four functions to some extent share common data bases, yet each has unique requirements that differ from function to function. To provide common data, should a data manager position be established that is responsible for retrieving data from computerized systems to meet these common needs, or should personnel be organized around the four functions, each having its own information retrieval personnel? If personnel are organized around functional areas, will there be a redundancy and underutilization of expertise, or will a maldistribution of expertise exist? Can a functional organizational structure provide for opportunities and job expansion that will permit individuals to achieve some degree of professional upward mobility? How can one handle special projects that cut across all four functional areas? How does an office maintain a working knowledge of what's going on in the several divisions and schools within the institution and, at the same time, keep abreast of new changes taking place nationally in specific areas of professional expertise? While there is no existing prescription for the resolution of these problems, the possible benefits that could be derived from the implementation of a modified matrix organizational structure or team approach should be considered. This type of structure may not be appropriate for small groups of fewer than ten to twelve individuals, but it does have advantages in terms of creating an appropriate work environment for larger groups. One might conceptualize having individual staff assigned to various cells in a matrix with the horizontal dimension being functional areas and the vertical dimension being based on specific skills such as information retrieval, analysis or statistics, data collection, report preparation, and so on. An alternative might be to have the vertical dimension representing broad areas within the institution, thereby facilitating the working knowledge of these areas. Although there would be difficulties in managing such a structure, one benefit that might be derived is that individuals would have more than a singular responsibility, therefore permitting some degree of flexibility in assignment as well as professional development.

Issues

While specific solutions to issues concerning the operating functions of the Office of Institutional Research of the future cannot be offered, some of the major issues that each IR director will likely have to address are summarized below:

1. With the increase in requests for data, both for data exchange and for accountability, how can IR offices more effectively respond to these requests and what criteria should be established for determining the degree to which they should respond to these requests? How can the efficiency of their responses be maximized, thereby minimizing the number of responses?

2. Assuming that IR offices will require increased staff expertise, how can additional training and experience be provided to existing staff which will facilitate their professional development? What should be the role of AIR in these activities?

3. To what extent is it possible to supplement the capabilities of IR offices through the use of both internal and external consultants? How should these arrangements be made, and can they be afforded?

4. What alternatives exist for organizing and structuring IR offices in such a manner as to provide a working environment that is conducive to maximizing the individual potential and expertise of the staff?

While recognizing that there will be many factors that must be considered based upon individual circumstances, the greatest challenge facing the director of an institutional research office will be to identify the right combination of expertise and personalities and to mold them into an effective force for contributing in an innovative way to the solution of college and university problems, both present and future. If these challenges are to be met successfully, innovative management strategies that will facilitate the management of institutional research offices will have to be developed.

THE INSTITUTIONAL RESEARCH OFFICE: REPORT FACTORY OR INFORMATION CLEARINGHOUSE

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The Report Quandary

As an institution of higher education grows in number of programs and affiliations, there is also an increasing number of national, state, and regional agencies and organizations expressing interest in knowing about the operation of the institution. While many of these interests relate to program evaluation by professional discipline groups, others are of a comparative nature. In many cases, the information furnished is ultimately published in widely circulated documents, often becoming the basis for peer comparisons and professional evaluations.

With the increasing number of respondents providing information to outside users, there also exists an increasing potential for embarassment when reports leave the institution reflecting facts that are grossly different. While some queries regarding faculty distribution, salaries, and credentials are addressed to the chief academic officer, others are addressed to the finance officer, the institutional research officer, or the librarian. It is not an easy matter to determine what offices throughout the institution receive queries and how these offices, in their own ways, respond to them. An institutional research office frequently hears about surveys and questionnaires when a secretary from another office telephones to search for needed information or to ask how particular questions should be answered in situations where available data is defined differently from that requested. It is likely that many items that leave the institution purporting to be official data come from attempts to gather piecemeal facts using unofficial definitions or look-good interpretations. It stands to reason that the validity of the institution's official records will soon be doubted as more and more inconsistent, and sometimes contradictory, data are distributed in this decentralized manner.

Although an office of institutional research frequently has no explicit authority to create or maintain any of the official data files of the institution, the performance of institutional research increasingly puts this kind of office in a position to be held accountable for such files as well as to become increasingly enmeshed in an interpretive role. Probably much more frequently than one realizes, this kind of office receives requests to provide a variety of information to users both inside and outside the institution. While these requests may be in the form of memos, letters, or questionnaires, they are most often received informally by telephone or a walk-in visit. Requests are received from all levels of personnel ranging from the ambitious, inquisitive student searching for class project data, through secretaries, administrative assistants, senior administrative officers, and the institutional president. Apparently, the institutional research office is seen by its numerous customers, particularly high echelon administrators, as a place where information and procedures appropriate to interpreting the institution's information are available on a moment's notice. Consequently, there is ample reason for an institutional research staff to become uneasy when asked to report and interpret data using numerous informal sources where definitions can be established only through trial and error.

The Clearinghouse Function

Without appropriate recognition and administrative charge, an institutional research office often functions to a great extent as a quasi-official clearinghouse for large amounts of quantitative information leaving the institution. Having recognized and assumed this clearinghouse role, the institutional research office has placed itself in the position where others, both originators and recipients of the data, are prone to see it as responsible and accountable for materials passing through its hands. To some degree, this function has put the institutional research office in a position to work closely with other offices, where data are generated and maintained, in efforts to establish consistent definitions and usage of basic information.

A case in point is the data relative to staff personnel usually collected and maintained in the institution's personnel office. At Georgia State University, efforts have been made between the personnel office and the institutional research office to develop consistent and accurate data about staff and faculty personnel. This joint effort has been quite productive, and today, a variety of regular uses can be made of information residing on the personnel office data files. This cooperative effort toward standardizing definitions and usage has produced a substantial payoff in the area of institutional studies about staff and faculty personnel. It is unfortunate that information on faculty is not so readily standardized as that on staff personnel. Consequently, when inconsistent definitions of information pertaining to personnel holding faculty rank exist, data cannot be utilized to the desired extent.

It is in an instance like this, where inconsistent definitions and erroneous use of data are apt to cause frequent and gross distortions, that the clearinghouse role acquires greater dimensions. It then becomes necessary for the institutional research office to deal with data in ways inconsistent with basic concepts of good management and often demanding that subjective decisions be made without benefit of all the facts. Again, it must be emphasized that an office of institutional research, although frequently thought of as an information storehouse, remains in actuality an information clearinghouse.

While the institutional research office is not usually responsible for the generation or maintenance of any official institutional data base, it regularly needs to use information from data files of various types (e.g., the personnel file, student records file, budget file, curriculum file, and payroll file). Because of its familiarity with the interdependent relationships in the data, the institutional research office can spot occasional problems in the data and can work with appropriate administrative areas in a quasi role toward preventing release or publication of inaccurate information. In these cases, the additional function of content monitoring is sometimes coupled with content correction in the clearinghouse context. Although the institutional research office in my institution has gained, through experience, the knowledge to permit minimum monitoring of data for accuracy, it is impractical to expect this office to take on the task, voluntarily or otherwise, of originating, maintaining, or correcting any official institutional files. Yet, out of

courtesy, my office has made a practice of informing areas responsible for the maintenance of data when obvious errors are observed. Generally these gestures have been positively received and encouraged.

Data Definitions

There are other vital areas related to these problems where an institutional research office can meet the challenge. A significant lack within the numerous record-keeping endeavors of most academic institutions is an institution-wide standard for data definition and utilization. The purposes of such a function are many. For example, when salary is mentioned, any number of meanings can be assumed depending upon the circumstances and interests. If a teaching faculty member's salary is in question, there are numerous options: Is it for the academic year? Is it for the fiscal year? Does it include supplemental remuneration? Does it include summer school remuneration? Does it include funds from grants? Does it include fringe benefits? Is the amount expressed as an hourly wage, a monthly salary, a quarterly salary, a per course salary, an academic year equivalent, or as an annual equivalent? These are representative of the type of questions that must be asked and answered about every item of data utilized in compiling information. With an operational data definition and utilization procedure, an item like salary would be consistently defined and utilized throughout the various areas where it is stored and used. Frequently, salary data is stored differently in various locations because one user needs total remuneration, another needs annual state monies alone, while still another needs equivalent academic year based only upon state funds. This ever-present increasing "hodgepodge" creates the very environment where nobody knows what anybody is doing and errors are born, nurtured and multiplied. In this context, eventual misrepresentation is a virtual certainty. Comparisons of disparate data coming from two different sources will obviously arouse suspicion as to the validity of any of the data or the honesty of the data reporter.

Data Base Manager

Several years ago, computer systems managers in many corporate structures perceived a collision course existing where major management decisions were being formed on the basis of inconsistently defined information. The need to monitor basic data definitions and specifications became even more acute as corporations began to recognize the interdependence of many of the departmental data bases previously thought to be the private domain of each individual operating component of the corporation. From the observation that all these separate little empires were related at some level grew the concept of linking the previously disjointed data to provide more timely and comprehensive management decision information. The management information system concept can thus be regarded as a practical attempt to incorporate general systems theory into the process of handling large amounts of detailed information so that it is meaningful when summarized for critical upper level management decisions. The function of the data base manager developed out of the need for data file elements to be adequately defined and documented at the time of systems design and implementation. This function, while not responsible for the accuracy of the individual bits and pieces of information, does have a continuing responsibility to monitor the mechanics and procedures of information storage and utilization. Otherwise, the type of data stored in a given field at any one point in time may differ greatly from that stored at another time, with the ultimate user never having any knowledge of the change in practice. The function of a data base manager is all the more important in situations in which data users have little or no input into the structure of the data and its initial gathering and storage.

It would seem appropriate that stronger support be afforded the function of data base manager in educational institutions. In some institutions, where there is recognition that all the official files of the university are related and interdependent, this function is in the hands of an institution-wide committee, with the chief executive officer or similar high echelon administrator as chairperson. Before new data files are added, their use must be adequately defined and justified. And, before definitions and utilization of any data files are amended, there must be full exploration of the effect of the change upon all the users. To permit this kind of tracking in the use of specific items of data, a data base manager must maintain a closely controlled cross-referencing procedure most often called a "data element dictionary." The National Center for Education Management Systems (NCHEMS) has for several years supported the concept of maintaining a data element dictionary and, consequently, provides a tremendous amount of technical support to implement such procedures within educational institutions. In addition to providing guidelines for consistent use of data fields, the data element dictionary indicates where specific kinds of data are available and identifies all the regular users of any piece of data. With this kind of procedure, no user finds himself suddenly without necessary operational data. Another great benefit from such cooperative monitoring efforts is that duplicate and unnecessary data gathering and storage can be eliminated, resulting in substantial monetary savings in both labor and computing machinery.

Considerations and Suggestions

While it is not the purpose of this paper to suggest that the institutional research office should assume responsibility for all reports prepared and departing from the institution, it is, however, envisioned that one frequently observed function of this office might be further developed and supported—that of being a clearinghouse for information destined for both internal and external utilization. A further suggestion is that this clearinghouse function needs to be more closely aligned with the function of the institution's data base manager in efforts to guarantee consistent definition and appropriate use of individual pieces of data. This joint effort would consider both the source and the ultimate use of data from the time the need for data is first recognized, through the process of designing computer programs for storing the data, and to the point where end-product reports are delivered and used.

Another probable responsibility of this function would be to serve as a clearinghouse for all queries received in the institution. These information requests are usually addressed to a variety of offices on the campus. What is reported and to whom is anybody's guess. It would appear that a satisfactory solution to this growing problem would be to have all external requests for information come to a central point, be logged, farmed out for necessary data where needed, but returned to the central recording point before the response is mailed. It is not unusual, for example, for two entities within an institution to spend hours of manpower and many dollars worth of computing time responding to duplicate requests from the same external office. When two requests are mailed to two different offices within an institution and there is no clearinghouse function for such requests, neither office can know of the other's involvement, and both may respond in their separate and different ways. There is no way to estimate just how much time and money is spent preparing data, if not duplicate requests, for similar information.

These considerations indicate a need for support in directions which would further define an information clearinghouse

function within the office of institutional research and toward formal alignment between this clearinghouse function and the institution's data base manager function. But the sensitivity of these suggestions cannot be overlooked, for precedent, sometimes of necessity, has long been set. In most institutions, it is frequently felt desirable to operate on a completely independent basis; administrative areas are long accustomed to defining their data systems to store just that data they presume necessary and then freely changing data definition as their own individual needs change. Efforts to establish a clearinghouse function and to align it with that of the data base manager could appear threatening if not provided the full support of upper level administration. Even minimal efforts to channel all information requests through the institutional research office could be met with disdain were upper echelon support denied.

This paper, while not intended to present a detailed picture of possible solutions, is concerned with calling attention to a growing area of concern. It is the belief of the author that views and concerns expressed in this paper are generally shared by data base managers and computer systems personnel who frequently emphasize their strong interest in further developing the relationships and functions discussed in this paper. It is desired that, by presenting some of the existing problem areas, this paper will invite further consideration of ways through which the administrative function of an educational institution can be made more efficient and effective.

PLANNING FOR INSTITUTIONAL RESEARCH IN KUWAIT

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The purpose of this paper is to report on a three-month mission to Kuwait, which was supported by UNESCO and completed in March, 1975. The overall mission was undertaken to establish a development office with institutional research as a principal component. The proposed functions of the development office were: to be a center for information needed, plan the orderly development of the University of Kuwait, improve the decision-making process, develop the curriculum, evaluate progress toward stated learning objectives, and introduce new technology into the university. The term *institutional research* was taken to mean those administrative functions which related observed performance to stated institutional purposes.

The mission was conducted in three phases. The first involved review of previous management studies; the second involved conducting interviews with University Council members, administrators, deans, and academic department heads as well as collecting student opinions using a questionnaire developed for this mission; and the final phase involved the drafting of a plan followed by detailed discussions of that plan with the rector of Kuwait University and the secretary-general.

Background

In 1975, the University of Kuwait was relatively new (founded in 1966), small (4000 students), undergraduate and professional (arts & education, science, commerce, economics, political science, law, medicine, and engineering) and traditional (established by Egyptians on the British model). It sought a workable autonomy within the Ministry of Education and a meaningful role as an instrument of regional development. It was well financed (operating budgets of around $20,000,000 per year and a building program of $500,000,000) and well staffed (all teaching staff members at all ranks holding a Ph.D. or other terminal degree). It was the only university in Kuwait and needed to operate within certain geographic, demographic, and economic conditions.

Geographic conditions. Kuwait is located on the Gulf, at the extreme eastern edge of the Arab world, at the center of gravity of the Islamic countries, near the mouths of the Tigris and Euphrates rivers and the obligatory point of passage to the Far East.

Kuwait University was very much aware of the geographic characteristics of culture the state wished to preserve, the historic role of Kuwait in the Arab world, the Islamic traditions, and the crafts of the sea. The development of a library, museum, or arts curriculum, for example, required specific information so that present practices could be viewed in the light of traditions, cultural values, and social developments. The university was actively engaged in regional development activities which needed detailed information that would help relate academic programs to the Gulf States and to the Arab world as a whole. Statistical reports and the analysis of regional data were needed to support university cooperation with the Arab world and international programs.

Demographic conditions. In 1950, there were fewer than 50,000 Kuwaitis living in the walled capital city of Kuwait. By 1975, the capital—a modern city with all the goods and services of an international trade center—housed over 400,000 citizens and an equal number of non-Kuwaitis. In the preceding ten years, the population in the secondary schools had increased by 20% per year and, in 1975, five students were enrolled for every one enrolled ten years before.

The university actively responded to the educational needs created by a rapidly growing population and helped translate the general population growth into projections of university enrollment growth. It cooperated with other planning agencies to make realistic estimates of the growing needs for teachers, engineers, doctors, lawyers, economists, etc., based, in part, upon the degree to which the population of Kuwait was willing and able to fill these professional roles. To help raise its general level of education, the university had to know the total plan for education in Kuwait and to know how university programs related to it. For example, so that consumption would be distributed and work disciplines established, it was a matter of national policy to provide employment for any Kuwaiti who wanted an education and it was necessary to assure the Ministry that this policy was being implemented by the university.

Economic conditions. The economy of Kuwait is a narrowly based one with a small population (under one million living in six thousand square miles, a rapid growth rate, and a high gross national product, resulting in a very high per capita income (around $8,000). Virtually the only source of income is oil, with almost all consumer goods being imported. In 1974, the annual financial reserve for city government operations was around six billion dollars.

Rapid accumulation of financial reserves of this magnitude placed a strain upon all agencies of the government to develop at a rapid rate. Universities, which traditionallly take time to mature, carry an extra burden when placed under pressures to graduate people from programs before the programs are fully developed. Rapid growth had caused planning parameters to change abruptly which created major problems when the parameter and/or the changes were based on inadequate or wrong information. At the same time, the university had to grow to meet new needs. It could not become paralyzed into delays and inaction. While the availability of money seemed to be a stable parameter for the next twenty years, the growth rate of the state of Kuwait demanded a prompt and informed response to changes in other planning parameters debated in a continuously changing environment. The university had to attend to shifting priorities and be able to specify, within the limits of conventional analysis, the consequences of actions taken in response to changing situations. It needed to look into the future and gather information on probable future events and their consequences.

University organization. The Minister of Education chaired the University Council which was composed of the rector, secretary general, seven deans of faculties, the under-secretary of education, a representative from the Office of His Highness the Amir of Kuwait, three prominent citizens from the private sector, and three citizens from the public sector. The rector was responsible for academic matters of curriculum, faculty, students, academic facilities, and evaluation of performance.

The secretary general acted as the overall supervisor of the administrative operations of the university. Five deans headed faculties of science, arts and education, law, commerce, economics and political science, and women. The sixth dean headed the College of Medicine and an engineering dean had recently been appointed. The secretary general was aided by two assistant secretaries, one for general services and one for finance.

The Problem

Previous management studies had established two types of problems: the reporting systems and the data systems.

Reporting systems. The problem of a reporting system was identified in 1974 by Arthur Young and Company who reported the following:

> . . . There does not seem to exist any structured and approved management reporting system. This is a serious shortcoming which prevents efficient management. The tendency, therefore, exists to request special reports to meet each problem and situation as it arises. Invariably such reports have to be submitted on short notice and they tend to be, therefore, neither complete nor as accurate and timely as they should and could be. (p. 13)

These consultants, along with the university committee which studied the problem, urged the university to establish some form of a development office.

Data systems. Problems with the data systems can be itemized as follows:

1. *Faculty data bank:* A systematic report needed to be developed which would identify the source of new faculty members, the number contracted for future employment, and the contract status of all faculty. It was felt that a faculty data bank would greatly complement the student data bank then being established; when both data banks were operational, some of the planning needs of other administrative units could be met. The Development Office was to conduct a project to accomplish this.

2. *Comparative data on admission and registration systems at other universities:* These data needed to be analyzed to show implications of the elective system for admission and registration because there was belief that many problems could be avoided if the consequences of decisions were made clear. The analysis was to be made by the Development Office.

3. *A program budget code:* Accounts had always been prepared by object code (salaries, expenses, building, etc.) and, therefore, an analysis of the cost of programs (teaching, research, public service) by units (colleges and departments) was difficult. Increased use of the computer helped some, but the major problem was still the need for an accurate system to code expenditures. A more profound problem was the need for a system which would allow each unit to assume responsibility and accountability for its own budget and which would give each unit the discretion to make fiscal decisions based upon program needs. The Development Office was to work with experts or consultants to help establish a system.

4. *Data for planning stores inventories:* A management survey of this inventory operation was expected to identify the data needed, rules and ratios for ordering, computer system applications, etc. A pilot study had been conducted by the Faculty of Commerce, and this assistance was found to be helpful. The Development Office needed to identify innovations from the general literature but would not become directly involved in any project as specific as this one.

The Plan

The plan for institutional research included the functions, methods, management, studies staff, and criteria for evaluation.

1. Functions and the related data: Teaching students (enrollment projections, demographic data, attitudes, etc.); Employing faculty (background and training, work-load analysis, working conditions, etc.); Designing curriculum (course load matrix, section size analysis, student credit hours cost, etc.); Utilizing space and facilities (room utilization, special instruction criteria, formula for cost analysis, etc.); Expanding resources (budget preparation, program cost allocation, manpower needs, etc.).

2. Methods and examples of data sources: Analysis of existing data (registration, payroll, etc.); Analysis by consultants (cost analysis of instructional TV); Questionnaires (student and faculty opinion surveys); Interviews (analysis of department operations); Systems analysis (management information system); Experimental research (evaluation of testing procedures).

3. Management tools: Job descriptions (director, institutional research, instructional development); Task analysis (projects, manpower required, trade-off analysis.

4. Institutional research studies: Studies of institutional data were to come from two sources: teaching and learning having to do with faculty, students, and curriculum; and administration having to do with administrative staff, capital, and fiscal affairs. Several methods were to be used to analyze these data. They were (in order from least to most man hours): existing data (in computer form), consultant's reports, questionnaire answers, interview reports, and experiment scores.

When studies were classified by this method, it was possible to approximate the amount of effort required for any group of studies selected. When man-weeks of work were tied to the task of analysis, it became clear that even a full staff could not possibly do all the studies. An institutional research professional was then to meet with the development office director and establish a priority for each project. With experience, the man-week work estimates were expected to change. New techniques (especially computer) could make major changes in the effort estimates. As new studies would be requested, old studies would have to be completed or discarded. New staff was to be justified only in terms of a careful study and adjustment of the task analysis.

5. Staff qualifications and duties: The major institutional-research-related staff positions were to be those of director and institutional research professional. The job descriptions that follow show the duties and qualifications of each. For all personnel appointments, it was assumed that normal procedures would be followed and that the national policy of giving preference to qualified Kuwaitis would be observed. These professionals were to be allowed to hold the faculty rank for which they were qualified in a regular academic department part-time so that they could teach and perform productive scholarly activities.

The director: The most important qualification was a record of administrative performance in which results had been produced tactfully and under difficult conditions. The ability to establish credibility by the production of useful reports of high quality was also important. The more objective qualifications, in this case, were more flexible and had to be weighed against proven administrative ability. The following would have been desirable attributes, but it was unlikely any one person could meet all of these conditions.

1. Teaching and research experience at the university level

2. Academic training in a quantitative area (mathematics, accounting, physics, etc.)

3. Administrative experience at Kuwait University

4. Administrative experience in a ministry of the state of Kuwait

5. Command of the English language
6. An advanced degree in education

The director would perform the following administrative functions:

1. Assist the secretary of the University Council in collecting and analyzing data needed by the council and its committees
2. Support faculty members in the identification and evaluation of innovations in the outside world
3. Supervise training of professional, specialist, and clerical staff in the Development Office
4. Supervise an ombudsman who would identify problems related to student welfare
5. Coordinate projects to develop university-wide areas and department-centered activities.

The institutional research professional: The academic qualifications of the institutional research professional were more specific. It was considered to be important that this professional be highly qualified, not only to gain credibility in a university community but also to keep the staff small in number and able to do many complex tasks. The institutional research professional was to hold a Ph.D. in institutional research.

The institutional research professional would perform the following functions:

1. Design and conduct studies on problems identified by the director
2. Initiate studies of university operations
3. Assist in the collection of data
4. Assist with studies related to the outside world
5. Present analyses of proposed decisions.

Evaluation

There were several recommendations made about the evaluation which was to be used to monitor the growth of the Development Office and the institutional research function.

If the Development Office was to be useful to Kuwait University, it should grow and expand with the university, but it should never be allowed to become too large (more than one and one-half percent operating budget) because it then would begin to be involved in internal problems (personnel, budgets, organizational structure) of the Development Office and would not have the time to devote to the problems of the university. There were certain factors which would cause the office to grow and these are noted below.

Useful reports: The more useful reports are to the user, the more he or she will demand. It is, therefore, very important to keep reports user-oriented by regular interaction with users.

Change: The more changes that are introduced into the university, the greater will be the information needs. The new course unit system illustrated this point.

Kuwaiti administrators: As the university moves from contract administrators with defined responsibilities to native Kuwaitis with general interests in the whole of the university, more information will be required of an interdepartmental nature.

Manpower planning: Several people view the main function of the Development Office as manpower planning. As this view prevails, more information and more staff will be needed.

Budget review: Several people view this as a function of the Development Office. The more the office engages in this kind of activity, the more information and staff will be required.

Computer development: This is perhaps the single most important unknown in the growth equation. Sophistication in computer management information systems, administrative procedures, and academic utilization will dramatically change the character and staff requirements of the Development Office. While the specifics are not clear, it is safe to assume that, as the computer applications grow, the need for additional data will also grow.

Reference

Arthur Young & Co. A report on the university reporting sytsem prepared for the ministry of education in Kuwait. 1974. (For further information, contact the Ministry of Education, Kuwait.)

OECD'S PROGRAMME ON INSTITUTIONAL MANAGEMENT IN HIGHER EDUCATION

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Aims and Background

Stated briefly, the aim of the Organization for Economic Cooperation and Development (OECD) Programme on Institutional Management in Higher Education (IMHE) is twofold:

1. to facilitate, within participating universities or equivalent institutions, the development of a capacity for better management of their affairs through interinstitutional cooperation

2. to provide for a wider dissemination of practical methods and approaches to institutional management.

The IMHE programme has been in existence for over nine years. Its first phase, involving eight associated universites, was sponsored by OECD's Centre for Educational Research and Innovation as a pilot exercise in conducting field-based studies on institutional management problems. Begun in mid-1968, it was completed at the end of 1971. During the second phase (1972–76), the programme functioned as one of the centre's decentralized projects. This is continuing for the third phase, which started in January 1977 and will continue through 1979. As such, while continuing to develop as an activity managed by the organization, the operational budget for maintaining its central staff is now entirely self-financed through annual, voluntary contributions paid by the institutions participating in the programme. Today, the programme serves approximately 100 member institutions in 19 OECD member countries.

The First Phase

The launching of the programme in 1968 coincided with a period of considerable student unrest in the European universities. This, coupled with the need to adapt to the requirements of centrally legislated reforms designed to reduce these tensions, caused universities to focus more attention upon the management problems facing them. It was clear, however, that the universities were ill-prepared for undertaking systematic examinations of their internal problems. In large part, this was due to the fact that the skills needed were generally unavailable due to the tendency of academics to remain within the strictly defined confines of their individual disciplines (economics, statistics, computer science, etc.).

In order to stimulate interdisciplinary research, teams of academics and administrators were set up in eight European universities to study different aspects of university management. Six major dimensions of university management were identified, namely: decision-participation, finance, information, student and staff flows, physical plant and equipment, and academic planning. The results of these studies were presented at an evaluation conference held in Paris in November 1971. The conference marked the end of the first phase and had as one of its purposes an evaluation of the work carried out during the first two years, with a view to making recommendations for future work. The programme, as it exists today, is the operational realization of many of the recommendations made at that time.

The evaluation conference recognized the need for, and the widespread interest in, the further development of specific approaches to university management. As a consequence, it was felt that a more systematic effort to organize and disseminate available information on university management methods was required, assisted by appropriate efforts by international organizations. Specifically, the conference recommended that the research and development efforts, which constituted the first phase, be used as a starting point for a more widespread and intensive effort of cooperation among those institutions wishing to initiate such research.

During 1972, all European institutions of higher education in the OECD area, as well as a selection of North American institutions, were invited, either directly or through the appropriate national authorities, to participate in the next phase. Those interested were asked to provide an indication of the types of activities which they wished to pursue and, where cooperative research was involved, to assign priorities to suggested topics. Based upon the responses, the central staff began to set up different services to be offered to members and to assist them in designing cooperative research projects. On the basis of the project proposals, governmental bodies and private foundations were approached with a view toward obtaining the financial support necessary to carry out the proposed work. In this way, support for several projects was obtained from national authorities and from companies of the Royal Dutch Shell Group in the countries concerned.

As the 1971 evaluation conference had recommended, a meeting of persons from those institutions which had expressed a definite interest in participating was called in January 1973 to consider a definite program of work reflecting their several interests and to make proposals for its organization and financial support. This meeting was the first general conference of member institutions of the IMHE programme.

The Evolution of Research during the Second Phase

If the approach to research in the second phase is to be distinguished from that of the first phase, the current approach may be characterized as more problem oriented. Rather than seeking to investigate some dimension of university management, research in the current phase has been addressed to some specific management problem which universities are facing. How can research be better managed? How can the retention and completion rates of students be improved? How can institutional performance be measured and monitored? What are the costs of the different teaching and training activities in an institution? These and other specific problems have been tackled in very concrete ways in research projects designed to lead to practical results.

The larger number of institutions participating in the second phase made it possible to identify groups of institutions facing common, or similar, management problems. Researchers and administrators from several institutions could then be brought together to jointly design a research project. A total of 56 institutions participated in the 12 research groups constituted during the second phase.

This cooperative approach to problem-solving has several distinct advantages. Teams may design a common methodology for application in the different participating institutions, thus providing a test of its general applicability. A division of labor can also be agreed to by the group (e.g., one team sets up a classification, another defines data to be collected, a third studies the utility of different statistical procedures, a fourth designs a questionnaire, etc.) which can result in significant savings over an isolated, single-team approach. A pooling of intellectual resources and enlargement of the disciplines which can be brought to bear upon the problem is also a feature of this group approach.

There are, in fact, numerous advantages to this approach which have been demonstrated in practice. There is also an additional cost involved which arises from the need for coordination, but experience to date would seem to demonstrate that this cost is offset by the advantages, provided that the problem under study is of sufficient importance and general concern to merit a joint approach.

In several countries, the existence of IMHE research groups provided a basis for organizing informal steering groups comprising not only administrators and researchers in the individual institutions but also representatives of different national bodies with an interest in higher education. Since the viewpoints of individual institutions and national bodies often differ on higher education issues, a mixture of these viewpoints on a national steering group, especially one which is not formally constituted, provides an excellent opportunity for improved understanding. Although it is not possible to measure its exact value, this is certainly a by-product which can, in some instances at least, be looked upon as a positive contribution of the IMHE programme.

Although it is not the intent of this paper to describe the work of each of the 12 research groups, some examples of these projects will provide the reader with an indication of the types of institutional research undertaken. For example, a group of seven universities in France studies methods for calculating unit costs of activities and outputs. Until 1968, budgeting for all French universities was carried out centrally. More recently, however, reforms have been instituted which provided universities with more autonomy in deciding upon the internal allocation of the global amounts provided by the national authorities. For historical reasons, however, universities did not have at their disposal any adequate procedures for determining the unit costs of their different activities. Under this project, a common methodology was developed and tested for evaluating both the total and unit costs of teaching, research, and administrative activities within universities. In addition to testing its general applicability in France, universities in Belgium and Switzerland were included in the group for comparative purposes.

In Austria, a group of universities undertook a systematic statistical analysis of data on student success and failure during the students' academic careers. In this way, it was possible to determine the predictability of student success or failure on the basis of student performance in the earliest phases of their studies. The monitoring of such information provides a tool for improved student counselling.

In the United Kingdom, where there is a dual system of universities and polytechnics, these two types of institutions teamed together to carry out research on the identification and measurement of indices of performance for the teaching function in higher education. A framework for performance assessment, in terms of response to the learning opportunities, was provided, and resource utilization was developed and tested on data from Lancaster Polytechnic and Loughborough University for the academic year 1972–3. At a discipline level of aggregation, few significant differences in response were found, but quite different patterns of instruction, leading to very different unit costs, were identified.

In Japan, an investigation of patterns and practices of the decision-making process in institutional management involved the collection of detailed information and data from over 150 institutions on the evolution of their decision-making structures over the last 5 years. A questionnaire survey of the attitudes and opinions of more than 1,800 faculty members towards the decision-making process was also carried out. The study of decision-making structures showed that, following the campus unrest of the 1960s, many new committees were established, but, whereas participation was generally extended to junior faculty members in the process, little implementation of student participation in institutional management was noted. This was the case, despite the fact that the expansion of student participation had been strongly demanded either by students themselves or by many faculty reform committees established during the campus unrest. The survey of individual faculty members sought to reveal their attitudes on such matters as professional roles, the composition and conduct of faculty meetings, university governance, and reform.

During the first phase, the central staff itself carried out comparative research on the distribution of staff and space between and within the university-type institutions. This in-house research function was not continued in the second phase, however, in order that the central staff could develop new types of activities to be offered as services to the member institutions.

Services to Members

In preparing for the second phase, it was recognized that not all institutions would wish to be engaged in a cooperative research project. Many institutions surveyed had indicated that they were interested in joining the programme to take advantage of the opportunities it offered for an ongoing exchange of information in the field of institutional management.

A quarterly bulletin, *Phase 2*, was chosen as the means for keeping members informed about the different activities. The first issue, eight pages in length, was published in June 1972 and contained only information about the programme. During the following years, the bulletin was expanded considerably, both in length and coverage. By 1976, it had grown in length to 20 pages, and its coverage included invited contributions from individuals on subjects of professional interest, while it continued to report on the different activities of the program. Beginning in 1977, this bulletin will be replaced by a more substantial one, International Journal of Institutional Management in Higher Education. Addressed to managers and administrators of institutions of higher education, as well as researchers in institutional management, this journal will keep them informed of current international developments, trends, and related research.

There were a number of additional services organized under the program for assuring an ongoing exchange of information and personnel. In its Survey of Managerial Practices and Innovations, the central staff collected, organized, and disseminated to all its members, a large body of information on the state-of-the-art of institutional management.

The AIR-IMHE exchange program made possible the transatlantic exchange of 20 North American and 20 European specialists to attend meetings of the two organizations. Since most of the IMHE institutions are located in Europe, this exchange provided an opportunity for a cross-pollination of ideas between Europe and North America which was not otherwise possible, given the limited North American membership in the programme. Although it has been decided to

discontinue this exchange in its present form, AIR and the IMHE programme plan to continue a cooperative exchange activity. In its new form, the programme will offer AIR members assistance in scheduling professional visits to Europe, and AIR will reciprocate when the IMHE members visit North America.

The Special Topic Workshops are another form of exchange which brings together administrators and researchers who wish to exchange views and research findings on particular problems in their institutions; e.g. problems of managing a geographically dispersed institution; problems of managing medical schools, etc. The biannual general conferences are additional occasions for the representatives of the member institutions to acquire information and exchange views.

Professional Training Seminars

Early during the seond phase, it was felt that the IMHE programme could provide a valuable service to its members by organizing professional training seminars at the internationai level on topics of current interest. As a result, a seminar on program budgeting was organized on an experimental basis in October 1973. In view of the favorable response of participants, a proposal was submitted to the Ford Foundation for a grant of $100,000 which made it possible to hold four additional seminars during the period from 1974 to 1976. A total of 524 participants from 18 countries attended the five seminars.

The seminar series covered a variety of topics. Included were planning models, information systems, student counselling, and research management. A set of basic documentation was prepared especially for each seminar and, in some cases, this documentation was supplemented with other materials and published in book form. The programme will continue to organize professional training seminars, the 1977 seminar being devoted to facilities management.

The IMHE training activities included other experimental approaches. A training course organized jointly with the Anglian Regional Management Centre in Danbury, England, was a small group, residential course which was highly intensive in terms of lectures as well as discussions (formal and informal) between participants and teaching staff. Another feature of this course was its division into three, one-week blocks of instruction, spread out over a period of six months, which gave participants time to reflect upon what was taught in each block and to apply and test some of the concepts in their own environments.

Another experiment was the touring seminar which consisted of a team of experts in institutional management traveling to different countries. The seminars were attended by over 220 higher education administrators, planners, and researchers from 8 countries and proved to be an effective means of reaching more interested persons than would have been possible if they had been held in another country. This, in fact, was the original purpose for proposing the touring seminar. The homogeneity of the backgrounds and interests of participants also led to a faster and better focusing on issues for discussion.

Membership

Any public or private establishment or institution responsible for higher or postsecondary education and belonging to a member country of the OECD may become a program member. Additionally, public or private nonprofit-making organizations, whose main concern is higher education and its management, may be selectively invited to join.

Although membership is open to institutions in any of the OECD countries, participation to date has been primarily in Europe, where institutions can derive the full benefit of the various meetings organized at OECD Headquarters in Paris. The result has been that the large amount of original and informative material which has been produced under the auspices of the programme has not received wide circulation in the distant OECD countries (Australia, Canada, Japan, New Zealand, United States). Seeking to remedy this situation, the directing group responsible for the overall supervision of the IMHE programme has studied ways of making available to universities, and other institutions of higher education, all materials provided to full members for a substantially reduced fee. Additional information pertaining to full membership and subscriptions may be obtained by writing to the following address: Programme on Institutional Management in Higher Education, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

GETTING INFORMATION INTO COMMUNITY COLLEGE DECISIONS: STRATEGIES, IMPACT, AND IMPLICATIONS

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At the outset, it is essential that several points be made as context for this position paper. First, accountability in higher education is currently a fact of life and will assume ever-encompassing dimensions. I particularly like the following nontechnical definition of accountability, although the author is unknown: "Every person (or group) in an organization is answerable (responsible), to some degree, to another person (or position) for something (or objectives) expressed in terms of performance levels (results or achievements) to be realized within certain constraints." Given this *Zeitgeist*, it becomes very important that decision making become more reliant upon accurate, relevant, and timely information.

Second, community college planning, policy formation, governance procedures, and decision-making processes will be increasingly influenced in a more direct fashion by external individuals and agencies. Among other outcomes, administrative duties, including both line and staff responsibilities, will become more managerial in nature. Also, there will be (a) more reliance upon medium-range forecasting capabilities and (b) a need to balance resources against identified community needs/demands. Finally, it will become increasingly important to explicate institutional goals and objectives for external groups as a framework for future decisions and performance evaluation.

Third, the notion that two-year college research and planning resides in a single office or individual is a misconception. Although the office should serve as information clearinghouse, this paper holds that planning and decision making are ongoing processes carried out at many levels by all staff members. Further, as the individual most knowledgeable about data definitions, explicit and implicit assumptions, and institutional context, the institutional research person has a service obligation that extends beyond data manipulation to the translation of numbers into alternatives.

Fourth, although it is essential to keep source data documentable and apolitical, the information officer should also provide low-profile assistance to the college staff in developing systematic decision strategies and a mindset for conflict management. Of necessity, he or she will become increasingly drawn into the political arena. The position advocated here is that two-year college researchers can no longer say, "I just generate the numbers but I don't make any decisions." They must keep information free of bias yet contribute their professional judgment, appropriately couched, when solicited. This concept will be developed more completely, with applicable constraints, throughout the paper.

Fifth, even though the National Center for Higher Education Management Systems (NCHEMS) models are principally oriented to four-year colleges and universities, the information system has been designed, modified, and structured to be compatible with the unique nature of the two-year college. As such, it places heavy emphasis on instruction and continuing education in nontraditional modes.

Sixth, the system makes no pretext of being a panacea. It is a sophisticated series of tools to (a) address simultaneously the myriad factors influencing an event, (b) encourage an individual to make his or her assumptions and decision process explicit, (c) establish an historical data base upon which the college can rely, and (d) shift institutional change processes from happenstance to predictability. Unless a college employs these methodologies, it could destroy the very thing it is trying to save. These processes, however, must be ongoing and repetitive rather than unidirectional. Finally, this paper diverges somewhat in style from the traditional technical-conceptual format and includes human reactions encountered when an entire college confronts the reality of accountability to the public it serves. This is a dimension of empirical assessment that institutional researchers have treated lightly in their quest for quantification. They must be more sensitive to charges that "they know the cost of everything and the value of nothing."

The next section will highlight briefly a comprehensive two-year college information system (MIS) framework and modeling/simulation capability. It will include development of a common language and organization of an institutional research structure for maximum impact to the unique natures of the two-year institutions.

A third section addresses itself to various impact points during construction and resultant empirical information availability. These impacts include perceived changes in level and quality of decisions throughout the college: on the board, administration, faculty, staff, and students. The final section attempts to project a probable evolution of these impacts on several areas: goal/objective formation, negotiations/college governance, staff awareness, accreditation, college-community relations, state agency/legislature-college relations, intra-college interdependence, grant development, program evaluation, and planning/forecasting.

Information System Structure

Figure 1 depicts a two-year college information/resource analysis system. Establishing such a system and integrating its output into decisions is accomplished in four general phases. The first phase centers around ascertaining a college's current data structure. Specific tasks include identification and definition of relevant data elements, charting information flow throughout the institution, and delineation of college mission, goals, and objectives. Also, one must identify the college organization-governance structure (formal and informal) including authority, responsibility and domains, current decision rules and recurring cycles or practices, and others. A second phase primarily involves construction of a data base. The circle in Figure 1 represents a computer-based, interfaced set of 8 master files containing basic components of an institution's operational existence. Each file, students, curriculum, facilities, programs, finance, professional personnel, classified personnel, and equipment, contains both static data elements which are secure, except for established modification procedures, and variable elements which are altered as verifiable changes are necessary. There are extensive edit-error routines both within and between files to maintain their completeness and accuracy. Each separate

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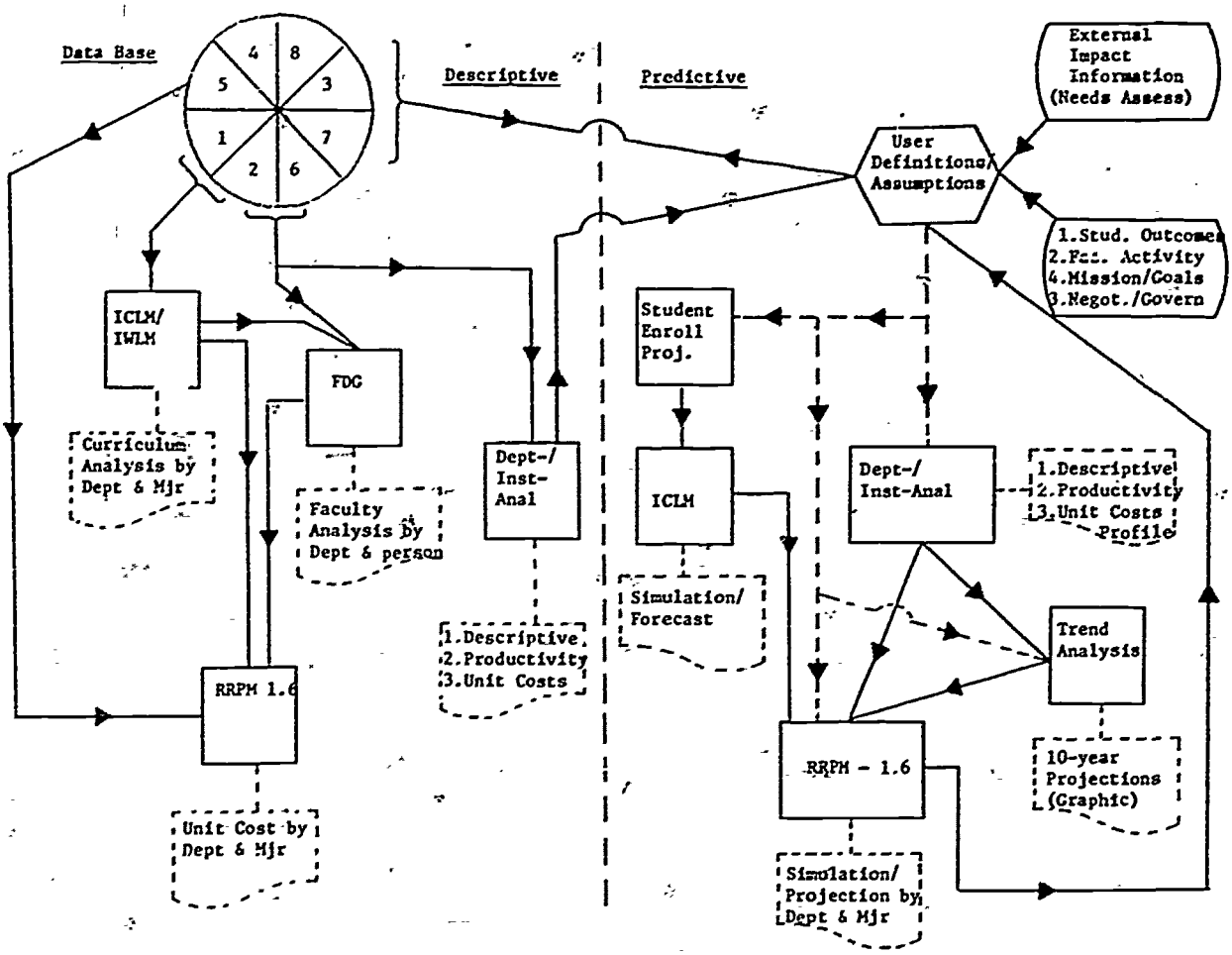

Figure 1. Yakima Valley College resource analysis system.

file produces a summary operational report while interlinked file outputs produce valuable management information.

Phase three (represented on the left side of Figure 1) involves operationalizing a descriptive information system. The resource analysis component programs are centered around NCHEMS and locally designed computer models. This information system is designed for administrative management, although the structure allows data base access for related research. Data from student and curriculum files provide input to produce and ICLM/IWLM by department and program. Faculty Data Generator identifies each staff member as a cost center as well as tabulating departmental work load. Finally, RRPM 1.6 produces a breakdown of direct and support costs by department and unit cost per program.

Besides the NCHEMS software, a local program profiles each department and instructor as in Figure 2. The department profile is divided into 7 sections: descriptive characteristics, student work load, full-time/part-time total faculty work load, additional resources, productivity indices, and unit cost indices. These values are compared to divisional and college-wide norms. Additionally, this program rank orders and graphs departments by any variable displayed. An instructor profile is essentially the same except for norms which include college average and full-time or part-time composite, depending upon instructor employment status. Finally, the program will also accept user-defined work load ranges, including expected value for both department and instructor patterns, as additional reference points.

Phase four contains the most sophisticated and difficult task series. Figure 1 shows a predictive/simulation capability utilizing descriptive software plus a locally created program that calculates appropriate regression equations from user-supplied input and graphically plots trend lines over a specified horizon. Major college reactions to outcomes of each phase will be subsequently highlighted.

Information System Impact

The MIS described above has taken approximately 2½ man-years to design and make operational. Impact on all segments of a college has been diverse, dramatic, and not entirely predictable. Possibly the best way to illustrate is by describing regnant system impact points and relating staff reactions as constraints and assumptions become germane.

A first significant impact occurs when the entire concept of a comprehensive, documentable information system is presented to top administrators and board for philosophical, financial, and staff endorsement. The information system operates on an implicit assumption that a college can be managed and that there is a greater probability of correct and prudent decisions when they are based upon complete information. An additional premise states that all information, and its derivation having a bearing, is open to all who are directly involved in the decision. A top-level commitment to institute and maintain this MIS usually produces ambivalent feelings within the board, president, and deans. In an era of faculty-administration confrontation, there are natural fears of exposing weakness and not understanding

Term:

(1) Total class sections . . .
(2) Total credit hours . . .
(3) Total student enrollment (HDCT) . . .
(4) Total student FTE (FTES) . . .
(5) Total student credit hours (SCH) . . .
(6) Total class contact hours (CCTH) . . .
(7) Total student contact hours (SCTH) . . .
(8) Average section size . . .
(9) Average class size (ACS) . . .
(10) Average student SCH load . . .
(11) Average student FTES load . . .
(12) Average student CCTH load . . .
(13) Average student SCTH load . . .
(14) Total full-time faculty headcount . . .
(15) Total F-T faculty FTE (FTEF) . . .
(16) Total F-T faculty direct instruct salary . . .
(17) Total F-T faculty fringe benefits (FRIN) . . .
(18) Average direct salary per FTEF (FSAL) . . .
(19) Total part-time faculty headcount . . .
(20) Total P-T faculty FTE (FTEF) . . .
(21) Total P-T faculty direct instruct salary . . .
(22) Total P-T faculty fringe benefits (PRIN) . . .
(23) Average direct salary per FTEF (FSAL) . . .
(24) Total instruction staff headcount . . .
(25) Total instruction staff FTE (FTEF) . . .
(26) Total instruction staff direct instruct salary . . .
(27) Total instruction staff fringe benefits . . .
(28) Average direct salary per FTEF (FSAL) . . .
(29) Direct support expenses (DSE) . . .
(30) Indirect/chargeback expenses (ICE) . . .
(31) Total department expenses . . .
(32) Average credit hours per FTEF ratio (PROD) . . .
(33) Average HDCT per FTEF ratio (PROD) . . .
(34) Average SCH per FTEF ratio (PROD) . . .
(35) Average FTES per FTEF ratio (PROD) . . .
(36) Average CCTH per FTEF ratio (PROD) . . .
(37) Average SCTH per FTEF ratio (PROD) . . .
(38) Relative faculty load (RFL) . . .
(39) Relative faculty effort (RFE) . . .
(40) Unit cost per student . . .
(41) Unit cost per credit hour . . .
(42) Unit cost per SCH . . .
(43) Unit cost per FTES . . .
(44) Unit cost per CCTH . . .
(45) Unit cost per SCTH . . .

Figure 2. Department analysis profile.

the system or comprehending implications of knowing what the college is like. Removed, also, is the security of arguing one's position from a unique frame of reference as parties are directed to prepare their respective cases from the same quantitative base. However, there is also a positive feeling which anticipates escaping continual, defensive reaction-to-crisis; rather, one can anticipate, identify, and resolve conflict from a secure information foundation.

A second impact occurs when one attempts to ascertain the current date structure of the college. To initiate the MIS, each college must identify its current organization/governance/management structure, its information needs and flow, goals and objectives, functional relationships and decision rules as reference points. In order for a system to be isomorphic with college structure, the sequence of activities in this construction phase is essential. Also, subsequent information system users must come to ordered and precise definitions of necessary data input/output variables. They must actively participate in the system design and implementation if it is to be effective. Typically, staff reactions are indifference or annoyance as they are asked to detail information needs and flow thoughout their domains, differentiate between their areas of responsibility and authority, define their essential data elements, become familiar with the concepts and lexicon of accountability, define how they make decisions or formulate policy, and relate effects of their actions upon other areas. When an attempt is made to develop common decision rules and data element definitions necessary to drive the model routines, one will hear such remarks as "Everybody should be accountable but me," and "You cannot quantify what I do, so I cannot be held accountable." Administrative exhortations about subsequent information utilization have little effect at this point. The staff does not accept a need to be held accountable, does not believe any system can handle complex interrelationships among units, and is generally suspicious of nefarious motives. There may also be negative reactions if staff erroneously perceives these tasks as a time and motion study which may disrupt established routines or eventually replace their jobs.

Formation of a planning advisory group to assist in system design and serve as a sounding board for tactics and strategies facilitates information system implementation. This group is composed of the formal and informal college leadership. Its members operate in an atmosphere of mutual trust, complete candor, and willingness to divorce themselves from parochial interests in order to address institution-wide perspectives. They have access to all information which does not violate individual rights. Written position papers are prepared for consideration by the president, deans, and staff. The information officer initially directs them as they become familiar with concepts but later becomes a technical consultant as they assume more responsibility and sophistication. This "Rand Corporation" approach provides a link between conceptualization and practical implementation. These individuals also serve as a buffer to assuage concerns that new ideas being proposed are not shallow, snap decisions.

A third impact occurs when descriptive summaries from the data base and resource allocation/expenditure models become available (see Figure 2). Each college group, (i.e., board, administration, division/departments, programs, instructors, classified staff, and students) peruses the information, and their responses cover a spectrum. Although all react with incredulity to the mind-boggling volume, comprehensiveness, and complexity of information suddenly available for analysis, there are discernable group differences. Board members are gratified that their capital investment has finally borne such bountiful fruit. There is also an initial tendency for them to desire more direct involvement in administrative decisions rather then to retain their proper role of policy formation. Assistance can be provided to help them understand how subsequent trend profiles will be of more value and teach them to ask the right questions in the right way. Top echelon administrators react favorably to the profiles and quickly incorporate output into their daily operations. After available documentation has confirmed some of their beliefs, it is easier for them to accept information at variance with preconceived notions.

Researchers must urge caution against a natural desire to institute sweeping changes based upon preliminary returns. System utilization must await the need to establish a sufficient data base, determine functional relationships over an appropriate time frame, and make certain that the model parameters have

been properly defined. If a discrepancy exists between college reality and model, it is the latter which must be altered.

At this time, faculty and instructional support areas are introduced to the output. Staff reaction varies, but there is generally a heightened anxiety level and an increase in overt expressions of hostility toward the information officer. Staff cannot identify with an impersonal computer routine or printout, and they cannot physically attack top administration, so they probably will vent frustration upon the system designer. This is a critical time for incorporating an MIS into college thinking. Many challenges to system design and operation provide an opportunity to explain constraints and shift vitriolic feelings into creative energy.

The first challenge, typically, is data falsification for certain groups. It is important to demonstrate that system output is neutral and operates only according to definitions and decision rules which were college created. Besides being able to document in-house source data reliability and validity, the staff should be encouraged to seek outside verification that decisions made about the college oy extemal agencies employ the same information. Also, model routines are logical, so the system assumes user-supplied input data and procedures for obtaining it are also logical, rational, accurate, and representative of institutional reality. This applies to output also.

Another challenge generally questions what is really being measured. The MIS is a process system, so staff and administration must be cautioned about seizing a unitary, simplistic efficiency index and then compounding the error by choosing a process rather than an output measure. However, the faculty allegation, that department/instructor profiles, productivity ratios, and unit cost values are not valid comparative indicators of contribution for resources expended, cannot be sustained. At the outset, such a system is designed around those elements lending themselves to quantification with full acknowledgement that, currently, there are no real definitions of outcomes to link with resource expenditures. Also, initial system structure emphasizes curriculum/program/instructor accountability although the design can accommodate support area inclusion. First use should examine relative relationships between departments or a single department across time rather than absolute values, and output must be viewed relative to a particular decision. The system is diagnostic rather than prescriptive, so administration and staff should be encouraged to develop profiles jointly over time before making far-reaching decisions.

A third accusation challenges the quest for uniformity and standardization which could destroy the very thing one is trying to understand. A corollary "1984—Big Brother" syndrome argues that computers will make ultimate decisions. One must be prepared to point out model/system constraints along with the analogy that one does not throw away a valid scale that is known to reliably weigh two pounds light; one merely adds two pounds. Some primary limits to highlight include the models' linear programming which makes them hypersensitive to enrollment fluctuations, their difficulty in handling inflation and marginal costs, the emphasis on expenditures with minimal attempts to tie them to revenues, and an illusion of decimal accuracy on output. Also, these models are designed for utilization as long-term indicators, not as budget models, although the staff tendency is to utilize them in the latter mode and attempt to discount the entire report when it does not show a budget penny match. Models do not indicate the efficacy of given alternatives, nor do they replace seasoned administrative judgment. Some information may be gleaned more efficiently in a manual fashion than by utilizing the models.

Finally, the sophistication and technical accuracy of system reports exceeds staff willingness to acknowledge that components of the educational process can be quantified. Likewise, their capability to comprehend the totality of factors inherent in any number generated through the computer routines develops slowly.

In response to Big Brother allegations, administrators must take a leadership role in demonstrating that their decisions include the information provided, including probable alternatives, but that they, not the computer, are still final arbitors, and responsibility rests with them. Once the staff accepts this fact and realizes that their solicited input, when empirically grounded, also has weight in the decision process, they begin to participate. With planning group assistance, all college segments receive in-house seminars on concepts and methods of simulation/forecasting utilizing the descriptive models in a predictive mode. They are encouraged to free their thoughts from traditional "it can't be done" and test new ideas.

A fourth impact occurs when initial forecasting attempts are made. First, the implicit expectation is that models somehow predict the future. Models do nothing more than employ user-defined decision rules to indicate the nature of the processes by which the future evolves out of the past and present. Second, models require that assumptions be explicated and queries properly framed prior to simulation. It is quite difficult for many staff members to confront the fact that their implicit assumptions and prescience are not always logical and rational, especially with colleagues. The information officer can assist individuals to organize their decision-making strategies and, thus, improve communication. Third, some users will carry out simulations ad infinitum in an attmept to avoid making a decision, while others will ignore the MIS potential and continue to rely on a binary decision-making device. Even though both techniques attempt to avoid setting priorities and defining most efficient use the system assumes that some optimum combination of resources does exist and has been defined by the users.

It is important that MIS staff have essential college management reports made routine in order to concentrate their talents as technical consultants, facilitators, catalysts, and service bureau. Additionally, an MIS office needs to coordinate college-wide information-seeking efforts to maintain or enhance an integrated program. This includes publication of an annual statistical compendium and graphic trend profiles. In summary, the information system must be acknowledged and utilized by the college as a Gestalt rather than merely a discrete computer data system.

Implications of the MIS

Although the time frame since implementation has been too brief to state documentable changes, some events have happened which could be directly attributable to the MIS. Also, logical extensions allow speculations about future uses of the system and new role dimensions for an information officer. Several distinct advantages have already emerged. They include: (a) a more complete and consistent reference frame for decision making and policy formation, (b) a greater staff awareness and acceptance of their interdependence, (c) a more complete understanding of resource utilization and contribution, (d) a facilitation of management/governance, (e) movement of college-wide planning from creeping incrementalism toward a recurrent cyclical process involving greater numbers and diversity, (f) a feeling by the staff majority that decisions are more equitable, democratic, and egalitarian in nature/scope, a greater flexibility in allocating scarce resources, more time before decision options need to be finalized, and a shift in decision making from crisis-reactive to anticipatory-planning. One can sense a greater level of confidence and firmness in the decisions being made. Concepts and vocabulary of accountability and husbanding scarce resources are now interwoven in staff conversations, and there is less fear of the "black box." The staff are beginning to express

less concern about being folded, spindled, and mutilated, and they are engaging in creative problem solving. They are moving toward self-study in all phases of the college operation within an institutional goals and objectives context.

With college decision making moving to a higher plane, certain ramifications will accompany it. It is inevitable that decisions ultimately resulting in program/staff reduction-in-force or termination will be made, and litigation will shortly follow. The information officer will be called upon to explain MIS structure and operation to a judge and jury, and the task will be formidable. Besides being in an adversarial situation, he or she will have to explain the complex intricacies of measurement, evaluation, simulation, modeling, decision-making processes, and accountability to a lay group in an extremely short time period with large dollar amounts at stake. The distinction between neutral, objective information and subjective structure which led to the outcome will be difficult for lay people to keep in perspective.

Another area where the MIS and information officer will enter the political arena is an interface between local planning and state system planning. Currently, most colleges find a disparity between their local management groupings and the way they are viewed by various state and federal agencies. Even with the advent of HEGIS (NCES) and PCS (NCHEMS) coding schemes, it is still essential for a college to take the initiative in defining itself before external parameters are imposed. In an era of projected student decline, fiscal constraints and retrenchment, when differences exist which affect resource allocation or expenditures, the MIS officer may be called upon to assist the president in negotiations with state and federal funding sources.

A perennial college problem is the large amount of staff time and effort expended to consistently respond to myriad state and federal requests for information "yesterday". Just when one fathoms the answers, the questions are changed. When a college cannot be sure whether reference points have changed or whether they merely represent the same points viewed differently, it is essential that the college decision makers have an internally consistent base for their own decisions. An MIS provides this, but the research office will have to establish congruence with external data bases containing the college data.

Besides responding promptly and accurately to information requests, a researcher can provide valuable assistance to the grant development office. In addition to rapid information access for meeting federal deadlines, this system allows for comprehensive follow-up/audit. It is also designed to drive off state agency input record formats. This allows the college and information officer to (a) make a direct impact on state long-range planning processes and (b) adapt the MIS to other community colleges with minimum modifications.

The adaptation capability produces another merging role for the information officer to serve. Forming regional inter-college consortia allows several colleges to pool resources, including the establishment of comparable units and definitions. Given the state of the art in this area, colleges need to maintain their definitional integrity as context while determining common definitions and standards. Just as words are merely sounds until they are given meaning by a user, so too is the comparability of units between colleges meaningless until definitions are negotiated. An MIS officer is in a position to strengthen relations between colleges utilizing information as a common bond.

The MIS officer will likely be drawn out of the ivory tower into college/staff negotiations. Besides putting common information on the table for both sides to use in constructing their respective positions, the system itself will become an integral element as position implications are simulated. At this point, the researcher faces a moral and ethical dilemma of extrapolating point-counterpoint yet remaining impartial to both sides. He or she may also be called directly into negotiations if the system structure and operation itself becomes an issue, i.e., establishing work load standards and procedures, policies and criteria for curriculum/instruction evaluation, dismissal criteria, governance structure, and others. Finally, the negotiated agreement must be examined in detail before ratification to assure that MIS freedom and flexibility has not been impaired by either party.

It is a fairly safe assumption that accreditation agencies will require more objective and empirical indicators of a college's efficiency and effectiveness in reaching their stated goals and objectives. The information office will play an increasing role in two ways: (a) the preparation of an annual statistical profile, trend analysis, simulation, and follow-up will provide extensive documentation for institutional self-study and (b) the system structure could become an integral component of accreditation requirements throughout the region.

Another area of significance is college-community relations. As consumerism and affirmative action become potent forces, students and college district taxpayers will demand empirical evidence of equal opportunity and return for their educational dollar investment. When it is necessary to present the college case to various special interest groups, occupational program advisory boards, or district patrons at levy time, a favorable vote is more likely if they receive valid information. The information officer can assist the staff in preparing such literature and may be called upon to address citizen groups. Another service the information office may be asked to provide is consultancy to district high schools, city governments, special interest groups, etc. As a clearinghouse for information, and backed with technical expertise, the research office is in a unique postion to influence community support for the college and its mission.

This paper has advocated that community college institutional research officers have a professional obligation to forestall standards erosion, while practicality demands that they go beyond system construction to get valid information into college decision-making processes. This includes assisting the staff to determine analytic/simulation capability and design implement change strategies, as well as ascertain the appropriateness of such changes. Finally, they will be called upon increasingly to translate these concepts to those external forces influencing the college. More and more their influence will extend into all facets of the institutional operation. Thus, researchers must be extremely sensitive to the potentially awesome power they could wield. While they should not take themselves too seriously, they must take what they are supposed to do quite seriously. If one is the primary designer/definer of such a comprehensive MIS, controls data input, and interpretation of output to individuals not schooled in its constraints, the possibility of creating an empire is present. Therefore, system development should proceed from directive to suggestive/supportive. When the MIS is operational, an information office will provide its greatest contribution by being merely a felt presence and a service bureau within its resource constraints.

INFORMATION REQUIREMENTS FOR STRATEGIC PLANNING

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Change is the sustenance of higher education. Beginning with the post-Sputnik era, we have witnessed unprecedented change and intense activity in our educational institutions and in the environments in which they operate. It is becoming more and more evident to educational planners that forecasting future trends by extrapolating from past occurences results in projections of limited utility over a short time period. Forecasting accurately the changes in postsecondary education cannot be done independently of the other social forces that impact on the human decision-making processes. These factors are too closely interrelated to permit one to be forecast apart from the others as is done in some of the normative forecasting models. We have found that we cannot plan/design the future of the university without considering how that future impacts and interrelates with other areas of the community and with the larger sectors of society as a whole. These sectors—business, community, government, industry, and public—act in concert with factors that are political, economic, cultural, and technological by nature. The alternatives available to the planner precipitate from the interaction of these factors in the various sectors of society. In some cases, these interactions greatly expand the number of available options; in other cases, they reduce the number. The objective of forecasting is to plan for change so that it is orderly, not chaotic and so that the institution is not caught off guard and unprepared for unexpected changes. If enrollments decline significantly, as they are almost certain to do at many institutions in the next decade, an orderly retrenchment must be planned and executed. Care must be taken, however, to insure that any planning for retrenchment does not sacrifice the effectiveness of the institution's programs which constitute its strengths and regress them to a level of mediocrity. Careful planning will obviate arbitrary and capricious decisions on the part of administrators and minimize the hardships created when the faculty and support staff must be reduced accordingly.

To plan successfully for future contingencies, accurate and pertinent information must be available to the planner along with an objective analysis of those data. Misinformation or misinterpretation of information could lead to academic and financial failure. A number of institutions of higher education have had to face such disaster. It has been suggested that the optimism of the decision makers at these institutions was encouraged by their lack of sufficient information and supporting data.

To promote orderly growth or retrenchment and to prevent future disasters in higher education, much more sophisticated approaches to planning must be implemented than have been used in the past. Forecasting provides the peephole through which possible futures can be glimpsed. Forecasting tells the planner where change may be needed—what to strive for and what to avoid. It tells him what is likely to happen in the future.

Forecasting is based on a set of meaningful assumptions, relevant data, and an understanding of the relationship between events and trends. The forecaster's role is twofold: first, to develop reliable forecasts, and second, to help bring about the desired change. The latter carries with it the responsibility for deciding what the desired change is and how it will impact on human or environmental considerations. This paper will focus on the kinds of information and the data bases needed to support strategic planning in institutions of higher education. Data bases, as used here, should not be thought of solely in terms of data stored in digital or other machine-readable form on discs, tapes, or in computer memory, but, in a larger sense, as data that have been purposefully collected, recorded, and organized in such a way that they will serve to help a decision maker in selecting from among alternatives.

The common denominator for all strategic planning in higher education is the revenue available to the institution. Strategic planning, by necessity, revolves around available revenue and projections of that revenue on into the future. Four major sources of financing higher education have been identified as (1) tuition, (2) state and federal subsidies, (3) private, federal, state, and local research funding, and (4) grants and endowments. The establishment and usefulness of data bases related to these sources will be explored in the remaining sections.

Enrollment Data Bases for Forecasting Tuition Income

For most colleges and universities, tuition is the largest single source of income. It is obtained either directly from the student or indirectly through state reimbursements. In either case, it is directly related to the institution's enrollment. Thus, enrollment is the first and most important factor that must be considered in the production of a planning model. To build a feasible model, good enrollment data are necessary. There exist, however, a number of participating forces both within and outside the parameters of the academic macroenvironment that influence enrollment. Figure 1 displays a number of these internal and external forces that can influence the enrollment stability of an institution. The factors shown on this chart are exemplar and are not intended to be an exhaustive list. Many other relevant factors could be added, or some of those shown might be eliminated, depending upon the time frame for which the planning is intended.

Before examining the factors that surround and influence the enrollment circle, a discussion of enrollment and the utility of an enrollment data base for planning is needed. Enrollment data, in essence, tell whom the institution has served in the past, whom it is serving at present, and whom it will serve in the future. Enrollment data thereby serve as the basis or beginning for the strategic planning process. The enrollment statistic is the barometer of the institution because from it the faculty size, financial needs, space requirements, and other requirements of the university can be estimated. It dictates immediate needs in relation to class size, faculty utilization, dormitory facilities, and auxiliary services. In addtion, management decisions as far distant as the next 10, 20 or 30 years must be based on enrollment projections.

Some of the variables an enrollment data base should

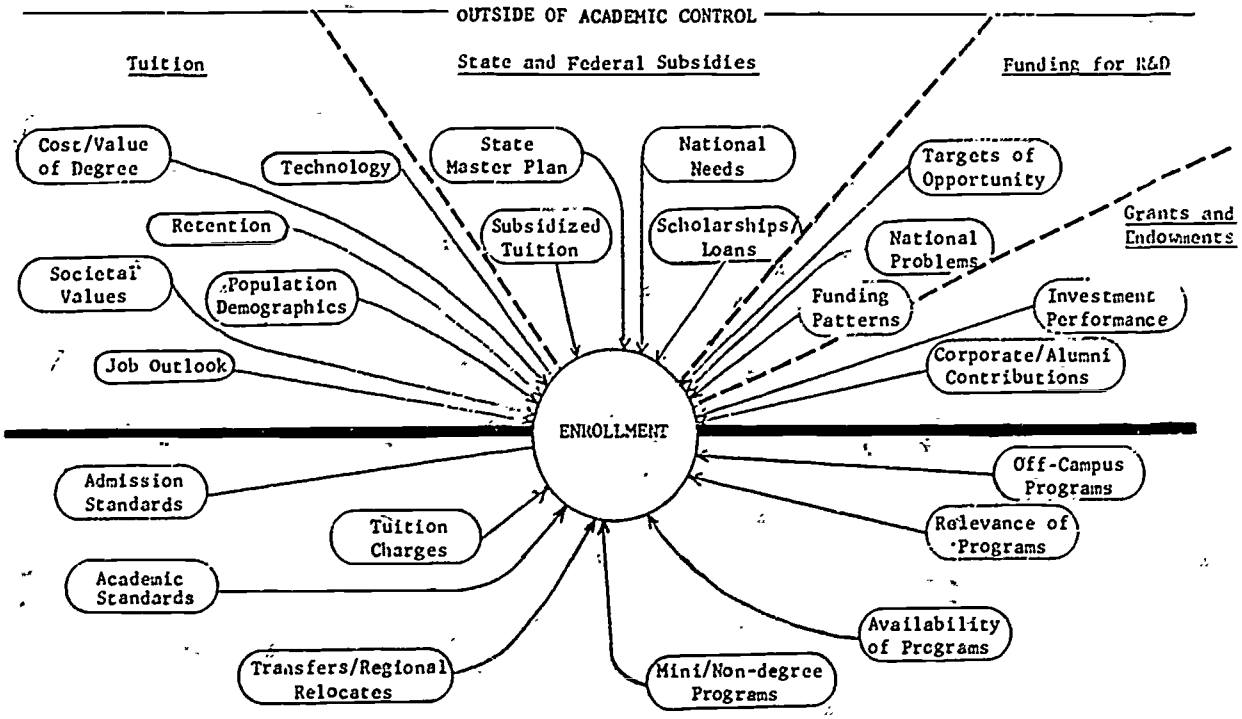

Figure 1. Forces within and outside of academic control influencing enrollment.

include are the number of students enrolled by county and state residence, school, department, undergraduate, and graduate status, full- or part-time status, sex, race, and class level. Both current and historical data should be collected. The usual point of reference is the fall term or semester; however, separate data for each term should be available. One function of term and yearly data collections is to derive attrition and retention statistics. If the data are in machine-readable form, a computing facility will be able to aggregate and cross tabulate the data and print out frequency distributions for all variables. If however, in the strategic planning process, innovations are introduced which will shape or change the current enrollment pattern, this information must be incorporated into new enrollment projections. For example, if an institution is alerted that its enrollment is declining, and a decision is made to introduce new programs not previously offered, valid long-range enrollment projections must be changed to reflect this decision.

A second important area which requires data base building is the retention and attrition rate of students. Information in this area is vital to building a Markov probability transition matrix which is a useful input to a planning model. It should be possible to answer such questions as the following: What percentage of an entering freshman class drops out each term? What percentage goes on to graduate? Which departments show an enrollment increase or decrease? If students leave the institution, it may be possible to determine whether the reasons were academic, personal, or financial, and if transferring to another college, whether it is because the current institution does not offer a program in their area of interest.

Another dimension of the enrollment model that needs to be considered in data base building is the policies of the local, state, and federal funding agencies. How much direct aid is available to students and the institution? What areas of vocational training or research are being funded or being phased out, and how long are the terms of commitment? If existing space cannot house long-range commited projects, strategic planners will have to decide whether to rent, buy, or build adequate facilities. They will need to know whether the situation is temporary or whether long-range expansion is justifiable. Data to support the decisions are essential.

Forces impacting enrollment that are outside of academic control. A number of forces which impact on strategic planning are outside of academic control. They are of an economic, technological, demographic, and cultural nature. These forces must be continuously monitored and both current and historical data collected.

Economic data bases. Economic forces include the job outlook and the growing concern about the value of a college education. Doubts about the usefulness of a college degree, especially in the liberal arts, in terms of getting a good job, sometimes outweigh the positive benefits that may accrue from a college degree. Such doubts have probably been a major factor in the decline in the proportion of high school graduates that go on to college. This proportion, according to the National Center for Educational Statistics, is 47 percent today, down from a peak of 55 percent in 1968. Monitoring this proportion is vital, not only nationally, but more importantly, in the geographic region from which the bulk of the institution's student body comes. Higher tuitions and the bleak outlook at the market place are blamed for this reduction. National employment needs and prospects must be examined for trends which will help identify academic programs that may suffer significant drops in enrollment because of a tight job market.

Education is the best example. The data were there in the late sixties, crystal clear, showing there would be fewer students at the elementary and secondary level to teach. Also, with unionization and higher salaries, there would be a slower rate of turn-over in personnel which would lead to a rapid saturation of the job market. Yet colleges and universities continued to produce teachers far in excess of demand long after the handwriting was on the wall. Other disciplines and professions need constant monitoring to keep them synchronized with the national employment needs and job outlook. The *Occupational Outlook Handbook* published by the Bureau of Labor Statistics may serve as the nucleus of data requirements for making decisions about future enrollment levels by discipline.

Data bases related to technological developments. Data base builders must be alert to new career horizons that are developing or will inevitably arise from new technology. It is now reported that over one-half of the nation's gross national product is generated from information-related goods and services (Porat, 1976). What new technology will emerge from this evolution and what forms of postsecondary education or training will be needed to prepare people for these occupations? Will higher education continue to move away from the liberal arts tradition to become more vocational in its orientation? If so, what are the consequences for educational planners? What are the cost/benefits of the altematives to a college education? What options are now open or will be opening up? What are the various payoffs? What value or worth is attached to each of them? If information related to these types of question is available from data bases, planners will be given a glimpse of the climate and potential future demands on the university and its educational delivery systems. It will help in discerning the most desirable future and the possible ways of achieving it.

Just as technological developments in industry proffer new products or new processes to increase income or to cut costs, so do they offer the same opportunity for education. A new breed of professionals will be required to utilize new technology, and there will be new opportunities for higher education to train them. Colleges and universities will be watching developments in computer-aided instruction, in cable television, and other forms of telecommunications as altemative methods of delivering education to the consumer. Universities must constantly be on the alert to new technology or methods that will increase their education-delivery capacity or reduce their costs. Information has to be assessed in regard to these questions: How will technology impact with education and with society? Will it change society's values? What causes values to change anyway? Information is needed about (a) how the media, with its programming, creates desires for the future; (b) how social dissatisfcation translates into pressure to change things; e.g., how a lack of stimulating, interesting jobs for college graduates translates into disinterest in a college education and a search, instead, for alternatives with better payoffs; (c) how the relationship between changes in technology and changes in life style leads to changes in what is valued; (d) how much a parents' glimpse of a better life for their children influences the decision of these children to attend college; (e) how our social institutions accomplish the change in values—through formal education in our schools, through informal education within the family and among peers. Sociologists suggest that a change in a society's value system begins with a small group and, with a snowballing effect, grows in acceptability until it is embraced by the majority. Insights into these factors are vital to strategic planning.

Demographic data bases. Population demographics can be a valuable source of information for strategic planning. Centers have been established in various parts of the country primarily to study the socioeconomic and demographic variables that impact on a community and its educational systems. The University of Pittsburgh's Center for Urban Research is an example of such a center. Demographic data will tell the planner the expected size of the pool of prospective freshmen enrollees. Once again, national data are not as important as data from the geographic region from which the bulk of the students come. As a case in point, the Western Pennsylvania region supplies over 90 percent of the undergraduate student body attending the University of Pittsburgh. Even more important than the number of youngsters living at each age level in this region is a data bank which includes their post-high school intentions. Are they planning on postsecondary education? At what level—2 year, 4 year, graduate, first professional? Have they selected a college or university? What are their career interests? An updated file, with data collected in the junior year of high school, would provide a basis for profiling the potential pool of future applicants and gearing university planning to their career interests.

There are other demographic concerns. Beginning about 1980, students, in the traditional sense, are just not going to be available in the same numbers as they have been in the past. The National Center for Education Statistics reports that approximately 49 million students are currently enrolled in our elementary and secondary schools. By 1980 that number will drop to under 45 million. It has been dropping steadily for the past six years, beginning with the elementary grades. The decline will spread with ripple-like effects through the secondary levels until it reaches the nation's colleges about 1980. The enrollment growth at many colleges and universities has already leveled off during the past three years. Many institutions not already employing open admissions policies have been able to maintain enrollment levels by lowering admission standards; i.e., moving toward open admissions. Most institutions will survive the economic crunch that will accompany declining enrollments. Some will not. It is expected that many of those which do not survive will find their students redistributing themselves at those institutions which do. Thus, the latter will be able to maintain their enrollment at levels which will allow them to continue to survive.

There is no end in sight to the declining student population problem. The declining birth rate, which accounts for the smaller enrollments, has not leveled off yet, according to the National Center for Health Statistics. It has declined steadily from a peak of 3.76 children per woman in 1957 to a record low of 1.75 for the year 1976.

Declining enrollments are going to force colleges and universities to diversify their offerings in order to attract new clientele. Students, other than those which fit the traditional mold, will be actively sought in all walks of life and at all age levels. Adults in continuing education and skills-updating programs will be heavily recruited as the population grows older and the median age of the population steadily increases. Demographic information related to this age group and its anticipated needs has to be collected so that the transition to more and more adult education programs will be smooth and productive.

Data bases related to cultural factors. Cultural developments are going to impact with greater and greater severity on the demand for the university's product, an education. Enrollments in higher education have begun to shrink and will continue to shrink due, mainly, to a leveling off of the number of high school graduates going on to college and a projected continuation of the declining number of students graduating or due to graduate in the next 18 years. Other cultural developments are also fueling the decline in enrollments. In the late sixties, there began to emerge a new value system among a small but vociferous group of our nation's youth which saw

little relevance in a college education to the conduct of their lives. Jobs were, and still are, hard to find, even with a college degree. A college education no longer automatically opens doors to an interesting, stimulating, high-paying job. Union membership can also guarantee high pay with job security without an initial heavy investment of time and money. The steady rise in tuition costs has placed severe constraints on the ability of the middle-class families to educate their sons and daughters; they are being priced out of the market. It is increasingly more difficult for middle-class families to qualify for student financial aid. Whether this anti-college sentiment and financial burden will continue to grow or begin to diminish will have a tremendous impact on the future demand for a college education. Changing cultural developments reflected in the values and life styles of our young people must be monitored and incorporated into strategic planning models.

Factors within the university's control. Up to this point, factors usually *beyond* the control of the academic institution have been discussed. The next section will explore the areas normally within the control of the institution. Many of these are closely associated with the capability of the university and the cost-benefit of its educational delivery programs: Capability is measured in terms of faculty, support staff, and educational research environments. Such things as tenure, salaries, teaching loads, unionization, retirement, as well as age of buildings and lab equipment, must all be taken into account in planning the future. For example, programs offered by the institution can be made available at other sites or discontinued entirely. If a program is to be instituted, the time frame within which it is to be introduced needs to be known by the strategic planners. Other factors that will have to be considered, and for which data must be available, are: the number of faculty that have to be hired, the student body size expected eventually to be served, cost estimates, and space requirements. On the other hand, if programs or departments are being phased out, the impact that will have on long-range plans needs to be assessed. The same type of care in addressing enrollment changes and facility requirements would apply to part-time, mini, and non-degree programs.

The next factor under academic control is the institution's admissions policy. Available data bases should be able to answer questions like the following: Has the pool of potentially qualified candidates been exhausted? Would changing the criteria for admission increase or decrease the pool of potential students? How far can admissions standards be lowered without sacrificing academic standards? To what extent are qualified students, including minorities, being recruited?

Another major factor which is within the control of the academic institution is tuition charges. Sufficient data should be collected to determine the impact that tuition increases and decreases have on enrollment. The data can be plugged into simulation models to estimate the revenue that will be gained or lost by changes in tuition rates. To what extent does a tuition increase change the composition of the student body? Are the changes desirable?

Yet another important aspect to be considered in data base building for strategic planners is the relevance of academic programs with respect to the needs of the academic community. Are the courses and programs students want being offered? One way of answering this question is through the distribution of questionnaires. Surveys are not only convenient for assessing the current climate but they are useful in directing long-range planners. Input from students can be helpful, also, in dispelling the notion that administrators make decisions while sitting in their ivory towers not knowing what students really want or need. Questionnaires distributed to high school students enable data bases to be built around the educational and career interests of those who will be served in the future. The ability to serve their interests can be assessed and future alterations can be taken into account during the planning process. Participation of the adult community through questionnaires can lead to better planned future programs for those institutions that offer adult education.

Data Bases Helpful in Assessing State Subsidies

Information about educational planning at the state level also plays a key role in strategic planning. The university's educational mission relative to the other educational institutions in the state or region needs to be put into perspective. The state's master plan for higher education, if such a document exists, may be useful for this purpose. What changes are evolving in the state's master plan? Are the undergraduate programs at the universities to be phased out and graduate and professional training to become their *raison d'être*? Will the state at some time in the future decide its employment needs and set educational quotas accordingly? Will the state go even further and decide which of its citizens should receive post-secondary education? To what extent? At taxpayers expense? If so, through direct aid to the students themselves, whereby they select the institution they wish to attend, or directly to the institutions so that they would select the students to receive financial aid? Different planning requirements would accompany either of these alternatives.

Data Bases to Monitor Federal Support of Research and Development

Government impact, at both the state and federal level, is hard to assess and monitor. Probably none of the large universities could operate at the level it currently does without federal and state support. Almost overnight, some of these universities with large research centers have come face to face with a major budget crisis because of a substantial reduction of federal money for support of research and the training of graduate students. Other national philantrophic foundations are uneasy about the new laws that have been passed or proposed that would have a direct bearing on their tax exempt status. Other pressing national problems of an energy, environmental, health, and welfare nature are in need of huge federal appropriations to support them, a fact which may cut into the money available for general support of higher education. There is a need to have available, and to incorporate into strategic planning, information from analyzed data bases which relate to federal support of research and development. Information as to the trends, based on past funding patterns, that are useful in projecting future levels of funding to colleges and universities must be collected, organized, and implemented into planning models.

To monitor federal R&D activities, the National Science Foundation (NSF), conducts a program of intramural and sponsored surveys of R&D spending during each ensuing fiscal year. This has resulted in an extensive collection of data and detailed analyses of programs related to the nation's science and technology resources. These statistical data (National Science Foundation, 1976) have become a useful tool in projecting future trends in federal R&D spending and, in turn, in formulating the university's planning and budget proposals.

Any number of unforseen factors can significantly affect the level of federal R&D funding. No one, for example, can predict which national issue on the horizon (or beyond) will stimulate sufficient public interest or debate to be transformed into legislation and massive R&D funding (as was the case with the Energy Research and Development Administration); or an impending international crisis which may alter the national R&D funding pattern. Such unpredictable factors are beyond

the scope of the data collected by NSF. The data can be related, however, to other economic variables to show their relationship to the level of R&D funding and to help identify the factors responsible for these relationships. Given such relationships, the next step is to assess the extent to which these same factors might impact on future funding.

Federal funding for R&D is an important source of income at the University of Pittsburgh as it is at other colleges and universities across the nation. It contributes approximately one-fifth of the annual budget and is subject to all the vagaries that accompany the distribution of federal dollars for R&D programs at educational institutions. These monies are not distributed equitably or proportionately, or according to a plan, but competitively through a system whereby proposals for R&D are evaluated and referred, with winner taking all. There is no ceiling on the amount any one college or university may be awarded in a given fiscal year. Since the system tends to reward those who have successfully completed their previous contract(s) and who have the personnel and physical resources to accomplish what they propose to do, it is easy to understand why some universities come away with the lion's share of the R&D funds earmarked for colleges and universities. While it is possible to increase the university's share of these monies, it must be recognized that competition in the future will be intense as enrollments shrink and institutions of higher education try to make up for the accompanying dollar loss by increasing their share of federal R&D funds. Increasing that share cannot be approached helter-skelter. To be competitive, the university must submit proposals that are in areas the federal agencies have earmarked for research and development. But there is more to it than that. To be competitive requires a great deal of careful planning, an assessment of the university's strengths and weaknesses, and a deliberate exploitation of opportunities. A key to this process would be an assessment of the direction of future funding for R&D at the federal level as it relates to a given college or university. What are the best bets for future R&D? What data bases need to be organized and tapped to support long-range planning in this area? What mini-studies, if any, need to be conducted to support this strategic planning activity? And what changes should be made with respect to programs, faculty, students, and research in order to be able to positively exploit the opportunities that will arise in the future?

Data Bases Related to Grants and Endowments

The last of the four major sources of financing for higher education is grants and endowments. The educational planner needs to incorporate into the strategic planning models data on current income from these sources, as well as projections of future income. To what extent is the university relying on these sources? Is the level of dependency increasing or decreasing? Data on the performance level of the investments is needed to insure that a maximum return is generated. These data, in turn, can be given to a professional financial analyst for appraisal and recommendations.

Utilization of data bases for statistical analysis. Many statistical approaches and a number of simulation models are available for manipulating data for strategic planning purposes. There is no absolute right or wrong method, but some methodologies are better suited than others. The criterion for choosing the best methodology is the purpose for which the results are intended or the questions to be answered. Futuristic trends and educational predictions are the main concern of strategic planners.

Summary

Forecasting is beginning to develop as a science. With the current state of technological development in data bases and information systems, the need to anticipate the future and plan accordingly for it is becoming a reality in higher education. Data bases to support demographic forecasting are in the highest level of development, followed by economic data bases. Data bases are becoming available to help assess the developing technology and the new career horizons that will spin off from it. There are data bases being built in the area of federal funding for R&D and for federal support to universities and colleges. State master plans for higher education are helpful, when available. Data bases to support cultural forecasting, however, are primitive, neglected, and most in need of development.

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ALLOCATION OF STATE FUNDS ON A PERFORMANCE CRITERION: ACTING ON THE POSSIBLE WHILE AWAITING PERFECTION

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Formula Funding: An Overview

In the United States, funds for public higher education are generally requested and allocated on the basis of an enrollment model or formula. Linking funds directly to the number of students served, given their level and field of study, has become educationally and politically acceptable.

Allocation formulae in most states represent an improvement upon earlier allocation models that relied primarily on an analysis of per-student appropriations. These earlier allocation models were themselves an improvement over the preceding allocation method based on presidential lobbying for funds.

Objectivity, equity, and simplicity are strengths that those favoring formula funding attribute to this approach. Formula funding has helped minimize political warfare and open competition among institutions for scarce funds. An appropriations formula provides state officials with a simple and understandable basis for deciding upon institutional requests for appropriations. Equivalent support for equivalent programs is widely understood as the rationale for a formula approach to funding. Most formulae recognize the number of students enrolled and the mix of educational programs by type and level.

Soon after funding formulae were implemented, however, criticisms began to surface. Prominent criticisms include charges about appropriations formulae:

1. They are inclined to impose a leveling effect upon the quality of educational programs. The use of average costs for formula instructional rates tends to homogenize institutional diversity. The costs of an exceptional academic offering are averaged out by the costs of typical offerings of the same course by other state institutions. Programs funded to be identical are continually reinforced to be identical regardless of the clientele served or the special character of the institution.
2. They provide no incentive for improved instructional performance. Instructional rates are the same regardless of the effectiveness or ineffectiveness of instructional performance. The emphasis is on quantity rather than quality.
3. They encourage a displacement of institutional goals. The goal of serving students is displaced by the goal of obtaining more students. Formulae tend to become ends in themselves.
4. They tend to utilize a linear approach which fails to recognize both economies of scale and plateaus of fixed or marginal costs. As a result, formulae are great during periods of enrollment growth since unit costs decline while revenues increase.

Coupled with these criticisms is the possibility that formula funding is ceasing to be an acceptable public policy. Hopefully, acceptable public policies express societal values. From the late fifties until the early seventies, higher education was growing, and society wanted to encourage this growth. As an acceptable public policy, formula funding reflected society's willingness to support higher education's growth. Today, however, the public no longer sees the growth of higher education as a virtue in itself. As a result, a policy of funding public higher education solely on an enrollment basis may be viewed as out of harmony with the wishes of society.

Performance Funding

Like many other states, Tennessee employs an appropriations formula for public higher education that derives major cost projections from a credit hour matrix by level and field of study. Formula guidelines are also provided for general administration, maintenance, and operation of physical plant, student services, and libraries.

The Performance Funding Project is an attempt on the part of the Tennessee Higher Education Commission, a statewide coordinating agency, to improve the current appropriations formula in Tennessee. Underwritten by grants from the Fund for the Improvement of Postsecondary Education, the Kellogg Foundation, and the Ford Foundation, the project represents a response to criticisms of the current formula and an opportunity for higher education to demonstrate publicly the effectiveness of instructional performance.

The major purpose of the project is to explore the feasibility of allocating some portion of state funds on a performance criterion, as compared to allocating funds solely on an enrollment criterion. The project assumes funding will continue to be primarily on an enrollment basis but that a complementary feature might be built into the formula to promote institutional diversity and improved instructional performance.

Any alteration in funding policy must meet certain boundary conditions. Changes to the current allocation formula designed to promote effective performance must accomplish the following:

1. They must be politically acceptable (i.e., easily understood and accepted by legislators and members of state government).
2. They must be professionally acceptable (i.e., striking the right balance between the need for institutional autonomy and the need for state-level review).
3. They must encourage institutions to exercise initiative in developing performance measures on which they might eventually be funded.
4. They must recognize differences in institutional role and environment and promote diversity.

The Performance Funding Project is completing its third year. The first two years were spent involving national and state-level higher education authorities in clarifying the conceptual base of the project, identifying related efforts underway around the country, outlining procedures for executing the project, and obtaining the necessary support for pilot projects.

The third year has been devoted to pilot project activity. We decided early in the project to involve as many campus individuals as possible in thinking about altering funding policy to include performance as well as enrollment criteria. One reason for this decision was a belief that those individuals potentially affected by such a policy ought to have an opportu-

nity to help shape that policy. A second reason was the belief that having as many individuals as possible working on such a complex policy issue would be advantageous.

In the spring of 1976, Tennessee public colleges and universities were invited to submit preliminary proposals for pilot projects that would ultimately result in a model for allocating some portion of state funds to their institutions on the basis of performance. As a result of these proposals, eleven public colleges and universities—two research universities, six regional universities, and three community colleges—were selected to develop pilot projects. Pilot projects extend over two years—calling in the first year for the development of institution-wide instructional goals and associated indicators of performance and in the second year for the acquisition of data on these performance indicators and the exploration of funding policies that might promote and reward effective performance.

Pilot projects vary in their approach, emphasis, level of sophistication and background of project director, but they share a common set of expected outcomes. At the end of this first project year, each participating institution has been contracted with to produce (a) a set of institution-wide instructional goals, (b) a set of corresponding performance indicators, and (c) a report on how those goals and indicators were achieved. Some projects are using the *Institutional Goals Inventory* to reach consensus on institution-wide instructional goals. Others are employing elaborate committee structures to arrive at instructional goal statements. Still others are using existing institutional goal statements as a vehicle for reaching consensus. The primary basis of some projects is in the faculties of the arts and sciences. Other projects primarily reside in professional schools. Two pilot projects represent attempts by professional schools to develop performance funding models that could be replicated throughout their respective institutions.

Pilot project directors share a common set of expectations, and they join the project staff in sharing a common set of challenges. Any effort that explores the possibility of linking two difficult problems—funding policy for public higher education and assessment of instructional performance—demands great care and humility. The project rests on a number of debatable assumptions:

1. A complement to the current allocation formula could result in improved instructional performance (i.e., that the behavior of a public sector agency can be affected by economic reinforcement).
2. Instructional effectiveness can be measured in terms of student outcomes.
3. Some instructional outcomes can be quantitatively described.
4. Acceptable measures of institution-wide instructional performance can be developed or identified and agreed upon by both institutions and a state-level agency.
5. In a society with diffused aims, an institution can reach consensus on its fundamental purposes and make them explicit.
6. Institutions fare better when their purposes are explicit.
7. Rewarding a public sector agency for effective performance would be acceptable public policy.
8. Performance funding should reward achievement rather than process.
9. Performance funding should be for demonstrated performance, not proposed or promised performance.
10. Current allocation formulae impede institutional diversity.

After some time, debating these assumptions became counterproductive. The formula was not being improved, and legislators were continuing to ask hard, unanswered questions about the effectiveness of higher education. Progress in improving the formula or assessing the performance of higher education seemed unlikely to emerge from a rehearsal of the difficulties associated with such efforts. As a result, we proceeded with pilot project activity, assuming it was better to act on a set of imperfect assumptions than to wait until there was agreement upon a perfect set of assumptions.

Lessons Learned

During the first year of pilot project activity, a number of lessons were learned while exploring the feasibility of funding institutions on the basis of performance.

Lesson 1. Performance funding is a difficult concept to communicate. It has been misinterpreted in a variety of ways (e.g., funding of innovative approaches to instruction, funding for special institutional activities).

Lesson 2. The possibility of statewide indicators of institutional performance is an anathema to campus personnel. Early in the project there was discussion of the possibility of developing a set of statewide indicators against which all institutions could be assessed. One campus administrator pointed out, though, that statewide indicators of performance would "average out" institutional identity, just as the current formula supposedly does, since every institution would be assessed by a common standard.

Lesson 3. While campuses are reluctant to consider statewide performance indicators, they remain almost equally suspicious of campus-based indicators. This suspicion grows partly out of a concern that campus-developed indicators will not be equally rigorous. One faculty committee working on the Performance Funding Project asked why it should develop rigorous instructional goals when another institution might select a straw-man approach to goal setting and be rewarded more for less achievement. Suspicion also grows out of a concern that one department or college be singled out as solely responsible for certain instructional goals or outcomes (e.g., English department for communication competencies, philosophy department for critical thinking competencies).

Lesson 4. Faculty and administrators are concerned about the unintended outcomes of a funding policy that would include performance criteria. The possibility of punitive funding (i.e., because of poor performance, receiving less than one would on an enrollment basis) is a concern that continues to be expressed.

Lesson 5. Getting faculty to think in terms of institution-wide goals and indicators is difficult. Individuals speak with ease about departmental goals and indicators, but arriving at goals and indicators that cut across departmental lines is another matter.

Lesson 6. Our desire for institution-wide instructional performance measures currently exceeds the technical capability of the assessment community. However, several developmental efforts by the American College Testing Program and the Educational Testing Service look promising.

Promising Findings

Coupled with some difficult and sometimes painful lessons learned during the past year have been some promising and encouraging findings.

1. A great deal can be accomplished for relatively few dollars. For less than one hundred and fifty thousand dollars, eleven institutions have undertaken a serious look at their instructional goals and effects on students.

2. Faculties across Tennessee are very concerned about instructional performance. They sense that funding solely in terms of number of students served has caused people to prostitute academic standards.

3. Addressing the question of what constitutes effective instructional performance has led to a serious consideration of what constitutes minimum competence for a college degree. This became the focal point of a statewide forum, sponsored by the Ford Foundation, on minimal, essential skills and understandings that all college students ought to possess. At two institutions the development of instructional goals and associated indicators is centering on assuring certain minimal instructional outcomes.

4. While some common goals and indicators are emerging from pilot project activity, sets of goals and indicators seem to be taking on a unique character at each institution.

5. The Performance Funding Project is causing hundreds of faculty members and administrators to take a serious look at the effect they are having on students.

6. A number of solutions have been found to questions that plagued the project in its initial stages. For instanc how can you have equal rigor in the assessment of achievement of goals when goals and performance indicators differ from campus to campus? One possibility would be to have a board of visitors provide an assessment of each institution's performance against its set of individually developed instructional goals. The assessment could, in turn, be translated into a factor to be used in allocating some small portion of the state allocation.[1]

Hopes for Next Year

Completing the first year of pilot project activity means each participating institution will have a set of instructional goals and a means of assessing performance on those goals. The second year, which involves gathering performance data and suggesting a means for incorporating performance measures into the current formula, presents an even greater challenge. We remain undaunted, however, in our optimism about what the project may achieve.

Questions continue to haunt us. Pointing out problems is far easier than finding solutions. We continue, though, on the conviction that, at worst, we have brought people together across Tennessee to grapple with the issue of instructional effectiveness, and, at best, we may have come across a policy for funding a public sector agency on some basis other than an analysis of activity.

Footnotes

[1]A number of hypothetical possibilities for funding on a performance basis are outlined in *Case Studies in Performance Funding*, available upon request from the Tennessee Higher Education Commission.

CALCULATING THE ECONOMIC MULTIPLIER FOR LOCAL UNIVERSITY SPENDING

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Economic impact studies have become a popular vehicle to promote the positive attributes of nonprofit institutions for the local area. Over the past few years, institutional researchers have prepared a series of such studies calling attention to the extra dividend of jobs and income that a university provides its local community incidental to its primary educational and cultural contribution.

Successive studies resolved numerous conceptual problems dealing with the ways university spending initially enters the local income stream. However, estimations of university-related direct spending do not complete the picture of the influence on local economic activity. Because of the interdependence of a high consumption, mass-production economy, every dollar of final goods purchased provides a flow of income to the entire chain of activity that provides these goods. Since direct purchases induce additional rounds of spending, the university's total economic impact is some multiple of university-related initial spending.

Institutional researchers have usually presented this conceptual basis of the community multiplier, but they have rarely presented an actual calculation of the multiplier value subsequently used. Instead, the value is usually taken from some more general study of trade areas of similar size. This lack of precision in estimating the multiplier value often compromises the considerable effort expended to measure accurately the amount of direct university-related spending.

The present study is a model for institutional researchers that illustrates specific means not only to conduct sample surveys of faculty and student spending but, also, to calculate a multiplier value of induced spending for the specific community where the university is located.

The model uses local value-added figures calculated from spending survey results and from readily available county census data. Formulas are translated into a stepwise calculation procedure that enables the researcher to arrive at a reliable economic impact estimate without spending many weeks reviewing the regional science literature. The multiplier calculation avoids both the massive data requirements of input-output models and the oversimplified structure of aggregate location quotient models.

As a working example, the study estimates the spending impact of a large public urban university on its metropolitan area.

Previous Impact Studies

Economic impact studies of colleges and universities first appeared in the mid-1960s. Table 1 summarizes the contributions of thirteen representative studies published from 1964 to 1976.

From the initial study forward, all have regarded the university as an export sector of the local economy. This is because most of a university's income and most of its students' income originates outside the community. To the extent that these funds from nonlocal sources are spent locally, the university provides community income very much like a local factory exporting manufactured goods to other areas. The university sells educational and research services to outsiders, although consumption takes place locally. Thus the university exports educational services in the same sense as a Florida resort exports services to winter vistors.

All of the studies estimate the demand for goods and services in the community resulting directly from expenditures by the university and its faculty and students. The Husson College Study (Vizard, 1967), though, was the first to use economic analysis to measure the secondary spending induced by the university's initial direct spending. The concept introduced was economic base theory and the local multiplier.

The underlying idea of economic base theory is regional specialization. The division of labor, and a corresponding degree of specialization, is a prominent characteristic of advanced economies. Great increases in productivity result when participants in the economy concentrate their productive energies in specialized activities where they have natural or trained abilities.

Similarly, geographic areas often contribute to increased productivity through specialization. The specialization may result from some indigenous talent of the local population or from a local endowment of natural resources such as soil or minerals. Specialization may also be the result of a location that has particular relevance to a market area or that serves as a transportation center or transfer point, say from water to rail or other land transportation.

An area's economic base consists of these specialized activities that produce for a demand that exceeds local consumption, that is, activities that involve sales to firms located elsewhere (North, 1955; Tiebout, 1962). Such activities produce an inflow of money income from nonlocal sources. A portion of the nonlocal income then makes its way as wages and purchases into local trade and service activity.

The University of Florida study (Cook, 1970) pointed out that an initial difficulty with the export-base concept lies in properly classifying basic (export) and service industries. The study examined the argument that the number of university employees attributed to the base sector should be limited to the ratio of funds from nonlocal sources to total university funds. For instance, if only eighty percent of the university's funds come from nonlocal sources, only eighty percent of the university's employment should be considered basic. Conversely, the study pointed out, if local expenditures for education would be spent elsewhere in the absence of the university, then local educational services represent a decrease in the community's imports (import substitution). Thus, all local university spending and employment may be classified as basic.

The Idaho State University study (Kelly & Peterson, 1971) raised the question of correct sample design for the surveys needed to estimate the funds students and faculty spend locally. Whereas their study estimated the level of student spending by surveying class sections selected randomly, previous studies had drawn a random sample of individual students. Wilson and Raymond (1973) suggests that a proportional, stratified sample produces a less biased estimate of the population's spending than other methods. Table 2 illustrates this method used to estimate local faculty/staff spending from survey results.[1] The

Table 1

Summary Characteristics of Previous Impact Studies

Institution and year	Major contribution	Major shortcoming	Use of a multiplier
University of Bridgeport (1964)	Recognizes the "export" nature of college services	Considers only direct expenditures of university	No
Northern Michigan (1965)	Disaggregates university spending by types of goods	Considers only direct expenditures of university	No
Husson College (1967)	Makes first use of multiplier to estimate induced spending	Derivation of multiplier is not specific	Yes (2.0)
University of Colorado (1968)	Considers input/output analysis but rejects it as too costly	Ignores induced effects of student spending	Yes (1.37)
University of Connecticut (1969)	Recognizes cyclical stability of university employment	Includes no report of survey results	No
University of Florida (1970)	Justifies all university employment as basic	Basic employee equivalents of student spending are biased upward	Yes (1.4)
Wisconsin State University (1970)	Estimates future impact based on enrollment projections	Derivation of multiplier is not specific	Yes (2.0–2.3)
University of Alabama (1971)	Illustrates upward bias of aggregate employment multipliers	Produces unusually high multiplier resulting from aggregate approach	Yes (4.35)
Idaho State University (1971)	Makes first attempt to disaggregate student spending	Sample design leads to considerable bias	No
Eastern Kentucky University (1971)	Makes first use of student spending diaries	Derivation of multiplier is not specific	Yes (1.75)
University of Pittsburgh (1972)	Uses comprehensive data collection	There is no independent estimate of multiplier	Yes (2.0)
Kent State University (1973)	Uses specific calculation of university sector multiplier	Assumes university multiplier and service sector multiplier are same	Yes (1.09)
Georgia State University (1976)	Uses specific calculation of alternative multiplier models	Does not consider negative tax impact or positive human capital impact	Yes (1.22–1.78)

Table 2

Estimation of Local Faculty/Staff Spending
Stratified Random Sample

	Percent distribution			
	Full-time faculty	Part-time faculty	Full-time staff	Part-time staff
Population (3305)	23.9	8.2	33.3	34.5
Sample (1108)	38.8	6.5	38.8	15.9
Spending category		Sample annual average		Weighted annual average[a]
.Iousing		$2523.00		$2280.96
Utilities		717.36		627.96
Food and houshold		1794.12		1576.68
Eating out		555.36		513.72
Entertainment		307.80		288.24
Automobile		1205.04		1052.64
Other transportation		75.00		75.48
Clothing		501.84		391.80
Personal service		280.32		244.56
Health services		524.64		429.96
Furniture		318.36		246.24
Other		801.84		690.96
Total		$9604.68		$8419.20

[a]Weighting factors are the ratios of faculty/staff population in each stratification to the population total. i.e., 23.9% for full-time faculty, 8.2% for part-time faculty, etc

same procedure is used to estimate local spending by the student population.

Multiplier Estimation of Induced Spending

The studies which calculated a multiplier value approached the problem in a conceptually identical manner (Billings, 1969) while seeking increasingly accurate methods of calculation. The simplest model drawn from this literature views the amount of induced spending as proportionate to the ratio of base sector employment (or spending) to total employment (or spending). This aggregate location quotient multiplier is easily calculated, but it has the drawback of using a single multiplier for all sectors of the local economy. However, individual sectors of the local economy may well have different proportions of local/nonlocal spending. If this is the case, each sector would then have a different income and employment effect on the local economy.

The assumption that all sectors have the same proportion of local spending can lead to great overstatement of economic impact, especially in rapidly growing areas where the base sectors are shifting. Using this method, some studies calculated multiplier values as high as 4.35.

To overcome this drawback, the Kent State study (Wilson & Raymond, 1973) suggested computing a multiplier specifically for the university portion of the export base. The multiplier is computed from the local value-added of various sectors in proportion to university spending in each of these sectors. However, even though this model more accurately computes the initial local spending impact peculiar to the university, it suffers the drawback that subsequent respending by all local consumers is presumed to have the same pattern as the university.

A third type of model, a differential value-added multiplier (Bresler, 1974), is a refinement of the Kent State model. As the name indicates, two different multipliers come into play—an initial local spending ratio unique for university patterns and a second ratio for subsequent rounds of local respending by consumers.

The limiting case of this type of disaggregation is the input-output model which uses separate spending ratios for every sector of the local economy. The Bresler model represents a happy medium by recognizing that, while the initial spending impact of a university may differ substantially from the initial impact of, say, an automobile assembly plant, the induced respending by various local consumers may be more similar and, thus, more reliably aggregated.

The model first estimates the initial university-related spending ratio based on the pattern of local university purchases. As Table 3 shows, the local value-added figures used in the computation are calculated from steadily available local payroll/sales data. The second ratio, local respending by consumers, is simply the value-added (payroll/sales) by local trade purchases.

This approach takes account of the university's unique initial spending pattern while avoiding the immense data requirements of a full input-output model that has separate local spending ratios for every sector. Table 4 shows how to compute the final multiplier value as a combination of the local value added by inital university-related spending and the local value-added by induced consumer respending.

Conducting the Impact Study

The estimation of the university's economic impact proceeds in five distinct phases:

1. Collection of university enrollment, payroll, and purchasing data
2. Survey and estimation of student spending
3. Survey and estimation of faculty/staff spending
4. Calculation of the local multipler
5. Computation of the university's total impact on local income.[2]

In the study of Georgia State University's impact on the Atlanta area economy, the Business Office provided state funds expenditure data for the fiscal year 1976. The purchasing data which was initially classified by university expense code was regrouped to correspond to the Standard Industrial Classification (SIC) used by the Department of Commerce. This was necessary because virtually all Department of Commerce local payroll/sales (value-added) ratios are published only for the SIC code industry groups.

The Business Office also provided gross and net payroll figures for the fiscal year for full- and part-time employees. The number of employees by category and the number of students by category came from the Office of Institutional Planning.

Next, the Office of Institutional Planning conducted questionnaire surveys of student spending patterns and of faculty/staff

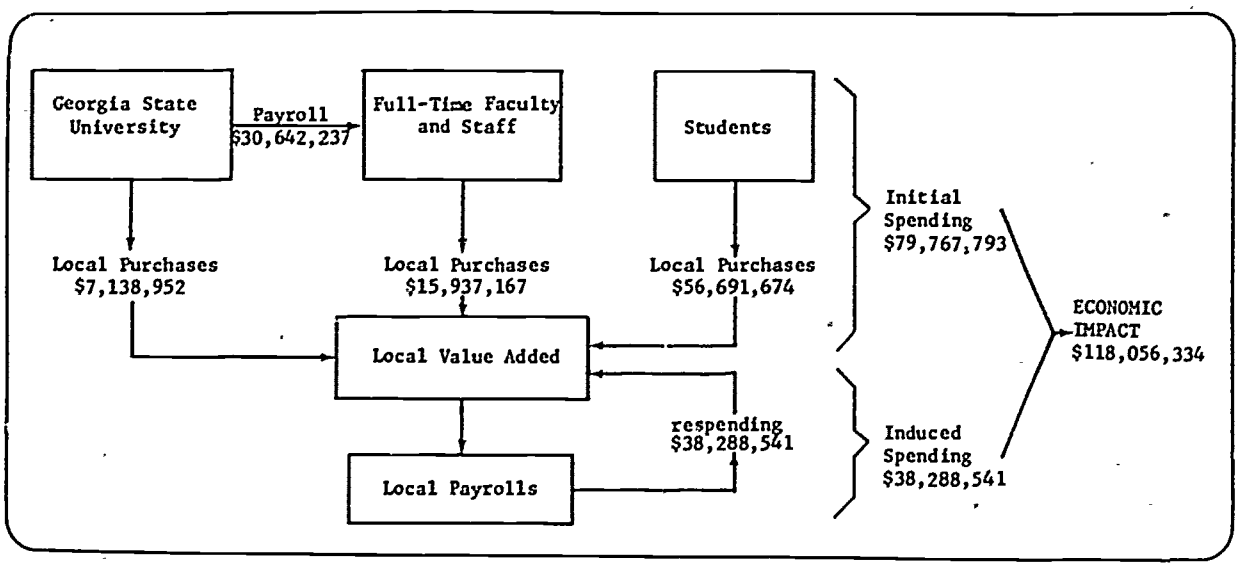

Figure 1. Atlanta spending patterns (1976).

Table 3

Calculation of Initial Impact by University Purchases Using Local Value-Added Ratios[a]

Item	Amount of local purchase	Industry SIC code	Value-added ratio[b]	Value-added amount (2) × (4)
Employee travel and benefits	$ 320,977	7000	.322	$ 103,355
Taxes and utilities	1,506,241	—	.397[c]	$ 597,978
Trade purchases (wholesale and retail)	3,198,829	5000	.133	$ 425,444
Finance and insurance	44,081	7300	.366	16,134
Rental	750,617	—	.219[c]	164,385
Repair services	611,436	7600	.372	227,454
Business services	668,156	7300	.366	244,545
Vehicle repair and service	20,516	7500	.219	4,493
Other	18,119	5000	.133	2,410
Total	$7,138,952			$1,786,198

[a]Adapted from S.R. Bresler, Multiplier for a Public Program, unpublished dissertation, Georgia State University, 1974, pp. 35–37.

[b]Atlanta sales-payroll ratios are calculated from data presented in *Census of Business*. U.S. Department of Commerce 1967. 5. (1). Table 4.

[c]J. Wilson. Economic Impact of a University on the Local Economy, unpublished dissertation, Kent State University, pp. 148 and 153.

Table 4

Computation of a Differential Expenditure Multiplier Using Local Value-Added[a]

$$m = 1 + \frac{r}{1-s}$$ where r = initial spending, s = re-spending ratio

A. Computation of r, the proportion of total Georgia State University spending that is spent locally.
1. Local consumption by full-time employees (survey) $15,937,167.
2. Gross payroll to full-time local employees $30,642,237.
3. Portion of payroll spent locally (1) ÷ (2) = .520. (proxy for all local payroll spending)
4. Value added by university's local purchases (Table 3) $1,786,198.
5. Initial local income generated by purchases (3) × (4) = $928,823.
6. Total initial local spending (1) + (5) = $16,865,990.
7. Total university spending (all purchases + 2) $37,781,189.
8. Ratio of local spending to initial total spending (6) ÷ (7) = .446.

B. Computation of s, secondary local spending induced by initial local spending.
9. Local value added by total local spending (6) × (.133[b]) = $2,243,177.
10. Induced local spending (9) × (3) = $1,166,452.
11. Ratio of induced local spending to initial local spending (10) ÷ (6) = .069.

C. Computation of multiplier.
12. 1.000 − (11) = .931.
13. (8) ÷ (12) = .479.
14. 1.000 + (13) = 1.479.

[a]Adapted from S.R. Bresler, Multiplier for a Public Program, unpublished dissertation, Georgia State University, 1974, pp. 33–46.

[b]Trade purchases value added, Table 3, col. (4).

spending patterns. A random sample of the student body produced 1,210 complete responses and a 100 percent faculty/staff survey produced 1,108 complete responses. Population estimates were then calculated from these results using the stratified sample method illustrated in Table 2.

The local multiplier value was then calculated. The calculation proceeds in three steps: (a) the payroll/sales ratios used as proxies for local value-added is calculated from census data, (b) the inital impact of local university purchases is calculated using the value-added figures obtained in the first step (Table 3), and (c) the actual multiplier value can then be calculated using the local purchase impact figure from the second step, the gross payroll figures obtained from the Business Office, and the results of the faculty/staff spending survey. The exact calculation using Georgia State University data is presented in Table 4. The calculated multiplier value for Atlanta is 1.48. This value is within the 1.20 to 1.50 range that the American Council on Education recommends for university economic impact studies (Caffrey & Isaacs, 1971).

Finally, the total impact of the university's spending on local income was computed using the calculated local multiplier value. As seen in Figure 1, the university's initial spending impact comes from three sources: local purchases by the university, local faculty/staff spending of the university payroll, and local spending by students whose activity in Atlanta is directly attributable to their enrollment at Georgia State University.

Local purchases by the university during fiscal 1976 totaled $7,138,952. This amount is virtually the total of all purchases since the university is located in the regional wholesale supply center and very few purchases are made outside the area. Purely nonlocal initial purchases are limited to periodical subscriptions and some travel expenses. All local orders, of course, do not produce additional local income if the actual materials are manufactured elsewhere. The local value-added ratios correct for this income leakage.

Annual local spending by faculty and staff members was estimated to be an average of $8,419. Total local spending by 1,893 full-time employees is, then, $15,937,167. There are an additional 1,412 part-time employees. Although their spending patterns are similar to full-time employees, their local purchases cannot be attributed entirely to the university since payroll records indicate that only $1,025,208 was paid out to part-time personnel. Most of their income, apparently, derives from other sources.

The third source of initial impact is student spending. Annual local spending by students was estimated to be $6,455.44 on average. Since many students are professionally employed in Atlanta and are incidentally enrolled in Georgia State University on a part-time basis, all student spending is not directly attributable to the university. Questionnaire responses, though, indicated that 46 percent of the student body lives in the Atlanta area largely because of enrollment in Georgia State University. Either students have moved to the area to attend this school, or they would have moved elsewhere to attend school if Georgia State University were not located in the Atlanta area. A total of 8,782 students fall in this category. Their spending is $56,691,674.

Initial university-related spending from these three sources totals $79,767,793. The figure is conservative because it omits spending by part-time employees and most part-time students. To obtain the total local expenditure figure, the amount of initial expenditure is increased by the local multiplier:

$79,767,793 × (1.48) = $118,056,334.

Conclusion

During the 1960s and early 1970s, economic impact studies became the vehicle to promote the positive attributes of nonprofit institutions for their local areas. Postsecondary educational institutions were prominent among these. A series of studies appeared calling attention to the substantial dividend of jobs and income the university provides its local community in the course of pursuing its primary educational and cultural aims.

Succeeding studies resolved conceptual problems dealing with the manner in which university-related spending enters the local income stream. Three channels were identified: direct university purchases, the university payroll, and, peculiar to the case of educational institutions, spending by the student body. The series of studies also resolved problems related to accurate estimation of the extent that faculty and staff spend payroll funds locally and the amount students spend locally.

Developing accurate methods to estimate these channels of direct university-related spending did not complete the picture, however. These initial purchases induce additional rounds of local spending. Consequently, the university's total economic influence is some multiple of the level of direct spending.

Most of the studies reviewed in this paper approached the problem of multiplier estimation in a conceptually identical manner although each sought to achieve an increasingly accurate method of calculation. All employed the concept of the community economic base whose initial income induces several rounds of additional local spending. This study illustrates the use of differential value-added multiplier model to estimate the economic impact of a large public urban university on its metropolitan area. The model incorporates an initial local spending ratio unique for university patterns and a second local spending ratio for subsequent rounds of respending. Using this model to compute the actual multiplier value will help the institutional researcher avoid both the oversimplified structure of aggregate location quotient models and the massive data requirements of a fully disaggregated input-output model.

Footnotes

[1]Copies of the survey questionnaires and the student spending estimate may be obtained from the author.

[2]Computation of the impact on local employment using employee equivalents of student spending is included in a more comprehensive paper available from the author.

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THE LUST FOR EFFICIENCY: A DOWNHOME STORY OF THE IMPLICATIONS OF ZERO-BASED BUDGETING

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To judge from its publicity, zero-based budgeting has become as much a part of Washington news coverage as human rights and the energy crisis. The *Wall Street Journal* reports that, in late January, Peter Pyhrr's book on zero-based budgeting reached the *Washington Post's* list of non-fiction best sellers. The concept has been much covered in popular periodicals, such as *Business Week*, and has been the subject for hearings before the Task Force on Budget Process of the U.S. House Committee on the Budget. The subject has even dented the provinciality of the *Atlanta Constitution*.

The popularity of a relatively new, but obscure, budgeting procedure is attributed to the election of Jimmy Carter, the former governor of Georgia, and his stated intention to apply zero-based budgeting across the board in federal agencies. As much as many proponents of zero-based budgeting would contend it is merely common sense, it is nonetheless an elaborate process in budgetary justification. Yet, according to the *Wall Street Journal* (Large, 1977) zero-based budgeting is used by many major companies and multinational corporations. Testimonials are freely given to the advantages accruing from the application of zero-based budgeting, and no less an authority than Arthur Burns, chairman of the Federal Reserve Board, indicated some years ago that the adoption of zero-based budgeting could be a significant factor in the control of governmental expenditures.

The arrival of zero-based budgeting is dated from Peter Pyhrr's article in *Harvard Business Review* (1970) and from its adoption by Jimmy Carter who had just then been elected governor of Georgia.

The purpose of this paper is to discuss the reactions to zero-based budgeting in the state of Georgia as it pertains to institutions of higher education. Few assumptions will be made about the success or failure of zero-based budgeting in corporate industry or in federal government. Some skepticism might be expressed, however, about the appropriateness and implications of zero-based budgeting for colleges and universities.

The Georgia Experience in State Government

The experience of state agencies in Georgia with zero-based budgeting has been examined by George Minmier and Roger Hermanson (1976). They report data collected in a survey questionnaire sent to 39 budget analysts who were involved in zero-based budgeting. The study also included follow-up interviews with selected departmental budget analysts and with selected department heads (as well as with former governor Jimmy Carter).

Although these investigators found a generally favorable attitude toward zero-based budgeting, there are several findings that require interpretation. For example, the majority of budget analysts believe the quality of management information gathered under zero-based budgeting has improved slightly or substantially, but they do not believe zero-based budgeting has resulted in a significant reallocation of the state's financial resources.

A majority reported that zero-based budgeting increased considerably the time and effort spent in budget preparations its first year. After implementation, zero-based budgeting required much greater, or slightly more, time than the previous incremental budgeting system. Respondents are in less agreement about the amount of involvement zero-based budgeting required of the agency head and its first line supervisors. Although agency heads tend to be more involved with zero-based budgeting, first line supervisors are clearly more involved than they were in the previous incremental system.

As would be expected, perhaps, the majority of respondents in the survey did not feel that the budget bureau had done adequate advanced planning for implementing zero-based budgeting, nor that adequate cost data had been available to the respondents to enable them to prepare decision packages properly. They did feel, however, that they had received adequate instructions during the first year of zero-based budgeting, that they now had the information needed, and that adequate cost data to prepare a decision package were now available.

Minmier and Hermanson note three primary advantages to the implementation of zero-based budgeting in Georgia: (1) the establishment of a planning phase prior to the budgeting phase itself, (2) an improvement in the quality of resultant management information, and (3) an increase in the involvement of personnel at the activity level in the state's budgeting process. Minmier and Hermanson conclude that the major disadvantage associated with zero-based budgeting is the increased time and effort required for budget preparation. On balance, zero-based budgeting has served the best interest of Georgia, and the budget analysts in this survey evidently believe it should be continued. Only five budget analysts recommended its discontinuance.

The University System of Georgia

For fiscal year 1973, the institutions of the University System of Georgia were asked to prepare a preliminary zero-based budget for all activities except primary resident instruction, research, and public service. Selected units under resident instruction were at first included in the requirement but later exempted. As a result, only the Agricultural Experiment Station, the Cooperative Extension Service, and the Marine Resources Extension Center now prepare a preliminary budget request using zero-based budgeting methods. Although these units prepare preliminary zero-based budgets, they actually prepare operating budgets and maintain all accounts by conventional budgetary methods. There is no planning, no preparation, nor any other remaining application of the zero-based concept in any resident instruction unit. There is good reason to believe, therefore, that zero-based budgeting has not been utilized in higher education setting in the state of Georgia (Barber, 1977).

Yet, the requirement of zero-based budgeting in the preliminary budget requests for fiscal year 1973 created considerable activity within the University of Georgia. A flow chart of the university's budget was prepared, evidently for the first time, and with much other data gathered, there was a resultant appreciation of the university's 300-plus budgetary units, which had not been possible previously. This appreciation may be the most significant outcome of the experience to date.

Budget heads on the University of Georgia campus who were involved in the process report varying opinions and beliefs concerning the efficiency of zero-based budgeting. At least one experienced budget head believes the method gave him better grounds on which to discuss his functions and activities with superiors. To no little extent, he thought the approach gave him "a manipulative advantage" over his superiors rather than the other way around. The continued use of zero-based budgeting in preliminary requests for the Agricultural Experiment Station and the Cooperative Extension Service is not seen as helpful, however, because of the diverse funding sources. State, federal, and university system requirements must be met, each imposing its own burden of paperwork.

Basic Assumptions and Implications

If zero-based budgeting gives a sense of deja vu, it is because of higher education's experience with PERT, PPBS, and MBO. The patterns of these three managerial techniques and zero-based budgeting have many similarities. Each technique has roots in corporate industry, transferred experience in public administration, and then a period of advocacy for institutions of higher or postsecondary education. In each case, the transfer of technique, first to government and then to higher education, came with something bordering on religious fervor.

Even a quick skimming of Peter Pyhrr's book or his article in *Harvard Business Review* will trigger a cynical humming of, "It seems to me I've heard that song before." The technique begins with "promises, promises" and leads quickly to linear arrangements in charted passages through operational mazes. As in most managerial techniques, there is the belief that corporate industry, government, and education are isomorphic in their demands for, and their amenability to, managerial effectiveness. There is an explicit faith that techniques developed in one organizational setting can be transferred without extensive modification to other organizations and institutions. Pyhrr hedges only slightly in referring to philosophy and procedures that are "almost identical."

The basic premise of zero-based budgeting is that programs, functions, and activities themselves, not annual increments in agency or unit budgets, should be justified. The process makes a distinction between planning and budgeting but is not explicit about the nature and details of planning that must clearly precede the budgeting process. The development of a zero-based budget assumes that work can be broken out into functional units that can be reassembled as a system of interlinking parts. An implicit interaction of goals, operations, and organizational capabilities is recognized.

There are six basic assumptions underlying zero-based budgeting that may be identified: (1) it will permit an analysis of purposes, costs, and benefits, (2) alternative courses of action can be specified, (3) the consequences of those alternatives can be identified and assessed, (4) the process will improve the effectiveness of resource utilization, (5) the involvement of managerial personnel at operational levels will eventually reduce the budgeting process, and (6) successful application of the technique will result in better decision making, as well as suggestions for innovation.

Such assumptions are not unknown in PERT, PPBS, and MBO, and there is temptation to conclude that zero-based budgeting is but another rational, management tool that offers a systematic way of examining ongoing programs and activities that is normally exercised only for new or expanded programs. Such advantages as zero-based budgeting might have for higher education would appear to be the rudeness with which it breaks into daily routine and requires a critical look at functions and activities long taken for granted. Also, a decided advantage might accrue from the emphasis zero-based budgeting ostensibly places on lower-level decision making in the budgetary process. There are always academic department heads who would welcome a more direct input to the budget process and better control over budgetary expenditures.

In Pyhrr's opinion, zero-based budgeting is effective because it focuses on the actual dollars required for successful operation and not on percent increase or decrease in the agency budget as such. How well this would permit institutions of higher education to identify and compare priorities both within and among departments or divisions of instruction remains to be seen. Program budgeting did not succeed in this respect, and it is well to recall that zero-based budgeting has specifically excluded direct production and manufacturing costs from the process. Zero-based budgeting is applicable, according to Pyhrr, only to the administrative, technical, or nonproductive portions of the corporate budget. For a labor-intensive industry, such as higher education, where the major production units are academic departments, the technique could involve some jarring implications.

The Product is the Process

The most audacious assumption of zero-based budgeting, however, is its requirement that the goals and objectives of an organizational unit should determine its budget—and not the converse.

Many of us wish this were true in higher education. Unfortunately, organizational goals, being more implied than explicit, are determined to a greater extent by the funds that are available (or by the prospects of additional funding) than by clear-cut choices that are made prior to the availability of funds.

There is no evidence that zero-based budgeting results in more clearly established goals or that it provides better measures of performance or progress toward the fulfillment of those goals. The budgeting process is still dependent upon an ex post facto form of rationalization that permits or requires the budget maker to justify expenditures in terms of worthy directions and commitments. While zero-based budgeting may be helpful in eliminating costly add-ons or accessories to essential programs and a needless duplication of costs in fringe or marginal activities, there is little about the process that would suggest that it is a cost-effective technique in its own right. The test might be whether the money it saves is worth the money it costs. Staff time, paper, photocopying, etc. are all costs that are added on the usual cycle of budget-making whatever that usual cycle might be. A process that eliminates expenses for the trivial or incidental but costs unknown amounts in staff time and clerical materials is not cost-effective by virtue of savings alone.

Nor is there anything in zero-based budgeting that prevents trade-offs, compromises, negotiation, treaties, pay-offs, and other forms of political behavior on the part of those making out the budget. Decision packets will still be identified with decision makers, and the logical necessity of certain functions or activities will always be more obvious than others. At the same time, there will always be the uneven administration of the decisions and judgments that must be made to keep the process credible.

In conclusion, there may be little about zero-based budgeting that is novel or unique. And there may be little about it that promises any special advantages or benefits for institutions of higher education. Its only advantage may be the process it requires, and the benefits may be too subtle for widespread adoption in higher education. There is at this time good reason to believe that the virtue or merit of zero-based budgeting lies in process only. No one should expect miracles from the product.

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STUDENT CHARGES AT TWENTY MAJOR UNIVERSITIES: CAN THE DATA BE COMPARED?[a]

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Institutional researchers, at least, know that questions such as What is the enrollment at your college or university? or How many faculty members are there at your college or university? must be answered with care, particularly if indices may be calculated and comparisons among institutions may be made from the data. Too many strange student/faculty ratios have seemed to result from the absence of detailed and observed definitions and misunderstanding of the data for the lesson with regard to student and faculty counts not to have been learned.

The principal purpose of this paper is to demonstrate, using information on tuition, fees, other required charges, and non-required fees at 20 major public universities[1], that the question What is the tuition at your college or university? is at least as troublesome as the questions about numbers of students and faculty. A secondary purpose is to describe a number of characteristics of the student charge systems in use (1975–76) at the subject universities. It is the variation in these characteristics which leads to difficulties in defining student charge terms and in wording student charge questions in manners that result in data that are meaningful, to say nothing of comparable.

Method

Data were collected by means of a three-page survey instrument. The first page contained survey instructions. Form A was used to report required student charges. Multiple versions of Form A were completed to reflect differential charges by program and student level and for regular semesters or quarters and summer sessions. The dollar and cents amount of each separately named required charge for each value of number of credits enrolled for resident and for non-resident students was entered on Form A along with brief names and descriptions of the separately named required charges. This paper addresses only the data for regular semesters and quarters. None of the data on summer session student charges are included. The number of Form A's completed for individual universities ranged from 4 to 18.

Form B was used to provide information on non-required student fees. It was simply a checklist of generically named non-required charges with spaces to indicate amounts and to enter remarks. One Form B was completed for each university.

The Form A on required charges per credit enrolled were graphed in order to reveal the shapes of required charge functions. Many characteristics of required charges were also displayed by university in a summary chart, available from either of the authors upon request. A non-required fees chart summarizing the information provided on Form B's was also prepared.

Findings

The predominant feature of all the information collected, graphed, and charted is diversity. No matter what characteristic of student charges stated by the 20 universities is considered, there is variation among the universities in the manner in which it is stated. The following summaries of specific characteristics of student charge systems substantiate this general finding.

Terminology. Most of the sample universities assess a basic, comprehensive, multipurpose, undesignated-as-to-specific-purpose charge. This is here labeled the "general charge," to distinguish it from "special charges" which are assessed all students, normally in addition to the general charge, and are designated for specific purposes. Only nine of the 20 universities refer to the general charge as tuition. Six of the remaining universities reserve the term tuition for an additional charge assessed non-resident students. Five of the 20 universities evidently make no use of the term tuition in stating student charges.

Many of us think we know what is meant by the term tuition, but what would we expect to learn if we collected data from these 20 universities on the amount of tuition assessed a full-time student for a semester or the equivalent thereof?

Other terms used for the general charge, and the number of the 20 universities using each, are: incidental fee (3), instructional fee (2), instruction fee (1), course fee (1), registration fees (1), general service fee (1), comprehensive fee (1), operating fees (1), and full program fee—combined with enrollment fee for reduced program and reduced program charge per hour (1). Terms used for special charges also vary widely. The term incidental fee is used at one university for a special charge and by two others, as noted, for the general charge.

Knowledgeable persons who collect data on faculty have learned that the term faculty, because it means different things at different places, should be avoided in describing the persons to be included and in defining the data items sought. The lesson here is that the term tuition should be avoided in collecting data on student charges. It may be necessary to admonish the person at one college or university who is seeking student charge data from another college or university not to use local descriptors on the presumption they have the same, or any, meaning elsewhere.

General and special charges. Charges applicable to principal categories of undergraduate resident students were classified as general or special charges, as previously defined. Although the survey instrument did not include specifications for distinguishing between general and special charges, this distinction was obvious in most uses. However, the categoriza-

[a]*Author's Note:* After this paper was presented at the 1977 Forum of the Association for Institutional Research, we discovered we had misinterpreted data provided for Pennsylvania State University (PSU). Specifically, (1) at PSU, students enroll for, and are assessed tuition on the basis of semester credits for, courses offered on a quarter calendar, and we should have used a normal load value of 10 credits, rather than 15, in our calculations, and (2) the per credit charge for credits in excess of 13 which led us to describe the PSU charge function as mid-range plateau was, in fact, a proposal that was not adopted. We have not revised the paper to correct the PSU data but offer this note as additional evidence that it is difficult to assemble comparable data on student charges.

tion of the authors may not be completely accurate. Two universities assess no general charges, most have a single general charge, two state two general charges (tuition/comprehensive fee and tuition/operating fees), and one distinguishes among a full program fee, reduced program fee, and a reduced program charge per hour.

The number of separately stated special charges ranges from none to four or more. The "or more" equivocation results from the fact that a student activity fee, for example, may in fact include a variety of components which consist of amounts designated for different student activity purposes and income accounts. Even the present comprehensive and detailed collection of student charge data does not reveal all details of this type. The names of the array of special charges and the designated purposes, in some cases inferred from the names, vary considerably among the 20 universities.

Amounts of the general and special required charges for resident undergraduate students for the 20 universities may be summarized as shown in Table 1. The dollar amounts stated are charges for an academic year (1975–76) of either two semesters or three quarters for a student enrolled for 15 credits per semester or quarter.

Table 1

General and Special Required Charges for Resident Undergraduate Students in 20 Universities

	General charges	Special charges	Total required
High	$1.365	$638	$1.365
Low	0	0	370
Median	545	117	672
Mean	577	154	731

The lesson learned here is that, with respect to the burden on the student and the comparability of data, the distinction between general and special charges should be ignored; only the total of the two types is meaningful. Of course, the distinction is important to individual colleges and universities because of the varying manners in which the rates are established and charged and the differing dispositions of the income. But the person at the university which collects an incidental fee (general charge) and a student activity fee (special charge) should not expect to collect data comparable to the two local charges from other universities.

Non-resident charges. At public universities, the amounts of required charges for non-resident undergraduate students exceed the amounts for resident students. This is well known. However, it may not be well known that this result is achieved in two ways. Six of the 20 universities assess non-resident students tuition in addition to the general and special required charges assessed resident students. This can be called the *add-on procedure.* The remaining 14 universities simply state higher rates for the general charge(s) for non-resident students. This can be called the *rate procedure.*

The person who is familiar with only one procedure--the add-on or the rate—may assume that there is only one way to assess non-residents more than residents and may encounter problems in acquiring comparable data from colleges or universities which use the other procedure. The lesson learned here is that the question should be What is the total required charge for non-resident students? and not What is the special extra required charge for non-resident students? or What is the amount of the general charge for non-resident students?

Total undergraduate non-resident charges and the amounts and percentages by which these exceed the comparable resident required charges for the 20 universities can be summarized as shown below. The dollar amounts are charges for an academic year of either two semesters or three quarters for a student enrolled for 15 credits per semester or quarter.

Table 2

Total Undergraduate Non-Resident Charges and Increment over Resident Charges at 20 Universities

	Non-Resident Charge	Non-Resident Increment	Percentage Increment
High	$2.871	$1,908	297
Low	1,366	790	98
Median	1,764	1,090	144
Mean	1,897	1,172	. . .

Of interest here is simply the variability and the high positive skewness of the distributions. The high values of these measures are from two to three times the magnitudes of the low values. At one of the 20 universities non-resident undergraduates pay twice as much as residents; at another, they pay four times as much. The modes of the three distributions are very close to the low ends of the distributions. The most popular $200 ranges for the non-resident charge and non-resident increment figures are $1,500 to $1,700 (8 universities) and $800 to $1,000 (7 universities), respectively. The most popular 20-percent point range for the percentage increments is 120% to 140% (6 universities). Data comparers should understand that comparisons with means, medians, and modes from skewed distributions of peer institution measures yield different conclusions.

Differentiation by level and program. None of the 20 universities employ the same required charge schedule for all resident or non-resident students. Thus, the question What is the total required charge for full-time resident students? has no unequivocal answer no matter how thoroughly the terms of the question are defined. The types of students subject to different required charge schedules can be identified by the level of the student (lower division, upper division, first professional, or graduate) and degree program. Typically, both identifiers are required.

Using the required charges for typical or lower division undergraduate residents or non-residents as a base, differentiation occurs for a variety of levels and programs. One of the 20 universities has differential charges for typical upper division students. Four have differential schedules for individual, or groups of, undergraduate programs. Two of these four have different schedules for one program each, and two have three schedules for different undergraduate or upper division programs in addition to the basic one.

All first professional dentistry and medical programs of the 20 universities have charges which are higher than those for undergraduates. Five of the six universities offering veterinary medicine and 14 of the 18 with law have differentiated (higher) required charges for the first professional students of these programs. The degree of differentiation for resident students in first professional programs varies from charges which are 8% (a law program) to 217% (a medical program) higher than the basic undergraduate required charge.

Thirteen of the 20 universities have differentiated required charges for all graduate students, four have one differentiated schedule for selected graduate programs, and one has two differentiated schedules for selected graduate programs. Only five of the 20 universities charge all graduate students at the same rates as undergraduate students.

In only two instances are the differentiated charges for resident graduate students less than the basic undergraduate rates. At one university, the graduate student rate is 98% of the basic undergraduate rate. At another university, nursing students at all levels are charged just over half as much as all other students.

Not only is there variation in the number of differential required charge schedules and the types of students to which they apply, there is also variation in the manners by which differentiation is achieved. As with the achievement of differentiation for non-resident and resident students, there is an add-on and a rate method. Of 59 sets of differentiated required charges identified for the 20 universities, eight involve an add-on charge, 57 involve different rates for the general and/or special basic required charges, and seven involve a combination of the two. In only one instance, a supplementary fee for first professional medicine and veterinary medicine students, is differentiation achieved solely by an add-on charge. On the basis of their names (instructional materials fees, law fee, testing fee, computer fee, publication fee, and microscope fee), the remaining instances of add-on charges appear to be add-on special charges designated for specific purposes.

Even ignoring the information assembled but not discussed here, on non-resident versus resident required charges in the instances of differentiation from basic undergraduate required charges, it is evident that differentiation by level and program is a varied and complicated matter. The lesson learned again is that comparable data cannot be obtained from simple questions or without some understanding of the complexities involved.

Required charge functions. A required charge function describes the relationship between the number of credits for which a student enrolls and the amount of the required charge assessed. Functions for undergraduate resident, undergraduate non-resident, differential resident, and differential non-resident charges, and for components of each may be examined. Seven types of functions for required undergraduate resident student charges are in use at the 20 universities. They are described, in order of frequency of use, as follows:

With the *per-credit-to-plateau* function, charges are assessed at $r per credit for 1 to n-1 credits and at ($r × n) for n and over credits. The plateau begins at n credits. Eight universities use this type of function for determining undergraduate resident charges. For five of them, n = 12; for the other three, the values of n are 7, 9, and 10.

The *per-credit-step-to-plateau* function assesses charges at $r per credit for 1 to n-1 credits and at [($r × n) + $s] for n and over credits. The value of s ($s > r$) is the size of the step, and the plateau begins at n credits. Four of the 20 universities assess undergraduate resident charges by this type of function. The steps occur between 6 and 7, 7 and 8, 8 and 9, and 11 and 12 credits. The plateaus, of course, begin at the upper ends of these pairs of values.

The *per-credit* function is just that; charges are assessed at $r per credit for any number of credits. Three of the 20 universities use the per-credit function for undergraduate resident students.

Bi-level functions assess charges at $k for 1 to n-1 credits and at ($k + $s) for n and over credits. The magnitude of the step between n-1 and n credits is $s. Two universities use bi-level functions for undergraduate resident charges. The steps occur between 8 and 9 credits in each case.

The *tri-level* function, which includes two steps and three plateaus, is used at one of the 20 universities for assessing undergraduate resident charges. The plateaus are for 1 to 5, 6 to 11, and 12 and over credits.

The *mid-range plateau* function assesses charges at $r per credit for 1 to n-1 credits, at ($r × n) for n to m credits, and $r per credit minus [$r×($m−$n)] for more than m credits. The plateau begins at n credits, and ends at m credits. For the single university at which this function is used for undergraduate resident students, the plateau extends from 8 to 13 credits.

Finally, one university uses the *flat-rate* function by which charges are assessed at $k for any number of credits.

An amazing variety of versions and combinations of these seven types of required charge functions is used by the 20 universities for various types of the differentiated charge cases. In three cases, the form of the function used for undergraduate non-residents is not the same as the one used for residents. Fourteen of the 20 universities use two or more of the seven function types for determining required charges for different types of students. Even where the same type of function is used, the parameters differ in some cases. For example, where per-credit-to-plateau function is used, the plateaus are likely to begin at different points.

The principal difficulties highlighted by the existence of this variety of specific required charge functions have to do with comparing amounts charged part-time and full-time students. While, to date, no survey may have asked What is the required charge for part-time students?, nothing is impossible. The growing proportions of part-time students at many or most colleges and universities, combined with the fact that systems remain in use for assessing student charges established for predominantly full-time student bodies are creating questions about how to determine appropriate charges for part-time students. It is not unusual for a question on policy to generate a survey. The lesson is that the existence of a variety of required charge functions would need to be recognized in any attempt to assemble comparative data on charges for part-time students.

Surveys of required charges for full-time students are common, and the existence of the variety of required charge functions creates problems with such surveys. The college or university using the per-credit-to-plateau or per-credit-step-to-plateau function has little difficulty in stating charges for full-time students. However, the per-credit institution may.

One strategy used by data collectors is to leave full time undefined on the basis that better data results from the application of the local definition of what constitutes full time. Problems with this strategy are that the idea of normal load (for example, 15 credits) is easily confused with the idea of full time, defined as at least 75 percent of normal load, and that full time denotes a range (for example, 12 or more credits) and is, therefore, ambiguous. A second strategy is to define full time very specifically: for example, a student enrolled for 12 or for 15 credits. The problem here is that the specific definition may not be appropriate at all colleges and universities.

A compromise strategy may be to define normal load in general terms and then to ask for amounts charged normal-load students. Student level should be taken into account. Typically, the normal-load values for undergraduates, for first professional students, and for graduate students do differ, and these differences may need to be considered. Also, differences among the specific first professional programs may need to be considered.

An example of how *not* to do it is provided by the present survey of the 20 universities. Data on normal load were not collected. In tabulating amounts charged for various types of students, charges for 15 credits were used. This may be a representative normal-load value for undergraduates, but it is almost certainly inappropriate for first professional and gradu-

ate students. Because the purpose of the survey was to examine comparability problems and not to develop comparable data, this limitation to the summary data, most of which is not presented here, is not considered serious.

Non-required charges. Colleges and universities charge individual students for a wide variety of individual services or transactions. The information on such ad hoc charges for the 20 universities is voluminous but cannot be considered definitive because of the great variety of designations used for the charges, specific circumstances in which they are applied, and rates applicable for individual charges under differing circumstances. Because of this variety of practices, it appears to be virtually impossible to assemble comparable and meaningful information on non-required charges.

The number of non-required charges at each of the 20 universities ranges from just over 10 to nearly 25. They can be categorized as (1) admission fees, (2) registration fees, (3) graduation fees, including thesis and dissertation, (4) facility or equipment use fees, (5) special course fees, (6) graduate research and continuous-enrollment fees, (7) voluntary student activity fees, and (8) a variety of other types of fees. Amounts range from 25¢ for an unofficial transcript and $1.00 for an add/drop transaction to $250 for an applied music course (non-majors only) and $325 for a field-trip course.

The lessons learned from this soft information are that, at best, comparable data on non-required charges are difficult to assemble and that required charges account for a variable percentage of the total income colleges and universities obtain from students. Surveys which seek information on required charges leave hidden the financial burden on students of the non-required charges, and given the present state of the art, this burden might as well be left hidden in the surveys.

Recommendations

The following points are offered for consideration by the person seeking to collect comparable data on student charges from any group of colleges and universities.

1. Define terms carefully and avoid the term *tuition*. It might even be desirable to avoid the term *fees*, because it means different things at different colleges and universities.

2. Seek information on total required charges and insure that survey instructions specify that special required charges are included.

3. In the case of public colleges and universities, ask for total amounts of required charges assessed non-resident students as compared with resident students.

4. Specify the category or categories of students for which required charge amounts are desired. Of most interest usually will be the rates that apply to the greatest numbers of undergraduate students. Instances of lower division versus upper division differentiation need be recognized. Separate information on rates applicable to graduate students and to students in specified first professional programs may be of interest. Beyond these basic categories, variations in the practice of differentiation by program and level can be addressed, if one really cares.

5. If required charge amounts for full-time students are desired, recognize that full time spans a range of number of credits enrolled and define what is meant by normal load. Then ask for rates applicable to normal-load students. Consider distinguishing between normal load for undergraduate, graduate, and first professional program students. Seek information on required charges for part-time students with great care and on the basis of an understanding of the variety of required charge functions that is in use.

6. Recognize that students pay non-required as well as required charges, but do not attempt to collect comparable data on non-required charges unless a specific purpose requires it and, then, only with considerable planning and care. Do not divide financial report amounts of income from tuition and fees by any counts of number of students and expect to be able to interpret the resulting averages.

The question raised by the title of this paper is Can student charge information collected from several colleges and universities be compared? The answer seems to be that if sufficient understanding, thought, and time are devoted to planning, data collection, and analysis, reasonable degrees of comparability of major types of student charge data can be obtained.

Footnote

[1]The 20 universities are. University of California-Berkeley, University of California-Los Angeles, University of Illinois-Urbana, University of Iowa, Iowa State University, University of Kansas, Michigan State University, University of Michigan, University of Minnesota, University of Missouri-Columbia, University of Nebraska Lincoln, Ohio State University, University of Oregon, Pennsylvania State University, University of Pittsburgh, Purdue University, University of Texas-Austin, University of Virginia, University of Washington, University of Wisconsin-Madison. In a few cases, data for separate medical school campuses are included.

MEASURING INSTITUTIONAL FINANCIAL HEALTH

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Institutions of higher education have entered a period of fiscal stringency. Private institutions, with heavy reliance on tuition, are particularly vulnerable. Yet, in spite of these financial concerns, there is only limited knowledge concerning the measurement of financial well-being. Certainly, there is no consensus with regard to the methods of measurement. Many researchers rely heavily upon the Higher Education General Information Survey (HEGIS) data. The obvious advantage is that these data are collected in a uniform manner, presumably, from every institution in the country. However, as many campus officials will admit candidly, the responsibility for the HEGIS reports is often delegated to nonprofessional office workers. Moreover, while the data that are collected are important, other useful data are not accumulated in that federal survey. Certainly, the fact that HEGIS financial information concentrates on current fund data is a serious limitation. Murdock and Davis (1975) advocate the use of institutional financial statements for outside evaluation of colleges and universities. Their argument becomes even more forceful with the increasing acceptance of the audit guide for colleges and universities published by the American Institute of Certified Public Accountants (AICPA) (1973) which sets standard guidelines for the form and substance of the auditor's product. The analysis reported in this paper makes extensive use of the college annual financial reports and supplements that information with data on students and faculty.

Turning from the source of data to the analytic format, this researcher takes the position that it is unproductive to look for one "bottom line" measure. Understanding the complex nature of colleges and universities, this may seem to be self-evident. Yet, many researchers continue to seek this final, but elusive, measure. Bowen and Minter recognize the problem, yet they inexplicably assign "arbitrary weights . . . to convert the data into a single index of 'strength' " (1976, p. 89). Lupton, Augenblick, and Heyison (1976) were more explicit and evoked a storm of protest. (See Finn, 1976; Johnstone, 1977.) The point is that it is probably impossible to create one faultless measure of institutional well-being. This report uses five dimensions of institutional health: demand for the product, liquidity, debt structure, resources, and operational analysis.[1] For each dimension, a number of specific indicators are used without preassigning a value to any one of them.

An additional criticism of college and university financial analyses is that they attempt to evaluate a set of institutions which is too broad and diverse. The analytic framework described here was applied to similar types of private colleges. It is appropriate for public institutions, nor even very large private ones. The methodology could, however, be modified to suit these types of institutions.

Purpose

One purpose of this report is to describe a relatively straightforward system for evaluating college and university financial health. The word relatively should be emphasized because the task is, by its nature, not a simple one. There is no substitute for informed judgments. However, a consistent framework can assist in the initial perception of problems and in framing questions for further study.

A second purpose of the report is to provide reference data for comparison. Again, these data can be very useful in identifying possible problems and for suggesting areas which need further study. While the study upon which the report is based examined the financial trends of seven subgroups, as well as the trend of the full sample, only the trend of the complete sample will be reviewed in this report. One reason is that the data for the subgroups are far more similar than they are disparate. A second reason is that some of the subgroups are rather small. Therefore, greater reliance can be placed on the trends revealed from the study of all 40 colleges included.

Sample Institutions

Forty colleges participated in the study. Each had either a single-sex admissions policy or was religiously oriented in the 1960s. Some of the colleges became coeducational. Some became more secular. And, some changed very little in these regards. All had taken the College and University Environmental Scales (CUES).[2] Because of these limitations, the sample cannot be considered, necessarily, as representative of all small private colleges. However, because most small private colleges had religious ties in the 1960s and many were single-sex, this limitation is not as restrictive as it may first seem. Moreover, it was already pointed out that the data for the subgroups showed many more commonalities than differences. This general uniformity further supports the contention that these data provide a reasonable estimate for the financial trends of most small private colleges, particularly nonselective ones. With the exception that there are no colleges from the far west, the sample represents well the geographic distribution of all small private institutions in the country.

Methodology

Consolidated balance sheet. College and university financial reporting practices have historically focused on the control and use of funds accrued from separate sources. From this principal of stewardship has evolved college and university fund accounting—separately aggregating and reporting financial information. While one may be reluctant to quarrel with the need to maintain separate records for certain funds, it is difficult to reconcile the extremes to which this principle is carried, that is, the absence of a final aggregation in the financial reports. Such an aggregation is necessary if one is to make any sense of trends in debts, assets, and equities. Indeed, many critics have advocated the use of consolidated balance sheets. (See Jenny, 1973; Bastable, 1973; Price Waterhouse and Company, 1975; and Wilkinson, 1976.)

This study created consolidated balance sheets for each institution, and an average balance sheet for all institutions, in the following manner:

1. The agency fund was excluded from the analysis.
2. Assets were subdivided into three categories: (1) liquid assets, (2) other assets, and (3) fixed assets. Liquid assets were considered to be all assets which could be readily converted

into cash to meet current obligations. These assets include cash, stocks, bonds, and interest receivable. Cash in the loan fund was not considered liquid because this money is typically federal money or money matching federal funds. Fixed assets included all building, land, equipment, and construction in progress. The remaining assets were placed in the "other" category: accounts receivable, inventories, student loan fund assets, and real estate holdings.

3. Liabilities were grouped in a fashion similar to assets: (1) liquid assets, term debt; (2) other debt; and (3) long-term debt. All obligations of college requiring cash payments within one year including interest payable, accrued wages, withheld taxes, and due principal payments were put in the short-term debt grouping. Long-term debts are those liabilities of the colleges that are payable after one year (e.g., mortgages and bonds). Debts not considered short- or long-term were grouped in the "other" category and include: deferred revenues, debts to religious orders which operate the institution, and the federal portion of the NDSL loan funds.

4. Total equity is defined as the total of all fund balances except agency fund. Separate fund balances were also reviewed.

5. Dealing with the loan fund presented a particular problem. Generally, about eight-ninths of the loan fund is federal money. It was decided to include loan fund assets and count the federal portion of the funds as an "other" liability.

6. Inter-fund borrowings were eliminated except as they involved the agency fund.

Combining unrestricted and restricted funds. At many institutions, particularly research universities, combining restricted and unrestricted dollars would be likely to yield a meaningless aggregation. However, for these small colleges, the simplicity gained by combining the two categories seemed well worth the slight distortion. First, based upon twenty-one colleges for which data were available, restricted income represented less than ten percent of the total current fund income in 1975. Second, the restricted income at these colleges typically was closely related to their educational mission (e.g., student aid). If these restricted funds were unavailable, it is likely that they would need to be replaced with unrestricted money.

Price adjustments. To adjust the data so that they are comparable from one year to the next, the Higher Education Price Indexes (HEPI) were used. Price adjustments were applied only to operating income and expense data. For a more thorough discussion of price indices, see Halstead, 1975, and/or Lanier and Andersen, 1975.

Per student adjustments. Another adjustment to establish comparability is to divide by units of output—in this case, the number of full-time-equivalent students. This adjustment can be made for both income and expense reports as well as for the balance sheets.

Specific measures. This study partitioned the financial/operating analysis into five areas: (1) demand, (2) liquidity, (3) debt structure, (4) financial resources, and (5) operating results. In each area several measures were used. They are summarized below.

1. *Demand:* Demand for places is obviously of critical concern for these tuition-dependent institutions. A number of measures were used and the interrelationships between the measures were considered—enrollment, applications, percent accepted, percent of accepted students enrolling, percent of students receiving financial aid, average SAT scores, percent of commuting students, percent from out of state, and the percent of the student body over the age of 25.

2. *Liquidity:* These measures are intended to probe the solvency of an institution, that is, how vulnerable the institution is to the demands of creditors. Specifically, the measures compare resources with debts. Fund data are clustered because an institution is unlikely to allow bankruptcy if it has sufficiently large available resources in any of its funds. These funds need to be expendable, but even if they are restricted the money can be borrowed or used as collateral. The most direct measure is the ratio of liquid assets to short-term debt. For the purposes of this report, this ratio shall be called the liquid ratio. A second measure of liquidity is the adjusted liquid ratio. It is identical to the liquid ratio except that endowment funds are excluded. Thus, it assesses the ability of the college to meet cash flow without tapping endowment. An additional reason for including this measure is that the liquid ratio relies on the rather erratic book value of endowment. Inclusion of endowment book value may be particularly misleading with respect to trend data. The final measure is short-term debt as percent of current fund income. This statistic scales short-term borrowing against dollar volume of operation.

3. *Debt structure:* These statistics are intended to array the financing structure of the college. Are the colleges relying more upon debt? The most direct measure is the ratio of debt to equity. A second measure is total debt as a percent of current fund income. Again, this statistic scales debt against the volume of operation. The final measure selected is debt service (principal and interest payments) as a percent of current fund income. Termed debt burden, this statistic estimates the relative drain of debt payments on the current fund.

4. *Resources:* The intent of these criteria is to probe trends in the financial ability of the institution to deliver education. Truly, these measures are rudimentary proxies. Yet, all things being equal, a wealthy institution is more likely to succeed in its mission than a poor one. The primary measure of resources is total equity or net worth (defined as the sum of all fund balances except the agency fund). This measure is further adjusted for depreciation. An additional measure, equity per student, corrects for the number of students over which the equity must be spread. Equity per student with investment in land, buildings, and equipment excluded and endowment equity per student were also examined.

5. *Operating results:* Relying heavily on the current fund income and expense statements, these statistics detail revenue and expenditure patterns and associated statistics for the ten-year period. They are not individually reviewed here because they are commonly found in financial analyses of colleges and universities.

Collecting financial data. Each college was requested to submit four audited financial statements: 1964–65, 1967–68, 1971–72, and 1974–75. In addition, complete data on faculty and students for these same years were assembled. To validate the collected data, the estimates, and the measures developed, each college was visited and the chief business officers were interviewed. After reviewing the work sheets and findings with these officers, it became clear that the degree of error in the work sheets was not unduly troublesome. With minor exceptions, the indicators of this study seemed to highlight well the ten-year fiscal trends. Occasionally, new information would surface (e.g., an undetected accounting change) and the data were altered accordingly. But in most instances, the business officers felt the measures were accurate and revealing.

Results

Demand. Because tuition represents two-thirds of the total revenue of these institutions, enrollment is obviously a critical concern. In this regard, there is reason for both optimism and concern. Enrollment increased from an average of 920 students in 1965 to 1,114 students in 1972. Since 1972, the number of students has been stable. Thus, it appears that these colleges have been able to hold their own. Another cause for

cautious optimism is the fact that the percent of accepted students choosing to enroll has remained relatively stable (about 66 percent). And, according to the returned questionnaires, these colleges have not become unduly reliant on commuter students; two-thirds of their students board at the institution. In addition, the percentage of students coming from out-of-state has declined only slightly (from 37 to 34 percent). These colleges have, however, become more dependent on older students. Students over the age of twenty-five increased from four to nine percent of the student body, and the plans are to greatly increase this percentage. Of more concern is the quality of the student. The percentage of accepted students has risen rapidly. In 1965, these colleges accepted 72 percent of their applicants. Now they accept 84 percent. Consequently, the SAT scores of entering students are falling more rapidly than the national average (10 vs. 6 percent).

Liquidity. The liquidity measures attempt to assess cash-flow trends and the vulnerability of the sample institutions to short-term creditors. Table 1 displays the average consolidated balance sheet for all institutions and is adjusted on a per student basis. Examining this table, one notices that liquid assets only grew 36 percent while short-term debt increased 157 percent. More to the point, the average liquid ratio declined from 78 to 13.[3] Or, perhaps even more germane is the fact that in 1975, between 15 and 20 percent could not meet their current obligations even if they liquidated their entire endowment. Obviously, there is a serious and growing cash-flow crisis at these small colleges.

Table 1

Consolidated Balance Sheet—Per/Student: All Colleges

	Years			
	1965	1968	1972	1975
Assets:				
Liquid assets	1,949	2,055	2,278	2,644
Other assets	810	950	1,498	1,829
Plant assets	6,986	8,031	9,283	10,510
Total assets	9,745	11,036	13,059	14,983
Debt:				
Short-term debt	162	202	339	417
Other debt	389	537	874	1,026
Long-term debt	1,465	1,885	2,248	2,559
Total debt	2,016	2,624	3,461	4,002
Equity:				
Current fund equity	226	191	75	92
Plant equity	5,367	5,872	6,676	7,790
Other plant fund equity	201	333	332	381
Endowment equity	1,891	1,976	2,460	2,640
Loan equity	51	40	55	78
Total equity	7,729	8,412	9,598	10,981
Total debt and equity	9,745	11,036	13,059	14,983

Debt structure. Calculating from Table 1, average debt as a percent of average equity increased from 26 percent in 1965 to 36 percent in 1972. It remained at 36 percent in 1975. So, while the average debt-to-equity ratio[4] was slightly higher, the trend is the same. Debt burden has increased from 5.2 to 5.6 percent. Moreover, because of the inclusion of balloon payments (payments which increase with time), this percentage is expected to become larger. Average debt as a percentage of Current Fund Income, however, has declined 111 percent to 102 percent.

To summarize, the average institution has significantly increased its debt since 1965 but not in recent years. Since 1972, there has been a general reluctance to assume long-term debt. However, as noted earlier, there is increasing dependence on short-term debt to finance the summer cash flow.

Resources. An important measure of the financial trends of private colleges is that of equity or net worth. Equity, as a measure of ownership, represents the resources an institution can bring to bear on the education of students. In this regard, total equity is more important than total assets because the assets may be funded with debt, and the debt must be serviced. With the exception of the current fund, the trend is uniformly upward. The large gain in the plant fund is not unexpected. Spurred on by rising enrollments and low interest federal loans, most of these colleges increased their plant rapidly in the 1960s. Mandatory repayment schedules insure the payment of plant debt with concurrent accretion of plant equity. The size of the increase in endowment was not fully anticipated. However, as noted previously, the trend in book value does not necessarily mirror the trend in market value. For about half of the 40 institutions, information on market value was available. These data reveal a rapid rise from 1965 to 1972 and then an equally swift decline in 1975.

Although current fund equity is a minor portion of total equity, it is significant that it has declined so rapidly. In 1965, 12 percent of the study colleges had negative current fund balances. By 1975, this statistic had risen to 38 percent. To some extent, this statistic may represent a random reassignment of funds from one group to another. Or, this change may parallel, and be symptomatic of, cash flow problems. That is, at the end of the year there are not enough assets in the current fund to meet current obligations.

The average total equity per student has increased at an annualized rate of about 4 percent. Colleges, however, do not depreciate their capital assets, and this obviously biases the trend in an upward direction. By assuming a forty-year life on plant and equipment, total equity is increasing at a much slower rate—about 1 percent per year since 1972.[5]

Summarizing, average resources have not diminished. Rather, they appear to have increased slightly—even if adjustments are made for enrollments and for depreciation. However, one should bear in mind that these are average data. Thus, we can estimate that total resources are declining for a significant minority of these colleges.

Operating position. Table 2 arrays the average current fund income and expenditures per student for all 40 colleges and indicates that both costs and income per student are rising faster at these colleges than the Higher Education Price Index constructed by Halstead (1975). Instructional expenditures, however, have remained relatively stable. In addition, the student-faculty ratio rose from 14 to 16. The most rapid rise in expenditures has been in sponsored research and programs, although these activities still represent a small part of the budget. Both expenditures for student services (primarily for the admissions office) and student aid are rising rapidly. Student aid expenditures, as a percent of tuition, has increased from 12 to 16 percent. The changes in student aid and admissions, of course, reflect the vigorous efforts of these colleges to keep up enrollments. Administration and maintenance also show sizable increases. However, when maintenance expenditures are corrected for plant size, they decline from 4.7 percent of plant book value in 1965 to 3.4 percent in 1975.

The percentage of income from tuition has been relatively stable at 66 percent. Outside income (gifts and grants) has risen, with government being the prime source. This is evidence of the increasing dependence of these colleges on the state and federal governments. Moreover, these data understate the trend

because of the increasing number of students who receive state and federal assistance The source of these funds is not detected by institutional accounting methods.

Both auxiliary income and expenditures per student have declined. This suggests that these colleges have become more dependent upon commuter students than their direct responses would indicate.

Turning to the often cited surplus/deficit information, the reader will note that there are three surplus/deficit calculations. The first excludes all transfers. The second includes only mandatory transfers. And the third takes into account both mandatory and nonmandatory transfers. The AICPA audit guide is resoundingly silent with regard to the definition of surpluses and deficits. The author's preference is to include only mandatory transfers. Using this second calculation, one notes an aggregate, but diminishing, surplus.

In sum, the operating budgets of those colleges are being squeezed. Money that might have been in the instructional budget is being diverted into the effort to recruit students. Maintenance as a percent of plant value is falling. With regard to income, outside sources, particularly the government, have provided important relief.

Summary

The purposes of this paper were to present a model for assessing small college financial health and to provide comparative data for use by other small colleges. The second objective requires little comment. An average consolidated balance sheet and an average income and expense statement were included in this report, along with other selected statistics. While space precluded a more complete set of data, they are available (Anderson, 1977). Perhaps the first objective could best be summarized by assessing the financial analysis with what might have been achieved if only the operating budget and enrollment had been examined.

A review of full-time equivalent (FTE) enrollment would suggest that these colleges have been able to stabilize enrollment. However, by reviewing Scholastic Aptitude Test (SAT) scores, the age distribution of students, and the percent of students accepted, as well as by reviewing the increased expenditures on student services (admissions) and student financial aid, it becomes clear that this enrollment stabilization was not without a price. While these data do not provide a complete analysis, they should provoke further study. Indeed, part of the full research project was to assess environmental trends. The result of this research showed that those colleges which were most successful in maintaining or increasing enrollments were also the most likely to show declines in sense of community, campus morale, and faculty-student relationships, as measured by changing CUES scores.[7] Although one must be cautious about generalizing, the results clearly indicate that the measurement of demand is far more complicated than counting students.

Probably the most significant new aspect of college finance uncovered by this analysis is that of the increasing liquidity problem. The flexibility, even the existence, of many of these colleges, is threatened by the relative size of their short-term debt. While total debt has stabilized, short-term debt continues to grow. However, not all of the institutions in this study have brought their total debt under control. A few colleges in this study were technically insolvent (total debt exceeded total assets). None of this information would be available from HEGIS reports or from the income and expense statements.

One bright spot was the increase in fiscal resources. However slight this increase was, it indicated that most of the colleges have some resources for reorienting their efforts. Again, these data are not available from HEGIS reports or from operating statements.

Table 2

Current Fund Income and Expenditures Per Student: All Colleges[6]

	Years			
	1965	1968	1972	1975
Income				
Tuition	1,726	1,884	1,987	2,070
Outside income	325	432	488	696
Investment income	150	141	125	147
Contributed services	255	211	153	120
Other internal income	101	138	117	105
Educational and general	2,557	2,806	2,870	3,138
Auxiliary services	978	963	822	820
Total current fund income	3,535	3,769	3,692	3,958
Expenditures:				
Instructional expenditure	1,126	1,190	1,158	1,197
Administration	249	263	258	298
Library	117	135	118	136
Maintenance	314	313	316	351
Student services	150	183	213	241
Student aid	211	249	270	325
Sponsored research and programs	26	41	83	105
Other expenditures	339	443	412	393
Total educational and general expenditure	2,532	2,817	2,828	3,046
Auxiliary services	818	814	732	735
Total current fund expenditure	3,350	3,631	3,560	3,781
Surplus 1	185	138	132	177
Mandatory transfers	59	80	90	137
Surplus 2	126	58	42	40
Other transfers	11	55	62	67
Surplus 3	115	3	(20)	(27)

Recommendations

Although this report has implications for the operation of small private colleges, it has concentrated on informational needs and formats. The recommendations will be similarly inclined.

College presidents and financial officers must consider both internal and external financial information needs. With respect to both reporting requirements, these officers should give more consideration to consolidated financial reports, e.g., grouping fund data. This is not a recommendation that current reporting practices be abandoned. The conventional reports are well-suited for the fiduciary responsibilities of the colleges and universities. Moreover, those reports have the very real advantage of familiarity, at least to many people. The format of the conventional reports, however, focuses administrative, trustee, and staff attention disproportionately on the current fund surplus and deficit. A consolidated report would expand the attention of the concerned constituencies. It would highlight, for example, an incipient cash flow problem—information that is critical for many of the colleges in the study reported here. Administrators who wish to develop a consolidated report should consult the model developed by Jenny (1973) or examine the financial statement of the University of Rochester.

In spite of the available models, change will not be easy. College financial administrators who wish to improve the

utility of their financial reports will be hampered by the standard reporting conventions on the one hand and the lack of consensus for reform on the other. The American Institute of Certified Public Accountants has made significant refinements in the accounting and reporting practices of colleges and universities. Business officers (NACUBO) are, however, reacting in a generally negative way to a proposal by the AICPA for more sweeping accounting changes. Many of these criticisms have merit. Still, college business officers must face the fact that self-imposed accounting improvements have been relatively insignificant. This must be changed. Professional associations, researchers, and business officers should develop meaningful accounting conventions which can be used by all, or at least large groups of colleges.

Further, researchers must work to develop, test, and standardize more meaningful statistical measures of financial health. This paper presented a few of the measures that have been adopted from security analysis. Standards were provided for private liberal arts colleges. It is hoped that these measures will be tried, criticized, and improved. Separate measures should be developed for public institutions and large private universities.

If institutions of higher education are to retain public confidence, they must improve their reporting techniques and methods of analysis. An accounting system closest to the corporate model and related analytic tools used by security analysts can help. College business officers, researchers, and professional associations should act now to help shore up sagging public confidence. College and universities are not listed on a securities exchange, but their stocks are, indeed, traded publicly.

Footnotes

[1]I am indebted to Collier (1973 a,b) and Carroll (1973) of the National Center for Higher Education Management Systems for sharing some draft papers with me. Many of the ideas in those papers found their way into my analytic framework.

[2]The reason for these limitations is that the purpose of the study was to evaluate the financial and educational impact of the strategic change from single-sex to coeducational admission and the strategic change from a religious to a secular orientation. The sample of colleges was limited to those that had taken CUES because, by readministering this survey on each campus in 1975-76, a measure of environmental change was achieved. More detailed results of the study are available in the complete research report. (See Anderson, 1977)

[3]The variation of the aggregate ratio to the average ratio is explained by the fact that some colleges had very high liquid ratios and raised the average statistics.

[4]See explanatory note 3.

[5]It is likely that even these adjustments are inadequate. Accountants looking at the corporate reports have been advocating some form of "replacement cost accounting." This technique would adjust depreciation to take into account the cost to replace assets. It is acknowledged, for example, that the profits of the steel industry are grossly overstated because the rate of depreciation used does not adequately provide for future plant replacements. Similarly, the method of estimating depreciation for these colleges did not consider replacement costs and, consequently, is likely to overstate growth in equity.

[6]All dollars in constant 1975 dollars.

[7]For example, the typical women's college which remained single-sex declined 6 percentiles on the community scale, declined 4 percentiles on the campus morale scale, and rose 9 percentiles on the quality of teaching scale. In contrast, the typical women's college which admitted men fell 33 percentiles on both the community and campus morale scales and fell 3 percentiles on the quality of teaching scale. The evidence is similar, although less dramatic, for the secularization of religious colleges.

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BUDGET FORMULATION BASED ON INSTITUTIONAL PLANNING

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For institutional planning to impact policies and resources effectively, it should be a comprehensive, continuous, and systematic process involving the broad participation of the university community. A planning process evaluates the past and present, anticipates the future, and formulates strategies to shape the future of the institution. Planning should influence the basic elements which comprise a university—missions, curricula, personnel, facilities, and budgets. These elements need to be analyzed from the perspective of how they interact with each other and with constraints external to the institution. The result of the planning process is an annual, or periodic, master plan for the institution projecting for a stipulated time into the future. The planning effort should provide greater coherence in, and understanding of, university decision making in addressing policy issues and resource allocation and reallocation.

The discussion which follows describes the essential elements of a planning process and resource allocation model adopted by a public four-year university within a complex system of higher education. It also illustrates some of the outcomes of the process after several years of implementation.

The Context for Planning

An essential precondition for effective planning are statements on institutional mission, planning assumptions, and university goals. It is important that these statements be published and distributed to the campus community prior to each annual planning cycle so that all constituencies know the parameters within which to plan. Each of these statements is defined here with illustrative samples.

Institutional mission. Almost every university has at least one mission or purpose statement which has been developed by the institution, or a board of regents if the institution is part of complex multi-campus system. These statements are usually broad and comprehensive and are long-range in intention. Sample mission statements are:

- Provide a base of liberal studies as the foundation for university degrees in the arts and letters and sciences, as well as for specialized professional and occupational degrees at the baccalaureate level.
- The university should offer graduate education in the arts and sciences, in business administration, in teacher education, and in programs growing clearly from areas of undergraduate emphasis meeting identified regional and state needs.

Planning assumptions. Planning assumptions refine the context for planning for five to ten years and the primary service area of the university. The assumptions are selective, rather than comprehensive, and are updated each year. Each assumption is chosen for its relationship to university mission statements and potential effect on the university. Sample planning assumptions are:

- Enrollment of FTE students will increase moderately until 1980 and then decrease significantly for at least a decade.
- Public funding will probably, at best, remain at present levels and may even decline in the future on a per-student basis. Resources for change and growth will, therefore, have to be made from base reallocation.

University goals. University goals are formulated from mission statements and planning assumptions. The goals are ends toward which effort is directed and provide a basis from which planning units within the university develop their specific objectives. The university goals are by design and necessity less comprehensive and take a shorter range view than mission statements and planning assumptions. Sample university goals are:

- Program development and support—The university will initiate new programs and modify existing ones in merging areas consistent with student needs and university strengths at the graduate and undergraduate level.
- Accountability and efficiency—New systems of collecting and disseminating information will be developed to insure accountability to various publics about the university programs and operations, increase efficiency, and maximize administrative support of instructional programs.

Unit objectives. Planning units (defined below) objectives with resource implications are developed during the planning process. These are very specific statements, usually having one- or two-year duration. Each unit objective supports at least one university goal. Sample planning unit objectives are:

- To establish a Master of Arts in Humanities degree which involves the departments of English, art, and music in the College of Letters and Science.
- To provide the public with easier access by locating the Continuing Education Division in a central and visible physical facility.

There are several types of planning units. These are defined here to assist the reader in comprehending the extensiveness of the planning process.

College planning units consist of faculty, students and administrators.

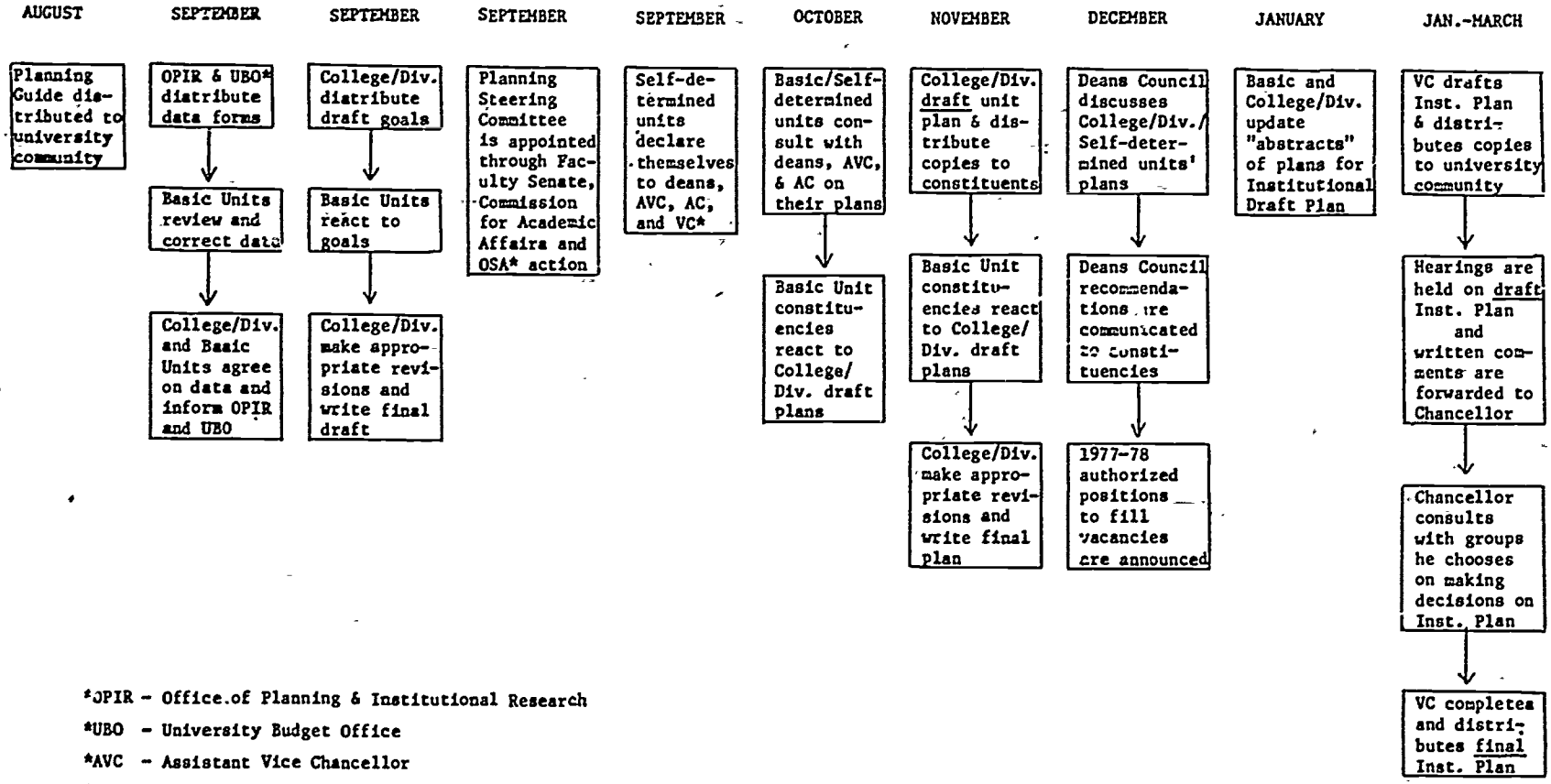
Division planning units consist of university support personnel.

Basic planning units are either academic (departments and programs within a college) or university support (offices and centers within a division).

Self-determined planning units consist of two or more faculty or staff not currently in the same planning unit who have common program objectives and wish to develop a planning proposal intended to better realize those objectives. (This facilitates interdisciplinary and interunit planning.)

The Planning Process

The process is programmed in Figure 1 and displays the flow of activity with a time schedule from initial distribution of the Guide to Planning to the completion of a one-year



*OPIR - Office of Planning & Institutional Research
*UBO - University Budget Office
*AVC - Assistant Vice Chancellor
*AC - Assistant Chancellor
*VC - Vice Chancellor
*OSA - Oshkosh Student Association

Figure 1. The planning process.

planning cycle. Next, each major step in Figure 1 is explained briefly to assist in visualizing how the process culminates yearly in an updated institutional master plan which determines resource allocations and reallocations.

September. Early in September, colleges and divisions distribute their objectives to constituencies for reactions. Later that month, they make revisions and distribute the final objectives to their basic planning units.

Also, early in September all data to assist planning units in developing their planning documents are distributed by the Office of Planning and Institutional Research (OPIR) and the University Budget Office (UBO). Data for planning consists, in part, of student credit hour production, faculty staffing, program majors, degrees awarded, class size analyses, and unit support costs. By the end of the month, basic planning units review the data provided to them and consult with their respective deans or division heads to reach agreement on any necessary revisions so that a common data base for the institution exists.

Near the end of September, a planning steering committee, consisting of faculty, administrators, and students is named and charged with oversight responsibilities in evaluating the planning process for the current year to improve the next cycle.

During this month, self-determined units (SDU's) also declare their planning intentions to appropriate chairpersons, deans, and university support division heads.

October. Basic units and SDU's discuss, with appropriate deans and division heads, the impact of their plans on staffing, budget allocations, graduate assistant requests, and physical facility improvement requests. By the middle of the month, basic and SDU's submit final planning documents to respective administrative heads and the vice chancellor's office. (Constituents within these units review the draft plan before it is sent to the next higher administrative level.) All planning documents are advisory until the institutional plan is approved by the chancellor.

November. Colleges and divisions develop draft plans and distribute copies to all basic planning units for review and comment. Colleges and divisions are required to list priorities for new academic programs, graduate assistantship assignments, and physical improvements as part of their planning documents. By the end of the month, reactions to each unit are received and integrated into the final plan.

The college and division planning statements are developed in a way similar to that of basic units, and the plan reflects an analysis and synthesis of the plans of its basic units. Colleges and divisions also establish program/function priorities by using uniform criteria. Colleges use quantitative criteria based on institutional data developed by OPIR and UBO as well as qualitative criteria, congruent with those in the Guide to Planning, from the vice chancellor and as approved by the college planning committees. University support divisions do not follow a uniform set of criteria because they are quite diverse in function. However, division heads are required to identify criteria clearly so that basic units know by what performance criteria they will be evaluated.

December. Early in the month, the Deans Council, in a series of open meetings chaired by the vice chancellor, analyzes, discusses, and makes recommendations concerning college, division, and SDU planning of documents. (The Deans Council, during these sessions, consists not only of deans but also of division heads.) The objectives of each college and division, and their resource implications, are assessed in light of university-wide needs. The council then endorses, modifies, or denies planning intentions and requests.

At the conclusion of the sessions, deans and division heads communicate recommendations of the council to their constituencies. At the same time, decisions to fill vacancies and any new positions which can be clearly authorized for the coming year are announced so that the recruitment process can be immediately initiated.

January. In its planning document, each college and division planning unit updates its basic units and its own "abstract" section statements to reflect decisions reached during the deans council planning sessions. Those abstract statements are an important part of the institutional plan.

By the end of the month, the draft institutional plan is completed by the vice chancellor and staff and distributed to all faculty, staff, and student government members, with added copies placed in the university library.

February. By the middle of the month, each dean and division head, joined by the vice chancellor, holds meetings with constituent groups to review the draft institutional plan. Written comments on the draft institutional plan are encouraged and sent to the chancellor.

Near the end of the month, the chancellor convenes governance and administrative officers to consult in making final decisions on the draft institutional plan. The chancellor also meets with the University Budget Committee, which consists of faculty, students, and staff, since the university's budget and internal resource allocations are based on the institutional plan.

March. The final institutional plan in completed by the vice chancellor and staff and, after approval by the chancellor, is distributed on campus as well as to selected external campus agencies, institutions, and associations.

April. The Planning Steering Committee recommends to the vice chancellor and chancellor any revisions in the process for the next planning cycle. Governance groups are encouraged to suggest revisions in university planning assumptions and goals. The chancellor and vice chancellor then consult with governance and administrative officers to determine any changes in the next planning cycle and to announce changes to the campus. The next year's Guide to Planning is then developed and distributed.

Planning Outcomes

At the end of the annual planning cycle in March, institutional policy decisions and resource allocations are determined for one year specifically and for eight years in general. The comprehensive Institutional Plan is the document reporting the aggregate results of planning, from the basic university support and academic unit level, through the division and college level, through the institutional level, (Deans Council) and review by all campus governance groups, to the chancellor. A few examples of outcomes from a recent year of planning follow.

- The College of Education will be reorganized into academic clusters from department structures.
- Self-determined units (SDU's), Alternative Futures, Community Arts, and an Ideal Educator Research Institute will be supported within proposal resource projections.
- Continuing education and outreach activities will be given high priority designations for the future, since the traditional college age pool is declining.
- An Institute for Human Design will be established in a consortial arrangement with a state mental health institute geographically contiguous to the university.
- Faculty and academic staff position allocations will remain the same; however, several position reallocations

within the institution will be made to reflect program priorities.

After two complete planning cycles, three developments can be described as a result of the process. First, many pending issues and concerns which had accumulated at the university level in recent history were resolved in the planning process. Second, the university's staffing and resources are more clearly known now, and effective policies and procedures have been put in place to implement the institutional plan. Third, the quality of university programs has improved through the continuous and comprehensive study and review required by the planning process.

It was determined from the substantial information base compiled in the first two comprehensive planning years that in the future an abbreviated planning cycle would be appropriate in alternate years. Planning documents will be developed by colleges and divisions rather than by basic units and then flow into a university master plan. While basic units will still have an opportunity to review and critique college and division plans, the primary thrust for development will come at the next higher administrative level.

The planning process outlined here should be applicable to many other universities which are interested in developing a "participatory management resource allocation model." It has accomplished the purposes for which it was originally designed: more informed policy decisions and resource allocations, where justified, to meet current and projected circumstances, and greater coherence in, and understanding of, university decision making. As a result, there is a sense within the university that it has attempted to shape its future with greater vision.

THE IMPACT OF FEDERAL FUNDING OF UNIVERSITY RESEARCH ON GRADUATE EDUCATION AND RESEARCH

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Research and scholarship are major functions of a university as well as necessary and integral parts of graduate education. Federal support of university-based research and changes in support differentially affect the departments that offer graduate education. What is lacking is both the means for assessing the total federal impact on graduate education and a means for exercising a reasonable influence over the direction of the effects (National Board on Graduate Education, 1974). This paper summarizes a study conducted on the impact of federal funding for university research on graduate education and research between 1969 and 1974 at a large midwestern university (Girves, 1976).

Both the level and the composition of federal funding for university research have shifted over the past thirty-five years. The number of federal dollars expended for university research increased dramatically from 1941 to 1964 and then leveled off through the late sixties. Given inflation, the real dollar funding levels between 1970 and 1975 were less than those between 1963 and 1969 (National Science Foundation, 1975). Although the funding levels increased during the sixties, federal research dollars were spread among more disciplines and among more universities.

Dresch (1974) points out that the shifts in the composition of federal support may ultimately be more serious to the graduate education system than shifts in the level of support. Increasing federal support has gone to applied rather than basic research. Contracts, which tend to be short-term, as well as restricted to a specific problem and initiated by the federal agency, are replacing research grants, which tend to be long-term, flexible, and almost entirely initiated by the investigator. This shift may affect the nature of the research performed in the university and the nature of the relationship between research and graduate education.

Orlans (1962), Pusey (1962 and 1963), Dressel and Come (1969) and NSF (1970) studied the impact on universities of federal support for sponsored research. In each case, universities were grouped according to the number of research dollars received. Only NSF compared individual disciplines. These studies largely focused on the similarities and differences among groups of universities within broad academic areas. None gave a comprehensive view of all the disciplines engaged in graduate education. The graduate professional disciplines were omitted altogether. None analyzed the interrelationships among the disciplines within one university.

Sample

This study focused on the relationship between shifts in federal funding patterns for university research and shifts in graduate education and research conducted within the fifty-five departments which offered the Ph.D. degree between 1969 and 1974 in a large midwestern university. The selected departments fall into nine areas which essentially represent the organization of the colleges in the university. The areas are: (1) administrative sciences, (2) agriculture and home economics, (3) arts and humanities, (4) biological sciences, (5) education, (6) engineering, (7) mathematics and physical sciences, (8) medicine and (9) social and behavioral sciences.

Data Collection

Existing data recorded routinely in various university offices were collected by department for fiscal years 1969 and 1974 or for autumn quarters in 1968 and 1973, whichever was appropriate. These data included research activity, budgetary information by source and category, personnel information by source and category, and graduate student enrollment and support information. A departmental profile summarizing these data was prepared by the researcher and sent to each department chairperson for review.

Then, each department chairperson was interviewed. The questions focused on the nature of the research performed in the department, on the relationship between research and graduate education conducted within the department and federally funded research, and on the impact of the shifts in federal funding on the faculty, students, and the graduate program. The chairpersons commented on the data provided and gave possible explanations for any changes that occurred over the five-year period.

In addition, questionnaires were sent to 1,216 graduate faculty members; 58 percent responded. The faculty were asked to estimate the amount of time they allocated to instruction, research, and service and to comment on the necessity for federally supported research in their departments, their success in gaining research dollars, any influence exerted by the funding agencies over the direction of their research, the quality of incoming graduate students, the quality of the apprentice/mentor relationship, and the overall impact of federal support of departmental research on the graduate program in their departments.

Analysis

Both the institutional data and the responses to the questionnaires were grouped by area and were analyzed using simple descriptive statistics; means, percentages, and percent changes. The institutional data, along with the faculty estimates of time spent on research and graduate instruction, were also analyzed using canonical correlations. The canonical correlations between the set of seven federal funding variables and each of the five subsets of the thirty-four graduate education and research variables were computed for each fiscal year and for the changes occurring between them. Table 1 presents the six sets of variables. Table 2 presents the canonical correlations between the set of federal funding variables and the subsets of the graduate education and research variables. (See Girves, 1976, for both the presentation of comparisons by area and for the displays of each paired set of linear combinations in the canonical correlations.) The remainder of this paper highlights and discusses the results of the analyses in relation with the perceptions of the department chairpersons and the faculty members.

Table 1

The Six Sets of Variables Used in Computing the Canonical Correlations

I. Federal funding variables
   1. Number of research projects
   2. Number of agencies providing support
   3. Number of research projects funded by the primary agency
   4. Salaries
   5. Equipment dollars
   6. Travel dollars
   7. Totally federally funded dollars

II. Graduate education and research variables
   A. Research activity variables
      1. Number of nonfederal research projects
      2. Number of nonfederal agencies providing support
      3. Number of research projects funded by the nonfederal primary agency
      4. Number of graduate instruction hours
      5. Number of research and scholarship hours
   B. Graduate student characteristics variables
      1. Quality—undergraduate grade point average
      *2. Number of first-year enrollments
      3. Number of full-time enrollments
      *4. Number of part-time enrollments
      5. Registered quarters after the General Examination
      6. Nonregistered quarters after the General Examination
      *7. Number of doctoral degrees conferred
   C. Graduate student support variables
      *1. Number of fellows and trainees
      *2. Number of research associates
      3. Number of teaching associates
      4. Number of "others"
      *5. Number federally supported
      6. Number nonfederally supported
      7. Number university supported
   D. Budget
      *1. University-funded salaries
      2. Nonfederally funded salaries
      *3. University-funded equipment dollars
      4. Nonfederally funded equipment dollars
      5. University-funded travel dollars
      6. Nonfederally funded travel dollars
      *7. University-funded total dollars
      8. Nonfederally funded total dollars
   E. Personnel variables
      1. Number of instructional staff
      *2. Number of university-funded A&P staff
      *3. Number of federally funded A&P staff
      4. Number of nonfederally funded A&P staff
      5. Number of university-funded technicians
      *6. Number of federally funded technicians
      7. Number of nonfederally funded technicians

*These twelve graduate education and research variables exhibited the largest correlations (all greater than .70) with their respective significant canonical variates when the differences between FY 1969 and FY 1974 were analyzed. The canonical correlation between the differences in the set of federal funding variables was .68, which was significant at the .01 level.

Results and Discussion

According to the department chairpersons and the faculty, the nature of the research activity is a major factor in determining the necessity for outside funding. When it is needed, the graduate program experienced by the individual student, as well as the research performed by the faculty, will be affected. Research conducted in the sciences, for example, requires substantial investments in equipment, supplies, and personnel. Graduate students in these departments are often supported as research associates for ongoing research projects. Their dissertations are usually part of the overall project. Consequently, a major portion of a student's research experience, which provides the basis for the student's future research activity, is determined by the research projects that do get funded.

At the other extreme, research conducted in the arts and humanities requires time and travel money. Research in this area is an individual activity. Students are supported as teaching associates. Their dissertations are independent of their teaching responsibilities and are often independent of the research performed by their advisers.

While over 90 percent of the faculty responding to the questionnaire engaged in research or other scholarly activities during 1969 and 1974, the percent who engaged in federally funded research varied dramatically among departments and declined between 1969 and 1974. Although most faculty said that they did not perceive any influence by federal funding agencies over the direction of their research, those faculty in engineering and in the biomedical sciences frequently reported that federal agencies had influenced the direction of their research. Some indicated that proposals were written "cosmetically;" others modified their focus from studying a particular aspect of a normal cell, for example, to studying the same aspect of a cancer cell; few changed directions entirely. Faculty in the arts and humanities, on the other hand, commented that increasing federal dollars provided a focus to the research underway.

Faculty members in administrative sciences, arts and humanities, biological sciences, education and social and behavioral sciences generally reported increases in the amount of research they performed. The faculty in engineering, mathe-

Table 2

Summary Table of the Canonical Correlations between the Set of Federal Funding Variables and Each Subset of the Graduate Education and Research Variables for FY 1969, FY 1974 and the Differences between FY 1969 and FY 1974

Variable Sets	Canonical-R[a]	Redundancy[b] 1	2
I-IIA			
1969	.7666	.306	.260
1974	.7527	.300	.305
Difference	ns	—	—
I-IIB			
1969	.8448	.437	.407
1974	.8809	.446	.483
Difference	.7762	.272	.208
I-IIC			
1969	.8849	.621	.523
1974	.9145	.624	.438
Difference	.8135	.253	.361
I-IID			
1969	.9060	.683	.491
1974	.9359	.633	.540
Difference	.7490	.324	.329
I-IIE			
1969	.9851	.720	.635
1974	.9793	.787	.517
Difference	.8274	.316	.341

$p \leq .01$

a. Only the first significant canonical root has been presented.

b. *Redundancy 1:* the set of federal funding variables given the subset of graduate education and research variables. *Redundancy 2:* the subset of the graduate education and research variables given the set of federal funding variables.

matics, and physical sciences and medicine reported decreases. In addition to changes in federal funding patterns, the faculty also cited changes in their own interests and lack of time as reasons for changes in the amount of research they produced. Overall, however, the relative amount of time expended on research by faculty remained about the same for 1969 and 1974. Department chairpersons and faculty members alike indicated that in many disciplines reduced research productivity was due to the increased competition for fewer federal research dollars. There was no relationship between the extent of involvement with federally funded research and the amount of time allocated to research activities or to graduate instruction. These two variables did not contribute to the significant canonical correlations (.77 in 1969 and .75 in 1974) between the research activities and the federal funding variables. Involvement with nonfederally funded research contributed strongly to the relationship.

The reputation of the department's research capabilities as perceived by faculty at other universities and the availability of financial support were given by department chairpersons as the two major reasons why graduate students were attracted to particular departments. As a result, faculty from those departments that were heavily involved with federally funded research perceived a strong relationship between federal funding and the quality of the students they attracted. Those faculty from departments that were not involved with federally funded research saw no relationship between the quality of the students attracted and federal funding. Motivation and preparation were given as the important indicators of student quality. Changes in incoming grade point averages were not associated with changes in the federal funding variables.

Both the type and source of student support shifted between 1969 and 1974. More students were supported by university funds and as teaching associates in 1974. Involvement with federally funded research was strongly associated with support of students. The canonical correlation was .88 in 1969 and 91 in 1974. In general, as involvement with federally funded research declined, the number of research associates declined and the number of teaching associates increased. Chairpersons and faculty were concerned that the shift away from research appointments would undermine the preparation and training of the future scholars in their disciplines.

Those departments that were heavily involved with federally funded research tended to be associated with high first-year, full-time and part-time graduate enrollments. As their involvement with federally funded research declined between 1969 and 1974, their enrollments also declined (the canonical correlation equals .78). New graduate student enrollment patterns were emerging in 1974. More students enrolled part-time More were enrolling in the professionally oriented disciplines. Both the lack of available support and the perceived poor job market accounted for these shifts. In effect, society's perceived needs were being reflected by the lack of federal support for graduate students in many disciplines.

The uncertainty surrounding federally funded research was very disturbing to the department chairpersons. Internal planning became virtually impossible. Federal research dollars would suddenly and unexpectedly be eliminated or drastically reduced. Personnel hired to support a research project would have to be let go, supported on another project, or supported by the department. At other times, funding would suddenly become available but would have to be spent within a short period of time. Commitments to support graduate students often could not be made until late summer, after many students had made other plans These problems created frustration, low morale, and inefficiency. The faculty members and the department chairpersons in the biomedical sciences were affected the most severely.

This uncertainty was due, in part, to the apparent shift, between 1969 and 1974, from awarding research grants to awarding research contracts. Many perceived these contracts as being restrictive, short-term, and less supportive of the educational aspect of research performed in a university environment. Fewer graduate students were supported as research associates in favor of full-time technicians. Of those who were supported as research associates, many were supported on short-term projects. Consequently, the continuity of their research experiences and of the research efforts of the faculty deteriorated.

Those departments heavily involved with federally funded research, particularly those in engineering, tended to have large financial commitments from nonfederal sources as well as from the university in 1969 and large financial commitments from the university in 1974. Decreases in federally supported research were associated with decreases in nonfederally supported research and increases from the university.

As with the departmental expenditures, involvement with federally funded research was strongly associated (r=.99 in 1969 and .98 in 1974) with the number of personnel supported in 1969 and 1974, particularly those supported from federal and nonfederal sources as technicians or administrative and professional staff. The university-supported personnel showed a much stronger association with involvement with federal research in 1974 than in 1969. Overall, the number of instructional staff, A&P personnel and technicians declined between 1969 and 1974. The change in number of technicians was closely tied to the change in number of research projects underway.

Faculty members were asked to indicate the primary effects on their graduate program of shifts in federal support for research and scholarship between fiscal 1969 and 1974. Forty-seven percent said that there was little or no effect on their graduate program. Forty-two percent reported negative effects of shifts in federal support for research. Lack of adequate graduate student support was the most common negative effect given. Without such support, it is difficult to attract top-quality students. And, if fewer graduate students are supported as research associates, fewer graduate students will have the opportunity to engage in research activities with the faculty.

Faculty members in the arts and humanities, in particular, noted that the elimination of the NDEA (National Defense Education Act) fellowship program not only reduced the number of graduate students supported but also eliminated the cost-of-education dollars that accompanied those fellowships. These unrestricted dollars had been used to support student and faculty research activities. Many faculty members commented on the unwanted strings attached to most federally funded research. Thus, the cost-of-education dollars had been ideal for many departments.

Some faculty members and department chairpersons suggested that reduced federal support did have beneficial effects on the graduate program. Mediocrity would be eliminated and the overall quality of the research program might be improved. Thus, students would experience and engage in higher quality research activities. In addition, it was argued that only those graduate students truly interested in learning would be motivated to apply to a graduate program.

Overall, changes in involvement with federally funded research were most strongly associated (r=.88) with changes in the following twelve institutional variables. (1) number of research associates, (2) university-funded equipment dollars, (3) number of federally supported graduate students, (4) uni-

versity-funded salaries, (5) total university-funded dollars, (6) number of fellows and trainees, (7) part-time enrollments, (8) first-year enrollments, (9) number of university-supported A&P personnel, (10) number of university-supported technical personnel, (11) number of doctoral degrees conferred, and (12) number of federally supported A&P personnel. Approximately 42 percent of the variability among these graduate education and research variables can be accounted for by knowing the federal funding variables. In summary, those departments that experienced decreased involvement with federally funded research, except for federally funded travel, tended to experience a decline in the number of federally supported graduate students and technicians along with an increase in university support and in the number of part-time and first-year graduate student enrollments. The increased part-time graduate enrollments might be explained by the lack of financial support which could result in many students securing outside employment. However, it would be expected that the first-year enrollments would decline in these departments due to lack of funding. This picture describes several departments in mathematics and physical sciences in particular.

The results of this study indicate that departments, indeed, are differentially affected by federally funded research. Although several departments were not affected at all by changes in federal funding, changes in the graduate education and research variables did still occur in them over the five-year period. The nature of the research performed and, thus, the resulting involvement in federal research are the primary factors in determining the extent of the federal impact on graduate education and research conducted in a department. The variables included in this study were identified in the literature as being affected by federal funding of university research. In the future, data on the set of twelve variables which contributed the most to the canonical correlations should be collected over several years. The trends could then be determined for each variable and prediction equations could be generated. Then, perhaps, department chairpersons and college deans could design strategies for handling and adjusting to the negative effects while the positive effects of federally supported research could be maximized.

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THE THREE-YEAR FINDINGS OF THE FLORIDA TECHNOLOGICAL UNIVERSITY TIME-SHORTENED DEGREE PROGRAM

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Time-shortened degree program development and implementation has received an extraordinary amount of attention during the past six years. In 1971, the report of the Carnegie Commission on Higher Education entitled Less Time, More Options, provided the catalyst for change. The report spoke specifically of shortening the time required for the baccalaureate degree, first to three and one-half years and then to three years. Bersi (1973) reported that 243 colleges and universities were involved in time-shortened program activities by 1973.

A variety of reasons have been advanced to establish the need for and purpose of a time-shortened or three-year baccalaureate degree. These reasons include the following:

1. Assumed reductions in university costs, at least in terms of the cost per baccalaureate degree
2. Consideration of the time-shortened degree as a vehicle for educational reform since it will force a thorough study of both high school and university curricular offerings
3. The assumption that better articulation and cooperation between universities and high schools will occur
4. Reduced costs to the individual student and family in paying for a college education
5. The calloused observation from a governmental point of view that the time-shortened degree places an individual student into a salary earning environment and, therefore, on the tax rolls at an earlier time
6. The assumption that students are maturing at an earlier age and can handle the rigors of college level instruction at a faster pace or earlier age
7. The claim that senior high school and introductory university curricula consist of senseless and endless duplication of efforts which stifles student curiosity, enthusiasm, and interest.

Numerous attempts have been made to economize the time required to complete the curriculum leading to the baccalaureate, and a variety of reasons have been advanced to support the need for such a program structure. However, program evaluation, when it occurs, has been limited to assessments of grade point averages and success in college.

Purposes

The purposes of this paper are threefold:

1. To contrast the intellectual development of time variable degree participants with a control group of students who participated in the traditional program
2. To contrast the academic achievement of time variable degree participants with a control group of students who participated in the traditional program
3. To present the findings of a follow-up survey designed to assess the level of program satisfaction and perceived intellectual development of time variable degree and control group students.

Historical Overview

Both the structure and length of baccalaureate degree programs have undergone frequent scrutiny and change throughout the development of higher education in America. In the colonial period, college had a predominately religious orientation which served the aristocratic groups by training for a broad liberal culture and Christian piety (Brubacher & Rudy, 1968). Today's universities are essentially secular, address social issues, carry out scholarly research, and are equalitarian in nature. The nature of the collegiate environment has changed as the needs of society have changed. In the late nineteenth century, Clarence King reported that university requirements for entrance were similar to college graduation requirements of fifty years earlier (Brubacher & Rudy). Many colleges allowed students to matriculate at age fourteen.

The division between secondary schools and colleges has not been clear, and articulation has been in a constant state of flux. As the secondary school system improved at the end of the nineteenth century and the beginning of the twentieth century, content duplication became a problem.

Due to the overlap problem which had developed, educational leaders recommended various approaches to modify the baccalaureate program. In 1888, at a meeting of the National Education Association, President Eliot of Harvard suggested that economizing the time to complete formal education should be considered. He asked if the length of time could be shortened and if the program could be enriched. Later, Eliot proposed that the four-year baccalaureate be reduced to three (Brubacher & Rudy). By 1906, when the baccalaureate program reached its peak, 41 percent of the Harvard graduating class received their baccalaureate degrees in three years (Bersi, 1975). William Rainey Harper suggested that the eighth grade through sophomore year be accomplished in six years by the average and five years by the brilliant (Brubacher & Rudy). Other educational leaders wanted to make adjustments to college courses themselves. Although repeated attempts were made through the first decade of the twentieth century to economize the time to complete requirements leading to the baccalaureate degree, the proposals were not widely accepted by academia.

Other than the continuing expansion of the public junior college system and the adoption of the Carnegie unit, through 1950, only limited attempts were made to shorten the time to complete the baccalaureate degree requirements. In 1953, the Advanced Placement Program was developed. After Russia's Sputnik, a survey of manpower resources in the United States revealed that less than 50 percent of the students who graduated in the upper quarter of their high school class received baccalaureate degrees (Brubacher & Rudy). Therefore, the need to increase the proportion of academically capable students receiving the baccalaureate degree became essential. The Advanced Placement Program served as a tool to facilitate the accomplishment of this national need. It not only expedited the transition from high school to college but also fostered the upgrading of high school curricula. The current interest was precipitated by the rapid growth of higher education during the '60s and the financial constraints of the early '70s.

A report published in October 1973 by the American Association of State Colleges and Universities entitled Restruc-

turing the Baccalaureate: A Focus on Time-Shortened Degree Programs in the United States revealed that 243 institutions were implementing some form of time-shortened educational activity on their campus. Of these programs, 73 institutions were either proposing, or were operating, programs which offered a major modification in the traditional four-year baccalaureate degree. A vast majority of the programs attempted to shorten the baccalaureate degree by eliminating the traditional general education requirements or replacing them with a modified program. However, only four institutions—Bellarmine College in Kentucky, Florida Technological University, Saint Francis College in Maine, and the University of South Alabama—awarded college credit on the basis of high school course achievement.

Florida Technological University Program

The Florida Technological University Time-Shortened Degree Program addressed the thesis that for the advanced student there is a needless duplication of effort among general education requirements of the university and closely related high school courses. During 1973, the program was limited to 108 first-time-in-college students who had a Florida Twelfth Grade Test score of 400 or higher (80th percentile or higher) and who had an academic grade point average of 3.0 or higher. Students were interviewed by an academic counselor to identify those courses for which university credit would be awarded. Credit was awarded for selected high school courses in which grades of B or higher had been earned. For example, if a student completed four semesters of English composition during his or her three years of high school with a final semester average of B or higher, the student would receive four quarter credit hours in basic English composition at the university. Table 1 provides a list of the courses for which credit was awarded and shows the number of students who received credit in each area.

Population. The population for this evaluation consisted of 108 time-shortened degree participants from the 1973 new-entering freshman class and 86 students selected as a control group from the 1972 new-entering freshman class. Although the time-shortened degree group and control group were not matched groups, they were similar in both academic potential and intended college major. The two groups had similar high school academic records, Florida Twelfth Grade scores, and initial discipline choice. The control group did not receive advanced placement since advanced placement was used only minimally during 1972 and 1973.

Methodology. The research design contrasted the development of the time-shortened degree group with a control group which had been selected from the previous new-entering freshman class. The Undergraduate Program Area Test, Undergraduate Aptitude Test, and the Watson-Glaser Critical Thinking Inventory were used to compare the intellectual development of the two groups. The academic achievement analysis was completed by comparing the overall college grade point average and the retention profiles by enrollment category for the two groups. In addition, an analysis was completed of the grades awarded during the first two quarters to time-shortened degree students in courses for which prerequisite credit had been awarded on the basis of high school achievement.

A follow-up survey was completed in February 1977 which was designed to assess the level of program satisfaction and perceived intellectual development by group.

Presentation and Analysis of Data

The comparison of the achievement records and retention ratios revealed that the time-shortened degree group was at least as successful as the control group. Furthermore, the data indicated that time-shortened degree students maintained relatively high grade point averages even though many waived the prerequisite requirement for advanced courses.

Table 1

Number of Time-Shortened Degree Students Receiving Credit, by Subject Area, Fall 1973

Subject area	Total
Communication	
English	78
Speech	11
Engineering	
Engineering Graphics	5
Humanities	
American history	73
World history	22
Humanities	21
Languages	64
Mathematics	
Introductory algebra	59
College algebra	24
Trigonometry	40
Analytical geometry	24
Calculus I	4
Natural Science	
General biology	76
General chemistry fundamentals	65
College physics	39
Social Science	
American national government	19
General sociology	15

Intellectual development. The testing program revealed substantial differences between group means for 4 of the 6 areas of assessment. Table 2 provides a summary of the measures of central tendency and dispersion of each test area by group.

At least nine-tenths of the time-shortened degree group and approximately one-third of the control group participated in the testing program. The control group members who participated in the testing program were representative of the overall control group in terms of academic potential as measured by the Florida Twelfth Grade Test (Coleman & Kamrad, 1974).

A comparison of the group means for the verbal scale revealed a difference of 43.4 points. The null hypothesis of no difference between the population means was rejected at the .05 level of significance. This may imply, in general, that students who participate in the traditional general education program have a higher verbal aptitude at the beginning of their second year, as assessed by the undergraduate test, than do students who receive advanced placement and exempt a majority of the general education courses. The comparison of the quantitative aptitude mean scores for the two populations did not reveal a statistically significant difference at the .05 level of significance.

The comparison of the area mean test scores revealed a difference of 71.6 points in the humanities area, 51.1 points in the natural science area, and 61.3 points in the social science area. The null hypothesis of no difference between the two population means was rejected at the .05 level of significance in each case. These findings may be interpreted, in general, to mean that students who complete the traditional first year of

Table 2

Summary of Undergraduate Program Test and Watson-Glaser Inventory Results, Fall 1973

Test area	Time-shortened degree group			Control group		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Undergraduate program aptitude						
Verbal*	106	482.0	85.8	30	525.4	95.2
Quantitative	106	573.9	92.2	30	590.2	80.1
Undergraduate program area						
Humanities*	103	447.2	64.6	26	518.8	73.1
Natural science*	103	548.5	78.2	26	599.6	90.4
Social science*	103	442.5	71.1	26	503.8	101.1
Watson-Glaser						
Critical thinking	98	77.9	8.5	21	79.5	7.6

*There was a statistically significant difference between the level of achievement for the two groups at the .05 level of significance.

college have a broader scope of knowledge in the humanities, natural sciences, and social sciences than students who receive advanced placement and waive these requirements. Since academically capable students at the university enroll directly in courses offered for majors rather than the traditional general education courses, the difference between the natural science group means may not be attributable to participation in the traditional general education curriculum.

A comparison of the group mean scores for the Watson-Glaser Critical Thinking Inventory revealed a difference of 1.6 points. This difference did not represent a statistically significant difference at the .05 level of significance. One of two conjectures may be drawn from these findings. Either critical thinking is not being taught in university general education courses or critical thinking is being taught, but the ability to apply these competencies does not develop until the student has had the opportunity to apply the techniques in the last three years of the baccalaureate curriculum.

Academic achievement. The three basic areas addressed by this section include overall grade point average analysis, retention analysis, and impact of waiving prerequisites. Table 3 provides a summary of the distribution of the enrollment of time-shortened and control-group students by group, enrollment category, and overall grade point interval. The data

Table 3

Distribution of Time-Shortened Degree and Control Group Students by Enrollment and Grade Point Average Category

Group and enrollment category	WP[a]	1.5	1.50–1.99	2.00–2.49	2.50–2.99	3.00–3.49	3.50–3.99	4.00	Enrollment total
Time-shortened degree									
Enrolled				3	17	17	7		44
Not enrolled									
<90 hrs			1	1	3	1	1		7
≥90 hrs and <135 hrs			3	1	7	3	1		15
≥135 hrs						1	1		2
Graduated					6	16	15	3	40
Group total			4	5	33	38	25	3	108
Control group									
enrolled			1	3	4		5		13
Not enrolled									
<90 hrs	1	1	1	9	4	3	5		24
≥90 hrs and <135 hrs					4	1	1		6
≥135 hrs									0
Graduated				4	5	19	15		43
Group total	1	1	2	16	17	23	26	0	86

[a]withdraw passing

revealed that 61 percent of the time-shortened degree group and 57 percent of the control group attained a B average or above. The null hypothesis of independence using a Chi-square analysis for group totals was not rejected at the .05 level of significance. This would imply that grade point average is not dependent on group. The null hypothesis of independence on the enrollment category totals was rejected at the .05 level of significance. These data revealed that enrollment category was dependent on group. A detailed analysis of these data revealed that a greater portion of the control group had graduated, a greater proportion of the control group dropped out prior to completing 90 quarter hours, and a greater proportion of the time-shortened degree group were still enrolled. The data seems to indicate that participation in the Time-Shortened Degree Program does not accelerate students by one complete year. However, participation in the Time-Shortened Degree Program may decrease student attrition. The percentage of students who either transferred or dropped was only 22.2 percent for the time-shortened degree group compared to 34.9 percent for the control group.

Table 4 provides a comparison of the overall grade point average and standard deviation by enrollment category for the two groups. These data revealed that the overall grade point average was the highest for each graduate subgroup. A comparison of the group means revealed that the overall average for the time-shortened degree group was higher than the control group mean in each category.

A statistical analysis in which the null hypothesis of no difference between population grade point averages by category was completed. In each case the null hypothesis of no difference was not rejected at the .05 level of significance. These findings would indicate that participation in the Time-Shortened Degree Program does not affect one's overall grade point average.

Table 4

Average Grade Point Average and Standard Deviation by Group and Category

Category	Time-shortened degree group		Control group	
	$\bar{y}$	s	$\bar{y}$	s
Graduated	3.430	.366	3.284	.453
Enrolled	3.076	.434	2.963	.669
Dropped	2.793	.576	2.765	.779

Table 5 provides a summary of the grades received by the time-shortened degree students in more advanced courses during their first two terms of attendance, after being awarded credit for the prerequisite course. These data indicate that more than 34 percent of the students received A's, about 38 percent received B's, and only 6 percent received less than a C. Of the 13 grades which were below C, 9 were in mathematics. These data seem to indicate that the time-shortened degree participants were able to do satisfactory work in the more advanced courses after having received credit based on high school achievement in the prerequisite course(s).

Survey findings. The follow-up survey revealed, in general, that both groups made considerable progress toward meeting their educational and professional goals. Likewise, participation in the Time-Shortened Degree Program did not appear to hinder those students who applied to graduate and professional schools. Sixty-one percent of the time-shortened degree group and 27 percent of the control group responded to the survey.

Table 6 provides a summary of the highest degree expectation by group. The null hypothesis of independence, using a Chi-square analysis, was not rejected at the .05 level of significance. These findings indicate that highest degree expectation is independent of group.

Table 5

Number of Grades Received in Advanced Courses for which Prerequisite Credit Was Waived, by Course Area, Fall 1972 and Winter 1973

Highest level awarded	Achievement in more advanced or related courses					
	A	B	C	D	F	W
Humanities & fine arts						
English 101–103	3	6	1			
History (American & Western Civilization)	2	2	2			
Speech 101	0	4	1			
Language 100	4	7	4			
Natural science						
Math 104	10	9	7			1/C[R a]
Math 106	5	2	4	1/C[R a]		1
Math 111	22	14	10	1		1
Math 211	7	12	5	3		1/C[R a]
Math 321	2	3	1			
Biology 100–102	7	9	4	2		
Chemistry 101–2–11	8	11	7	2		
Social science						
Sociology 201	2	1				
Total	72	80	46	9	4	

[a]Designates courses repeated and grades awarded.

Table 6

Highest Degree Expectation by Group

Degree level	Time-shortened degree		Control	
	Number	Percent	Number	Percent
Baccalaureate	19	29	5	21
Masters	33	50	12	50
Professional	6	9	2	8
Doctorate	8	12	5	21

Table 7 provides a summary of the number of graduate or professional school applications filed and the number of acceptances by group. These data revealed that although very few students had applied to graduate or professional schools, they were very successful in obtaining acceptances. When the time-shortened degree students were asked if participation in the program affected their acceptance status, three students

reported that it favorably affected their status, and the remainder reported that it had no impact.

Table 7

Number of Graduate School Applications and Acceptances by Group

Group	Number of applications filed			Number of acceptances		
	1	2	3	1	2	3
Time-shortened degree	10	5	6	12	4	5
Control	6	1	3	6	2	2

Table 8 provides a summary of how the participants perceived their experience at Florida Technological University in several areas of academic or social development. These data revealed that a vast majority of students from both groups perceived their experience at the university as an important contribution to their intellectual or cultural growth development. However, a greater percentage of time-shortened degree students indicated that their experience contributed only a small amount. A null hypothesis of independence using the Chi-square analysis was tested for each area after the little progress and moderate progress columns were combined. The quantitative area null hypothesis was rejected at the .05 level of significance. This would imply that the control group perceived their university experience as contributing more toward the development of this competency. The remaining null hypotheses were not rejected at the .05 level of significance. When the time-shortened degree participants were asked direct questions about

Table 8

Summary of Program Contribution in Selected Areas, by Group

Item	Time-shortened degree group				Control group			
	Little progress	Moderate progress	Much progress	Very much progress	Little progress	Moderate progress	Much progress	Very much progress
Intellectual growth: Your ability to understand and use concepts and principles from several broad areas of learning	2	13	36	15	0	7	14	3
Social growth: Your understanding of other people and their views; your experience in relating to others	8	25	19	14	2	6	6	10
Aesthetic and cultural growth: Your awareness and appreciation of literature, music, art, and drama of your own culture and of others	18	26	11	8	3	8	10	3
Reasoning ability: Recognizing assumptions, making logical inferences, and reaching conclusions	1	27	23	14	0	5	14	3
Critical thinking: Ability to withhold judgment, raise questions, and examine contrary views	4	24	23	14	1	4	12	7
Quantitative thinking: Understanding concepts of probability, proportion, margin of error.*	14	26	14	11	1	4	14	4
Writing and speaking: Clear, correct, effective communication	9	28	19	9	3	10	9	2

*There was a statistically significant difference at the .05 level of significance.

the value of the program, they overwhelmingly reported that it was an outstanding program and did not hinder their development. Likewise, they reported they would recommend it to any student who had a similar background.

Conclusions

The findings of the study indicate that both the time-shortened degree and control groups were successful in achieving their academic goals. Mean scores of the control group on the Undergraduate Program Test were greater than scores of the time-shortened degree group in the verbal aptitude and area tests at the beginning of the program. No difference was observed in either the quantitative aptitude section or the Watson-Glaser Critical Thinking Inventory means for the two populations. Although the graduation rate was higher for the control group at the end of three years, the overall attrition rate for the time-shortened degree group was lower. The time-shortened degree group was very successful in courses for which prerequisite credit had been awarded and attained at least as high an overall grade point as the control group. Both groups perceived the university experience as making a substantial contribution to their overall intellectual and social development. However, a larger proportion of the control group expressed reservations about the value of their university experience in contributing to the intellectual and cultural development. Direct program evaluation questions evidenced nearly complete satisfaction with the Time-Shortened Degree Program.

Since a majority of the time-shortened degree group did not graduate in the three-year period, additional research will have to be completed before conclusive evidence can be provided about the overall effectiveness of the Time-Shortened Degree Program.

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PLANNING AND HIGHER EDUCATION IN BRAZIL

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The explosive and dramatic growth which has characterized the development of the Brazilian economy since the mid 1960s has been labelled *the miracle*. Yet, even those persons who are most laudatory of such growth are also aware of the problems and obstacles which have accompanied this boom. Brazilian higher education—indeed, the entire educational system—has not escaped some of the problems resulting from this growth. Inadequate physical facilities, too few qualified faculty, and underdeveloped libraries are some of the problems that plague the orderly growth and development of Brazilian education. In higher education, especially, we can say with accuracy that most of these difficulties have resulted from a scarcity of accurate statistical data which, in turn, makes educational planning difficult to accomplish.

A recent publication by the Carlos Chagas Foundation of Sao Paulo states:

> During the last decade, educational planning has had a strong impact on the Brazilian educational system . . . The Ministry of Education (Ministerio da Educacao e Cultura, 1974) points out that in the early stages of development of educational planning, one of the greatest difficulties was the scarcity of information about the educational system. The same publication characterizes the present stage by two main efforts: (a) to solve the most crucial problems; and (b) to develop a better information system. It is explicitly recognized that much research and evaluation is needed to support the continuing development of educational plans. (Bessa, 1976, p.17)

Before delving further into the origins and details of this problem, we should first provide some background about the Brazilian system of higher education.

Background

The early 1960s signalled the end of a period of long pedagogical debate resulting in the approval of the Law of Directives and Bases of National Education. The adoption of these directives ushered in a new period of university reform. Born out of a compromise between two opposing philosophies, the Law of Directives and Bases of Education was, in effect, a synthesis of antinomies. It was this reform which made possible the development of the comprehensive integrated university, the movement toward which comprised three distinct phases: (a) implementation of the University of Brasilia, (b) the university reform movement, and (c) implementation of the reform on a general scale.

While the reform was well received, it had no immediate impact on the expansion of higher education. It was the student unrest and public pressure for expansion of higher education that pushed the government to create a task force to expedite the university reform.

The work of the task force for the reform of the university constituted the second phase of the reform movement. The basic philosophy of this working group can be summarized as follows: university reform must, in the opinion of the working group, fulfill its primary function of accepting the role as a preinvestment in the development effort (Abu-Merhy, 1971).

Following is a brief description of the new structure of Brazilian higher education. According to a 1974 report of the Ministry of Education and Culture, the guiding principles of the present university reform are the following:

1. The principle of no duplication of means for identical or equivalent ends in order to permit full utilization of available resources
2. The principle of structural and functional integration of research and teaching within the university
3. The adoption of the departmental system
4. The concentration of basic, scientific, and humanistic studies in an integrated system of units (centers or facilities) for the service of the whole university
5. The organization of a first cycle of basic studies common to all courses or groups of related courses.
6. The creation of a superstructure of graduate courses (Sucupira).

The real and dramatic expansion of Brazilian higher education started in the 1960s, when the Law of Directives and Bases of Education permitted the creation of private institutions of higher education. As a result, in 1973 there were 797 institutions, of which 57 were universities, 3 were federations of schools, and 712 were "isolated schools." By type of control, these institutions were distributed as shown in Table 1.

Table 1

Number of Institutions of Higher Education in Brazil, 1973

	Federal	State	Municipal	Private	Total
Universities	29	7	1	20	57
Federations of schools	1	. . .	. . .	2	3
Isolated schools	16	74	75	547	712
Extensions	25	. . .	. . .	. . .	25
Total	71	81	76	569	797

Note: From "Emerging Structures of Higher Education and the Community College Concept: Implications for Brazilian Higher Education," an unpublished doctoral dissertation by J.C. Dos Santos, Filho, University of Southern California, 1974. Used by permission.

Another result of the reform has been a dramatic shift in emphasis from elitist to mass higher education in Brazil.

As Jose Camilo Dos Santos (1974) points out:

> While in 1963 only 13 out of a thousand students who entered the school sustem registered in higher education, in 1973 there were 63 out a thousand entering higher eduacation. While, in 1965 the index of students in

higher eduction for a population of a hundred thousand people was 2 percent, in 1973 that index rose to 7 percent. (p. 148)

The magnitude of this expansion is best realized when one studies the enrollment growth which has occurred during the last three decades.

Table 2

Growth of Student Enrollment in Brazil from 1940 to 1974

Year	Student enrollment
1940	23,000
1950	44,000
1960	93,000
1970	425,000
1973	836,000
1974	1,018,000 (estimated)

It is not only this rapid growth in enrollment that has made planning difficult. There is another, more important, reason: poor methods of data collecting. Educational data is collected and analyzed primarily so that it can be used to improve the processes of administration, planning, and decision making which, in turn, assist in the improvement of education.

The lack of proper methods for data collection in Brazil results, in large part, from the attitudes of educational administrators (who are not accustomed to having timely and pertinent information available to serve them and who generally do not think in terms of the role that such information could play in their decisions).

Obviously, the relationship between the gathering and development of educational information and its use in planning and decision making is one which can be resolved only in part by improvements in the information system itself. Operation of the Brazilian education system needs to be considered as a whole, including all levels and types of education, both formal and informal methods of delivery, and both public and private sectors. Also, the inputs to, and production from, these areas need then to be related to the economic and social needs for training and for other education-based characteristics of the population. Well-organized and reliable information can serve to improve and strengthen education, but not without full use of that information in the management of the system. The planned development of Servico de Estatistica de Educacao e Cultura into a national education information system is thus a hopeful development. However, to be effective, it must be linked with research, economic planning, and a more coordinated operation of the entire education system.

The following brief account of one federal university's efforts to develop and implement master degree programs is intended to illustrate some of the obstacles that stand in the way of proper planning of such programs.

Case study

In May of 1974, the School of Education of the Federal University of Parana began planning and developing its first graduate program. Major responsibility for this task was assigned to an elderly professor who held the degree *Livre Docente*. He was assisted by others of like training and experience, none of whom had master's or doctor's degrees or taught graduate-level courses.

Initial efforts toward curriculum development were haphazard. Advice of available curriculum specialists was not sought, programs or courses were not based on labor market surveys or job analyses which would indicate the type of graduate desired nor was adequate attention given to the National Plan for Graduate Education. Instead, the two curricula developed were based on the personal experiences of certain individuals, the courses (disciplines) that could be offered by present, local faculty, and the heavy interest placed at that time, throughout Brazil on planning. The two areas of the graduate program selected were (a) teaching methodology and (b) educational planning.

The lack of understanding of what graduate education involves and the lack of sufficient academic and technical planning assistance in preparing the graduate program were quickly noted, primarily by the younger professors (with master and doctoral degrees from the USA and Europe) who were called in later to serve as assistants to the Livre Docentes. Several probable obstacles to implementing the graduate program and obtaining accreditation from the Federal Council of Education were cited by the younger professors. Most important among them were (a) an inadequate library collection, (b) an insufficient number of Ph.D.'s and (c) the existence of similar programs in several other Brazilian universities.

Even though these implied suggestions for improvement went unheeded, consultation was sought in April of 1975 from appropriate federal agencies for the formal request for accreditation. At that time, it was once again pointed out that several other federal universities were offering similar programs, that the present quality of the faculty needed strengthening, that the library was insufficiently specialized, with too few holdings, and that certain support conditions (equipment, facilities, and secretarial assistance) needed improving. It was suggested that the School of Education reconsider its plans. In the meantime, classes continued to be held.

In May of 1976, federal agencies offered to furnish substantial funds for the improvement of the above-noted deficiencies if the School of Education were willing to develop a major in "curriculum" for which there was great need in Brazil. The suggestion and offer were accepted, and as a result, technical agreements were prepared which enabled the school to obtain the equivalent of approximately $75,000 for equipment, materials, and serial publications (the money to be spent within one year). A similar amount was obtained for the contracting of new professors during the period of July to December 1976. Additional salary funding provided for an additional five Ph.D.'s, two Livre Docentes, and two Ph.D. candidates.

Also, during 1976, and with needed assistance provided by faculty with foreign degrees, the graduate program statute was entirely reworked with the intent of strengthening the program, adding a new program in curriculum and adding several new faculty members. Subsequently a new program-directing body was elected and a new request for program accreditation was prepared and submitted to appropriate officials for approval.

It is expected that the new program will continue to function normally in 1977. The intention in 1977 is to begin planning for the development of a second major area of graduate study in 1978–79. Hopefully, adequate planning and survey data will be utilized so that the programs more closely approximate the local and national needs.

Discussion, Conclusion and Recommendations

Recent past and present efforts by the Brazilian Ministry of Education and Culture and the related semi-autonomous institutions have provided an ever more centralized viewpoint of needs and coordinated planning efforts through which it is expected that education can maximize its contribution to national development. During the past two or three years, federal funds for education have increased rapidly, keeping pace with the

government's belief in the role of education in national development. In fact, among all ministries, the budget for the Ministry of Education and Culture increased the most—doubling from 1976 to 1977.

However, the federal, state, and private universities, by and large, still continue to develop new graduate programs largely on the basis of individual professors' interests, even though many of them lack the abilities and understanding of what graduate education is all about.

Such actions are in violation of one of the directives of the National Plan for Graduate Education, which emphasizes the need for a coordinated expansion of graduate education programs and which states that the expansion of the system not be prejudiced by personal or institutional initiatives that do not coincide with national priorities.

Initially, the Ministry of Education made no concerted attempt to compel universities to follow ministry-level planning. Consequently, individual professors and institutions continued to create or expand programs having inadequate program structure (libraries, laboratories, equipment, staff support, etc.) and insufficient numbers of qualified professors. The National Council for Graduate Education, therefore, passed a resolution requiring that financing of new programs or the expansion of existing programs can only follow preliminary approval by one of the council's technical coordinating groups. Hence, to obtain federal financing today for graduate education, a series of forms justifying the creation or expansion of a program, guaranteeing the continuance of the program for at least three years, and setting forth a program for faculty upgrading must be submitted at least 180 days prior to the projected date for initiating graduate program activities.

There continues to be a lack of adequate communication between the federal coordinating agencies and the universities and the professors involved in the programs. Moreover, much of what is communicated goes unheeded at the lower levels and underscores the need for more effective two-way communication.

Another interesting point to consider is financing. In the past, plans for program development were made and funds promised. But, in many cases, the financing did not materialize. Therefore, in the early phase of program development, there was a general pessimism about receiving any funds and, therefore, little desire or interest in planning for them. As a consequence of the present availabilty of government funds and present understanding or program planning and execution, there is now the odd circumstance of having, or being able to have, funds and not knowing how to use them well.

In an attempt to clarify and begin remedying some of the major problems which have beset graduate program development by discussing mutual development problems, a nationwide seminar of graduate school deans and ministry personnel was held in December of 1976. The implementation of the Institutional Plan for Faculty Training was another positive step taken in 1976 toward upgrading and completing graduate program faculties which, in turn, have provided a much stronger basis for supporting research on the graduate level.

If graduate-level programs are to grow and develop properly, planning must first be improved and regularized.

The authors believe the following four major suggestions would bring about the necessary improvement:

1. Some formal, regular means of communication (newsletters, meetings, and/or other forms of communication) ought to be established—vertically between the ministry and its related agencies and the universities, and horizontally among the appropriate university personnel—to keep all involved in planning graduate programs fully informed.

2. A series of regularly scheduled training programs/seminars, accompanied by the distribution of pertinent technical materials, should be offered to all those responsible for planning and developing graduate programs within the federal universities.

3. A ministry-level, or ministry and its related agencies, technical aid service should be offered, either on a regular or on-call basis, to assist those responsible for planning individual graduate programs or university graduate education systems.

4. A series of regularly programmed, vertically and horizontally focused planning sessions should be built on the above three activities. Such activities would not only provide a better insight into, and acceptance of, overall and detailed planning but would promote a constant coordination of graduate program planning.

Failure to find solutions to the problems referred to in this paper will lead to more serious difficulties and will further impede the development of needed planning efforts.

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RESEARCH AND PLANNING THROUGH DEPARTMENT/PROGRAM REVIEW: A UNIVERSITY'S EXPERIENCE

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The purpose of this paper will be to describe the development and use of a department and program review process employed at the University of Utah. This process was designed to identify issues and problems of planning and management as well as to consider their impact on resource use and was intended to produce information in a form useful to institutional managers (executive officers, deans, and department heads) as they make resource allocation decisions. The activities of university planners and institutional researchers as they supported the review process will be given special emphasis.

Before proceeding, it seems appropriate to define the concept of a review. A review, whether program or department, is a process of collecting, analyzing, and integrating a variety of data elements in order to focus attention on program or unit performance and policies directly related to enrollment, personnel, funding, work load, and course and degree offerings. In other words, a review process provides an objective macro-analysis of department or program policies and practices that require a closer look as well as providing clues as to which departments or programs may be candidates for resource enrichment or reallocation.

The Review Process

The planning and budgeting processes provide instances where the availability of department or program review information can influence decision making. Several years ago, staff in the University of Utah's Academic and Financial Planning Office felt that they could improve their service to institutional managers by initiating a review process intended to accomplish the following objectives:

1. University decision makers would be provided with timely planning and management information obtained from central data sources.
2. Significant trends in specified areas of university operations would be highlighted.
3. Attention would be focused on specific problems and policy issues.
4. A medium for familiarizing decision makers with the use of management information would be provided.

To achieve these objectives, it was necessary to employ several strategies and to initiate a variety of actions.

A. Review considerations. The decision to initiate an ongoing centralized review process was preceded by consideration of seven questions.

1. Who are the primary actors in determining the allocation of institutional resources?
2. What formal and informal processes are employed to arrive at planning and resource allocation decisions?
3. What role does data analysis play in department, college, and institutional planning and budgeting decisions?
4. What amount of staff effort is devoted to the preparation of planning and management information?
5. Are planning and budgeting data available when needed by decision makers?
6. Do planning and budgeting data portray trends in such areas as enrollments, course and degree offerings, personnel, work loads, and funding?
7. Are planning and budgeting data analyzed and provided to decision makers with commentary?

Answers to these questions helped to determine whether an ongoing department or program review process was needed. The answers also provided clues as to how such a process could effectively improve managerial decision making.

B. Data considerations. The review process was designed to focus attention on unit performance and policies through the display of management information. The preparation of management information involved defining, collecting, interrelating, evaluating, analyzing, and interpreting data to assist decision makers in addressing the issues and problems of planning, organizing, and controlling. The need to take each of these items into consideration during the process of preparing review information caused numerous problems and challenges for the academic and financial planning staff. For example, data elements considered as appropriate descriptors resided in a variety of data bases which were developed to satisfy the operational day-to-day needs of specific administrative units. Since the stewardship function of administrators varied significantly from the planning, organizing, and controlling functions performed by managers, preparers of review data had to identify the weaknesses and idiosyncrasies of operational data before such data could be processed. Below are several examples of issues and questions staff planners encountered when considering data elements for review purposes:

1. Student credit hour data can be reported in a variety of ways, e.g., by course level, by student level, and by a combination of the two. Which way is most meaningful?
2. Full-time equivalent student and faculty calculations can be derived in numerous ways. What criteria should be employed? Can this criteria be applied uniformly within the institution?
3. The accuracy of student and course data is dependent on the admissions and registration processes and systems. Where do the holes exist in these systems? What problems are created through automation of these reports?
4. Financial data can be reported using actual expenditures or budgeted amounts. Which reporting method will provide timely, yet comparable, data?
5. Is it possible to obtain an accurate count of regular and part-time students and faculty?
6. Can the institution identify which graduate assistants and fellows actually have course-related responsibilities and which do not?
7. When should the snapshot be taken for each type of data? What reconciling problems will be created when these time frames vary?
8. Is it possible to implement a data crosswalk between the institution's organizational structure and Higher Education General Information Survey (HEGIS) disciplines?

The academic and financial planning staff were also concerned that review information mirror organizational and program units as clearly as possible. It is especially important to check this when computers are programmed to perform much of the data integration and manipulation. This point prompted consideration for the evaluation of review information prior to

its use by decision makers. By employing computer technology and software packages to generate management information, institutional personnel have increased their ability to produce an overabundance of data. However, the utility of such data is questionable unless its accuracy is verified. Therefore, preparers of review data must define their expectations regarding data accuracy and utility. The academic and financial planning staff responded by posing questions about data validity and reliability to those who maintained each data system that supported the review process. In addition, these administrators were asked to "signoff" on data derived from their data bases before it was distributed to academic units.

A final consideration regarding data preparation concerned the fact that few academic deans and department heads have the time or desire to review volumes of data. Therefore, data synthesis and interpretation become indispensible elements in the review process. The planning staff in the Academic and Financial Planning Office saw their role and task as one of translating numbers into information that academic administrators could use.

With these considerations in mind, the data elements and their uses, (as listed in Table 1) were those employed by the academic and financial planning staff for inclusion as the primary department and program review data.

C. Data display. After data elements were selected, an appropriate display format was designed to aid in their collection, integration, and analysis. The major sources of data included: registrar's reports of enrollment, credit hours, and degrees conferred; budget and financial reports; instructional staff and salary summaries of the American Association of University Professors (AAUP), instructional work load and other activity data. Most of the compilation work involved transfer of data elements from standard reports (some computerized) and documents to a four-page summary format designed for the project (see figures 1 and 2). These data formats served to display review data for the three groups of institutional decision makers: executive officers, deans, and department heads.

D. Data analyses. In addition to supplying decision makers with trend data, planning staff also performed analyses which centered on such topics as course and section proliferation, faculty activity and instructional productivity, the replacement of teaching assistants with regular faculty to improve undergraduate education, the magnitude of instructional service to departmental majors versus other university majors, and class size analyses.

These summaries, including written analyses, helped to highlight significant trends and issues of concern to executive

Table 1

Department and Program Review
Data Elements and Their Uses

Data element	Uses
Credit hours	Measure of instructional service by course level Source for FTE student enrollment Instructional work load productivity ratio Instructional work load matrix Enrollment projections Student/faculty ratios
Budgeted FTE faculty	Measure of budgeted salary support Instructional work load productivity ratio Average salary information Student/faculty ratios
Headcount faculty (regular only)	Measure of budgeted salary support Percent tenured
Budgeted FTE teaching assistants	Measure of instructional support staff Average salary information Ratio of teaching assistant FTE as percent of faculty FTE
Budgeted salaries (regular faculty & TA/TF)	Average salary information by rank
Total funds	Measure of total financial support
General operating funds	Measure of state support
Other funds	Measure of non-state support Ratio of other funds as percent of total funds
Course contact hours	Measure of total instructional service
Section offerings (fall quarter)	Measure of instructional service by course level
Degrees conferred	Measure of instructional output

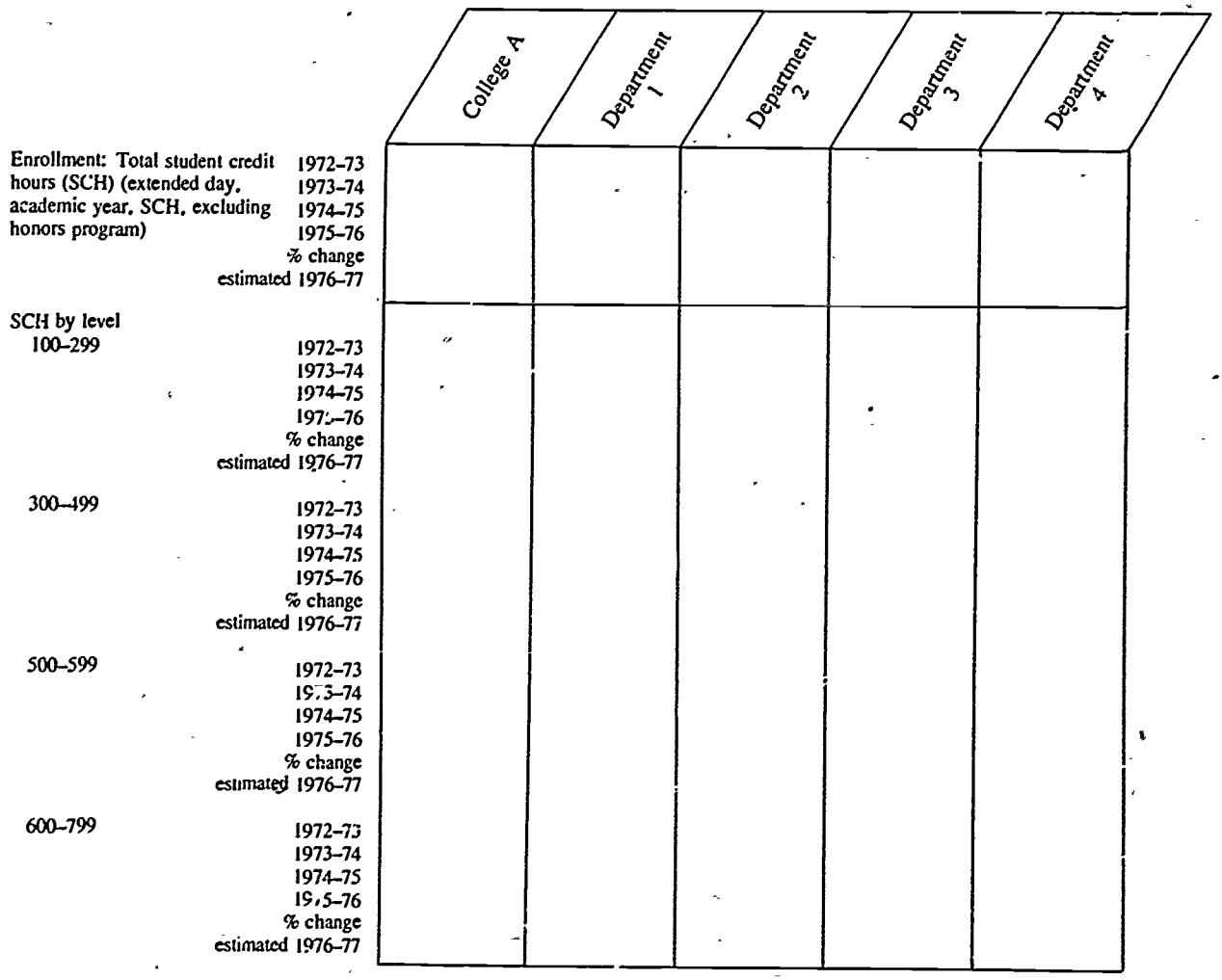

Figure 1. Enrollment data elements and display format for use in college and department review.

officers, deans, and department heads. Since the planning and budgeting needs of executive officers varied somewhat from those of academic unit heads, a separate data analysis was performed for each group.

E. Marketing. With completion of the data analysis phase of the review process, attention turned to the assembly of the analyzed data into a Planning and Budgeting Guide and its distribution to appropriate decision makers. Actually, two versions of the guide were prepared: one for executive officers reflecting their needs and one for use by deans and department heads.

The guide was packaged in a looseleaf binder to facilitate additions, deletions, and updates of the materials. It was organized as follows:

I. Introduction and Table of Contents
II. Policy Issues and Data Analyses—A Synopsis
III. Review of Academic Units/Programs
IV. Historical and Projected Enrollments
V. Department Information Exchange
VI. Appendixes
  A. Summary of College Expenditures by Fund Source
  B. Employment Outlook for Graduates
  C. Source of Data Elements

Since a major objective of the review process was to familiarize decision makers with the use of management information at a time when it would be useful to them, distribution of the guide became a major concern. The strategy employed by the academic and financial planning staff was to include the guide with the budget request worksheets and total dollar allocations sent to deans and department heads shortly after the university received its state appropriation. In addition, the guide was reviewed with deans on an individual basis and, one year, collectively at a regular meeting of the council of deans chaired by the vice president for academic affairs.

Executive officers received copies of the guide shortly after the deans and well before the review of department and college budget requests. Each executive officer was given a private orientation to the guide to ensure that he or she understood its contents, its potential utility, and its shortcomings.

F. Benefits. Reflection on the process of preparing department and program review information indicates that the following benefits have been derived:

1. The academic and financial planning staff interest in providing planning and management information provided a forum for discussion of issues and concerns with a variety of university decision makers.

2. The staff were challenged to carefully consider data availability and utility, display formats, and analyses to be performed before plunging into the task of data collection.

FACULTY:		FACULTY (cont.):		INSTRUCTIONAL DATA:	
FTE (budgeted)		Average faculty salary	1972–73	Course contact hours offered	1972–73
Academic year	1972–73		1973–74	(Academic year total	1973–74
	1973–74		1974–75	on-campus instruction	1974–75
	1974–75		1975–76	excluding unscheduled	1975–76
	1975–76		1976–77	teaching)	
	1976–77		% change		
	% change			Number of sections	
		Average TA/TF salary		(fall quarter, excluding labs	
Summer	1972–73	(.50 FTE)	1975–76	or discussion)	
	1973–74		1976–77	Lower	1972–73
	1974–75				1973–74
	1975–76	FUND SOURCES:			1974–75
	1976–77	Total funds			1975–76
		(all sources)	1972–73		1976–77
Head count	1972–73		1973–74		
	1973–74		1974–75	Upper	1972–73
	1974–75		1975–76		1973–74
	1975–76		% change		1974–75
	1976–77				1975–76
		General operating			1976–77
Tenured (no. & %)	1973–74	funds (actual)	1972–73		
	1974–75		1973–74	Graduate	1972–73
	1975–76		1974–75		1973–74
	1976–77		1975–76		1974–75
			% change		1975–76
Auxiliary	1974–75				1976–77
	1975–76	Budgeted	1976–77		
	1976–77			Degrees conferred	
		Other funds	1972–73		
FTE teaching assistants/			1973–74	B.A./B.S.	1972–73
teaching fellows (TA/TF)	1972–73		1974–75		1973–74
	1973–74		1975–76		1974–75
	1974–75		% change		1975–76
	1975–76				% change
	1976–77	Other funds as a % of			
		total funds	1972–73	M.A.	1972–73
TA as a % of faculty FTE	1972–73		1973–74		1973–74
	1973–74		1974–75		1974–75
	1974–75		1975–76		1975–76
	1975–76				% change
	1976–77				
				Ph.D.	1972–73
					1973–74
					1974–75
					1975–76
					% change

Note: College and department columns have been omitted for display convenience.

Figure 2. Format for college and department review of faculty, fund source, and instructional data elements.

3. Data collection and subsequent use provided an excellent means to critique the strengths and weaknesses of operational data systems.

4. Persons responsible for the collection and reporting of operational data were informed of how their data were being used to develop management information. Suggestions were made (and some were implemented) regarding the improvement of these data bases.

5. Information included in the guide was up-to-date.

6. Data analyses were issue directed and simple to communicate and understand. Policy analysis was facilitated by the availability of relevant information.

7. Distribution of the guide to deans informed them of the specific data used by executive officers in arriving at resource allocation decisions. This awareness permitted these administrators to begin resource negotiations from the same reference point.

8. The guide contained data items often required by external agencies, including accrediting agencies.

9. Preparation and distribution of review data to deans and department heads lightened their load in preparing this information.

In summary, it should be emphasized that the lessons learned when preparing the Planning and Budgeting Guide have caused academic and financial planning staff to be critical when analyzing the data supplied in standard operating reports. Where these data are input directly to a computer-based information system, there must be awareness of potential problems concerning the validity and reliability of the system's output. The preparation, by hand, of reports for use by college and university administrators offers the distinct benefits that derive from "hands on" experience. In addition, these efforts pave the way for eventual assimilation of the reports into a totally automated process.

The following recommendations are offered to those who would wish to follow the illustration presented here. They should, in addition, provide useful reminders for those persons who rely on computer-based information systems as the source of management information.

1. There should be a constant monitoring of the sources of operational data and a check on the utility of such data for planning and management purposes.

2. Administrators should be encouraged to identify the issues and concerns they wish to have addressed before data is collected and analyzed.

3. Persons or offices where data is generated should be tapped as a source of expertise with insights into the quality and meaning of the data provided.

4 Sufficient time should be allowed for data analysis before reporting.

5 Procedures for information collection and update should be thoroughly documented so that tasks can be performed by clerical staff under supervision. This assures continuity of efforts and comparability of data.

6. Information should be disseminated as widely as organizational policy will permit. This will help to negate the need for colleges and departments to maintain separate records or hire analytical studies staff of their own.

7. Efforts to increase the number of organizational units covered should be made. (For example, efforts are underway to develop and report planning and management information for use by the university libraries, student services, and division of continuing education.)

TRANSLATING GOALS INTO MEASURABLE OBJECTIVES: RESEARCH STUDIES AND PRACTICAL PROCEDURES

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In a recent essay on university goals, Conrad (1974) points out that goals (a) are standards against which to judge success, (b) provide a source of legitimacy which justifies the activities of an organization, (c) define organizational needs and priorities, (d) define production units for "outputs" for the organization, (e) define the organization's clientele, and (f) define the nature of the relationship between the organization and society. He also points out that "in most universities, goals are often implicit, residing in an extended body of collective understandings rather than in explicit statements" (p. 505). He goes on to say, "If university goals are to serve the purposes listed above, they must be identified more precisely."

The goals of specific colleges and universities have traditionally been described in broad, vague, high-sounding, and, often, internally inconsistent terms. Such a situation did not cause any major problems as long as people fully accepted the intrinsic value of a college education and as long as the demands made on postsecondary education institutions remained relatively stable. However, during the fifties and sixties, postsecondary educational institutions, in particular those in the collegiate sector, came under increasingly severe pressure to grow in size and complexity and to meet the diverse needs, desires, and expectations of many new groups throughout society. In response to these voluminous, diverse demands being made on them, institutions often found themselves trying to become everything to everybody. In the process, colleges and universities of all types grew increasingly alike; they tended to lose their individual identities as they pursued an ideal typified by the university model. As a result, the purposes, goals, objectives, and priorities of institutions have not been very distinct, nor very apparent even to students, faculty, and administrators.

It is apparent that the problem of goal setting becomes one of identifying and clearly stating the following: (1) what it is the institution is trying to accomplish, (2) whom it is trying to serve, (3) how it intends to accomplish its objectives, and (4) how much it intends to accomplish and how well it intends to do it. Without answers to these questions, an institution cannot really specify its purposes and goals sufficiently to meet its internal needs for direction. It also becomes difficult for it to stake out its claim to some special place in the larger postsecondary education community. And, unless institutions get down to tangible, concrete levels of specificity, it is impossible to really answer these questions. The key to solving the problem of goal setting is concreteness or specificity. There seems to be widespread recognition of the problem but limited capability to deal with it. Institutions have found that dealing in the abstract with the development of goals and objectives has proved to be a very frustrating experience: they can often identify and state their goals in general terms but cannot make the crucial leap to the translation of their goals into objectives in terms specific enough to be effectively acted upon and assessed. Developmental work on the development of institutional and organizational unit goals, conducted by the National Center for Higher Education Management Systems (NCHEMS) at institutions such as South Dakota State University and Kalamazoo Valley Community College has further emphasized the need for concrete guidelines and alternative strategies for deciding about goals and, especially, for translating these general goals into specific objectives.

Translating goals into measurable objectives to be pursued by the institution is the step that gives concrete and specific expression to the institution's purposes. It is also a step that is especially difficult to achieve. In translating goals into measurable objectives, all of the issues and complexities related to outcomes identification and measurement come into play. Inability to state institutional purposes in specific, measurable terms often hinders, if not precludes, assessing the extent to which goals have been achieved. Moreover, lack of specificity also increases the difficulty of effective communication with institutional constituencies, especially external constituencies from whom pressures for institutional accountability arise.

In translating institutional goals into measurable objectives, a major difficulty is identifying the pieces of evidence that demonstrate progress toward the achievement of the established goals. One factor contributing to this difficulty is that the persons responsible for identifying outcome measures most often start from scratch. Furthermore, as in the goal-definition process, there is frequently difficulty in reaching agreement on specific measures because of the variety of interests, perspectives, and expectations.

The purpose of this paper is to describe two studies which researched questions related to selecting specific measures to be used in goal translation and evaluation processes. In addition, these efforts provided prototype methodologies that could be used by institutional personnel to support the objective-setting process. These studies were the following: Institutional Goal Achievement: Measures of Progress (Romney, 1976) and Higher Education Outcome Measures Identification Study (Micek and Arney, 1974).

These studies and their implications for the goal translation process are discussed in the following pages.

Institutional Goal Achievement (IGA): Measures of Progress

The IGA study was guided by the following purposes:

1. Assess the interests of three campus constituencies (faculty, administrators, and trustees) in being involved in institutional goal-setting and assessment processes
2. Examine the acceptability of specific goal areas (or planned outcomes) to these three audiences in six kinds of institutions
3. Assess perceptions as to which goal areas can be measured and how they can be measured, as viewed by trustees, administrators, and faculty

4. Gather information regarding perceptions of the appropriateness of specific kinds of information as measures of progress toward the achievement of broadly stated institutional goals

5. Determine if the appropriateness of the measures of progress toward the achievement of institutional goal areas varies significantly among the three constituent groups

6. Determine if the appropriateness of the measures of progress for different institutional goal areas varies significantly among six types of institutions.

The study population consisted of 1150 faculty, trustees, and administrators from 45 colleges and universities throughout the country. These institutions were classified into six major categories, as follows:

1. Public doctoral-granting institutions (7)
2. Private doctoral-granting institutions (3)
3. Public comprehensive universities and colleges (9)
4. Private comprehensive universities and colleges (4)
5. Liberal arts colleges (12)
6. Two-year colleges and institutions (10).

Faculty and trustee respondents to the study were chosen randomly, whereas administrators were selected on their specific institutional responsibility. The survey instrument to which these individuals were asked to respond consisted of two principal sections. The first contained demographic and identifying information about the respondent. The second dealt with measures of progress for twenty broadly stated institutional goal areas. The goal areas were derived from the Institutional Goals Inventory (IGI) developed by and used with permission of the Educational Testing Service (ETS). The IGI consists of several specific goal statements in each of 20 institutional goal areas, 13 of which are designated as outcome goal areas. The remaining 7 are labeled process goal areas by ETS.

Associated with each IGI goal area on the study questionnaire were sets of 4 to 11 measures of progress or possible items of information to be used to demonstrate progress toward the achievement of the goal area in question. All in all, respondents, in addition to the 20 goal areas, were asked to respond to 125 measures of progress. These measures were developed and contributed by the staffs of NCHEMS, Western Interstate Commission for Higher Education (WICHE), and the Higher Education Center of the School of Education at the University of Colorado. In addition, a panel of experts, identified by the author and staff members at NCHEMS, reviewed and supplemented the list of measures.

To complete the questionnaire, respondents were asked to rate the degree to which each goal area should be a goal of his or her institution. Secondly, the respondent was asked to indicate the degree to which each item of information was considered to be an appropriate measure of progress for the goal area.

Findings of the institutional goal achievement study. The study produced a wealth of information, only a small portion of which has been thoroughly examined. A detailed examination of the results and conclusions obtained thus far are recorded elsewhere (Romney, 1976). Only those results that relate directly to the topic at hand, namely translation of institutional goals into measurable objectives, are reported here.

1. Generally, the appropriateness of measures of progress for demonstrating institutional goal achievement did not vary across the faculty, trustees, and administrators. There were only seven instances in which views of the three types of respondents differed significantly. Trustees and administrators differed only with regard to two measures.

(a) Scholarly works produced by students and/or former students that are considered suitable for publication (trustees rating this lower than did administrators)

(b) Institutional policies and procedures developed to protect the exercise of academic freedom by faculty and students (trustees rating this lower than did administrators).

Trustees and faculty ratings of appropriateness differed only for one measure, "institutional policies and procedures developed to protect the exercise of academic freedom by faculty and students" (faculty rating this significantly higher than did trustees).

Administrators' and faculty ratings of the appropriateness of measures of progress differed significantly only with regard to five measures:

(a) Satisfaction of currently enrolled students or recent graduates with their academic development (administrators rating this as being more appropriate than did faculty)

(b) Student/faculty ratios (faculty rating this measure higher than did administrators)

(c) Amount of release time granted to faculty members for community service (faculty rating this higher than did administrators)

(d) Availability and use of an institutional information system (administrators rating this higher than did faculty members)

(e) Satisfaction of students and former students with the extent and nature of their educational experience and subsequent employment (administrators rating this higher than faculty).

2. The results suggest that if the following 14 types of information were collected, progress could be demonstrated toward the achievement of the 7 most important goal areas for each of the 6 institutional types. Moreover, this evidence would be acceptable generally to at least the faculty, administrators, and trustees in each type of institution.

(a) Student ability to apply knowledge

(b) Continuing active intellectual involvement of former students other than formal, advanced study

(c) Course offerings and institutional opportunities pertaining to the development of individual goals, values, and personal growth

(d) Students and/or former students expressing concern for human welfare and well-being

(e) Employer satisfaction with former student vocational or professional training

(f) Scholarly works produced by graduate students and/or former graduate students considered suitable for publication

(g) Basic research publications or other results of scholarly effort produced by students or faculty members during the past year

(h) Evaluations and perceptions of members of the community regarding the quality of institutional services available to them

(i) Existence of special courses and programs to meet the needs of particular groups of students

(j) Institutional policies and procedures developed to protect the exercise of academic freedom by faculty and students

(k) Attendance and participation by faculty in the faculty senate or similar body

(l) Faculty and staff perceptions and evaluations of internal morale

(m) Student and/or faculty attendance at cultural activities sponsored by the institution

(n) Impacts of modifications made in courses and programs.

3. An examination of these 14 items of information reveals a decided lack of compatibility with measures currently used to provide evidence of productivity. For example, in a study conducted to determine which outcome measures of community colleges are collected by state agencies, Kinnison (1976) found that most are required to supply information on the number of students enrolled, full-time equivalent students, and degrees

granted. To such a list one could add grade-point averages and student/faculty ratios as typically collected measures. Yet none of these measures was rated as highly appropriate in this study. In fact, the measures now in use tend to conform more in orientation and substance to those rejected by the participants. This apparent conflict can have some important implications for institutional management and productivity as well as for statewide control and coordination. If the theme of enumeration survives as the way to provide evidence of accountability, institutional administrators and faculty may begin to operate in accordance with radically different incentive structures. Emphasis on quality and impact would pale in the light of degree production and body counts. Indeed, it is suspected that most incentives would operate to maximize degree production and body counts. In such a situation, all participants tend to lose in terms of impact and satisfaction. The measures found to be appropriate pieces of evidence provide an empirically substantiated base for such a change.

4. In a different vein, the results of the study suggest some conclusions regarding the development of goals and measures of progress for these goals. Respondents from six types of institutions from all parts of the country were participants in this study. In general, it can be said that consensus was reached across all types of institutions as to the appropriateness of some goal areas and measures of progress within these goal areas. In some cases, consensus regarding goals and their measures was restricted to agreement within particular institutional types. Therefore, it is suggested that the process of selecting institutional goals and appropriate measures of progress can utilize consensus-building techniques and that these techniques are useful within individual institutions, within systems of similar types of institutions, and across a conglomeration of several types of institutions. The number of goals and measures thought to be appropriate most likely will decrease as the diversity of institutions involved increases. Yet the task of identifying perceptions of common purposes and measures of progress toward their achievement seems to be feasible as well as necessary.

Higher Education Outcome Measures Identification Study (OMIS)

The OMIS was initiated primarily to study and develop procedures for collecting outcomes and associated measures deemed most important to different types and levels of decision makers. The objectives of the study were the following:

1. To learn what outcome information different decision makers need for their decision-making responsibilities
2. To learn what outcome information currently is available to them
3. To identify a high priority list of outcome measures for which data acquisition procedures need to be developed.

OMIS survey questionnaires were sent to 388 randomly selected college administrators (including 97 presidents, 97 chief academic officers, 97 chief student affairs officers and 97 chief fiscal officers) and 125 state level decision makers (including 75 statewide planners and 50 state legislators). The overall response rate for the study was 58%. Responses were received from at least one administrator in 95 of the 97 institutions included in the pool. Whereas 235 (61%) of the college administrators returned completed OMIS questionnaires, only 64 (51%) of the state-level participants responded.

The participants in the study were asked three types of questions. The first question concerned the extent to which they felt they needed information about each of the ten outcome information categories delineated in Section 1 of the questionnaire (see Micek and Arney, 1974). The second major question dealt with the extent to which each respondent felt the need for each of the specific outcome measures listed in Section 2 of the questionnaire. The final question pertained to his or her access to, or ability to obtain, each of the outcome measures presented in Section 2.

Findings of OMIS study. Detailed results of the OMIS project are reported elsewhere (Micek and Arney, 1974). However, the following are a few excerpts from those findings that are directly related to the goal translation process.

1. Three measures in the OMIS effort were given a high Need to Know endorsement by all six groups. They were:

(a) Number of students graduating from the institution after a certain period of time as a percentage of their entering class

(b) Number and percentage of graduates for the year who transferred from another school

(c) Number and percentage of students leaving the institution prior to receiving a degree, diploma, or certificate during a particular academic term or year.

In addition, five measures were given a high Need To Know endorsement by at least five of the six groups:

(a) Number and percentage of students surveyed who were taking noncredit, independent study, or special courses

(b) Number of students receiving a degree, diploma, or certificate within a certain time period

(c) Average amount of time it takes a student to earn a degree, diploma, or certificate

(d) Student scores on a scale measuring the degree of satisfaction with their progress in achieving their occupational career goals

(e) Number and percentage of former students (graduates and nongraduates) surveyed who were employed within a certain time after leaving the institution.

2. Interesting similarities and differences occurred among the six respondent groups. With the exception of the group of chief fiscal administrators, the top-ranked measure for each of the groups was in the outcome area entitled Student Educational Career Development. The following identifies some highlights with respect to each of the groups:

(a) *Presidents*—This group endorsed the widest range of outcome measures. Possibly this is a result of the wide range of decision-making responsibilities encountered by people in this group. Two measures were unique to this group.

(b) *Academic affairs administrators*—This group appears to have the greatest need for measures relating to Student Knowledge and Skills Development, Student Educational Career Development, and the Development of New Knowledge and Art. To some extent, this was to be expected, given the planning and management responsibilities of respondents in this group.

(c) *Student affairs administrators*—Respondents in this group appear to have concentrated on measures concerning Student Educational Career Development, Student Educational Satisfaction, and Student Occupational Career Development, respectively. Of all the groups, this group indicated the greatest need for Educational Satisfaction measures. It is interesting to note that, of the five measures unique to this group, four involve student perceptions about their educational progress. This may suggest that student affairs administrators are more receptive to this kind of information.

(d) *Budget and finance administrators* – As expected, respondents in this group favored those measures directly linked to financial data. Further, each of the five measures that were endorsed only by this group concerned the acquisition of financial data.

(e) *State-level planners*—This group of respondents endorsed many of the same measures concerning Student Educational Career Development endorsed by the respondents in the four institutional decision maker groups. Of all the groups,

state-level planners favored the greatest number of measures associated with Student Occupational Career Development.

(f) *State legislators*—This group concentrated its major attention on measures associated with Student Knowledge and Skills Development, Student Educational Career Development, and Student Occupational Career Development.

Implications for Goal Translation

As stated at the outset, goal translation is the process of stating institutional goals in specific, measurable terms; that is, stating them in terms of measurable objectives. This goal translation process can be disaggregated into the following, greatly simplified steps:

1. Identification of the full range of goals for the organization
2. Selection of those goals that will be most important
3. Identification of the kinds of information that could be used to assess the degree to which the high priority goals are being accomplished
4. Selection of the information items (e.g., outcome and environment measures) that will be used to assess levels of goal attainment
5. Preparation of objectives stated in terms of the information items selected previously as well as the audience for whom they are intended and the minimum performance levels expected.

The reader should recognize that the goal translation process, a very complex exercise indeed, is only partially supported by the study procedures and findings recounted within this paper. For example:

1. Both the IGA and OMIS procedures can be useful to assist decision makers in the goal selection (Step 2) and measure selection (Step 4) procedures outlined previously.
2. The questionnaires and results of both studies may serve as resources during the goal and measure identification processes (Steps 1 and 3 respectively). Clearly, however, there are numerous sources of goals and measures that might be referenced. Relying on these two studies would limit the scope of the goal translation exercise.
3. Individuals involved in the goal translation process should consider measures of the types preferred by decision makers and postsecondary education participants in the IGA and OMIS studies, that is, measures of measurable impact and satisfaction.

In conclusion, the authors suspect that not only are the procedures of these two studies useful for addressing portions of the goal translation problem but also that when they are used in individual organizational units, institutions, systems or other populations as research tools, important insights can be gained about the outcomes information preferences and needs of postsecondary education participants and constituents.

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EXPLORATORY ANALYSES OF A LARGE DATA BASE: A STUDY OF AMERICAN MEDICAL SCHOOLS

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As multivariate statistical methods become increasingly available and widely used, it is only natural that new ways of using these techniques will be sought. One possible application of these methods is the exploration of the large masses of data which are gathered for both inter- and intra- institutional purposes. Using the methods described in this paper, it is possible to examine similarities and patterns in the data collected and in the objects that these data describe, whether they be faculty members, departments, or institutions. The purpose of this paper is to describe a series of multivariate studies aimed at exploring the underlying dimensions in an institutional data base maintained by the Association of American Medical Colleges (AAMC) and the patterns of similarity among the institutions.* The understanding gained from the identification of basic dimensions of difference and the grouping and mapping of similar schools can guide decisions that affect these institutions.

The purpose of the analyses described in this paper was not to answer specific questions but rather to systematically probe existing data to illuminate areas of potential interest for further investigation and to generate research questions and testable hypotheses. It cannot be stressed too often that the analyses described in this paper are exploratory. They were designed and conducted to "map the territory" existing in a heterogeneous compilation of quantitative measures of the institutions of medical education in the United States. Further, the analyses described here are secondary analyses, using data initially gathered for other purposes (primarily institutional accreditation), to enhance existing knowledge about the process of medical education from an institutional perspective.

The studies described in this paper used three different multivariate statistical procedures: factor analysis, cluster analysis, and multidimensional scaling. Briefly, factor analysis is essentially a means of grouping variables which correlate with one another. By illuminating groups of variables that are related to one another and that may be thought of as being related to a common underlying dimension, factor analysis simplifies somewhat the examination and interpretation of the full set of correlations between all pairs of variables. Cluster analysis and multidimensional scaling, the other analytic procedures used, are methods of creating simplified models of institutional similarity based on several empirical or derived measures. Cluster analysis sorts institutions into groups such that the schools in a particular group have similar values on all of the variables, while different groups have dissimilar value profiles. The third technique, multidimensional scaling, produces a map of institutions in fewer dimensions than were present in the original data in such a way that distances on the map correspond closely to the numerical similarity among the institutions.

Procedure

AAMC's Institutional Profile System (IPS) is the computerized repository for most of the institutional data collected by the association. In August 1976, there were more than 8,000 data elements from over 60 different sources in IPS. Many of the data were longitudinal repetitions of the same variable for as many as 15 years (1959–60 through 1974–75). The data in IPS come from a number of different kinds of sources including annual surveys, special purpose surveys and questionnaires, and other AAMC and non-AAMC data bases from which data may be aggregated by institution. The other, noninstitutional data bases describe applicants and students, faculty, and research grant applications. Data elements from the most current sources in IPS were initially screened for the present series of students using a number of criteria including completeness, lack of redundancy with other measures, and a potential for revealing previously undescribed dimensions of variability among institutions. In addition, a number of relative measures, such as ratios and percentages, were computed from the existing variables. The initial screening resulted in the selection of 139 variables from four general domains: institutional characteristics (45 variables), student (40), faculty (22), and curriculum (32). A series of preliminary factor analyses was performed within each of these four domains to reduce the final set of variables to those that were most complete and which described the institutions on a number of meaningful dimensions.

The final set of 33 variables on which the analyses described in this paper were based consisted of 14 student variables, 13 institutional measures, 4 faculty variables, and 2 curriculum variables. The proportional representation of the variables in the final data set was due, in part, to the predominance of student data in IPS and the qualitative nature of the curriculum data in the data base. The final data set also consisted predominantly of *relative* measures, (e.g., the percentage of medical students who are female) rather than the original raw counts contained in IPS (e.g., the number of medical students enrolled). Preference was given to relative measures in order to allow institutional characteristics other than overall size to be exposed in the analyses.

The first step of the analysis was the factor analysis of the 33 variables selected from the most recent data in IPS. The factor analytic method employed was principal components analysis. The first nine components extracted from the correlation matrix, which accounted for 74.4 percent of the variance in the data, were retained for rotation. A number of varimax rotations were performed in which different numbers of the components, ranging from 9 down to 4, were rotated. These six solutions were then compared, and the eight-component solution was selected as the most interpretable and intuitively appealing.

*The work on which this paper was based was performed pursuant to Contract No. 213 76-0011 with the Health Resource Administration, Department of Health Education and Welfare. References to individual reports describing the studies in detail are included in the references of this paper.

The cluster analysis performed in this study was done in two steps. In the first step of the clustering process, 110 U.S. medical schools were hierarchically clustered on the basis of their values on 8, 6, and 5 factor scores using a technique developed by Ward (1963). These three analyses were conducted to assess the impact of selected factor scores on the hierarchical solution. However, hierarchical cluster analysis forces all objects under consideration to be combined, thereby allowing for distortion of natural clusters by inclusion of outlying objects.

The second step of the cluster analysis procedure involved using the results of the hierarchical cluster analysis to initiate a refinement of the derived clusters through an iterative cluster analysis technique developed for Forgy (1965) which minimizes the differences of objects within clusters without the artificial permanence of cluster membership inherent in the hierarchical approach. In the second step of the clustering, this method was applied several times to derive cluster solutions ranging from 12 clusters down to 6 using factor scores as input. From the variety of possible clusterings, the 8-cluster solution was selected for presentation based on its representation of the schools and their similarities.

The final phase of the analyses in this series involved the application of multidimensional scaling, separately to public and private schools, to derive spatial maps of the similarities among the schools. Similarity matrices for the two groups of schools were submitted to both metric and nonmetric procedures. Metric multidimensional scaling is a computational algorithm that accepts an N-by-N symmetric matrix of similarity (or dissimilarity) measurements between all pairs of N objects, and produces a set of spatial coordinates for each of the N objects. The mathematical underpinnings of metric multidimensional scaling are detailed in Torgerson (1958). Basically, the input matrix of distances is transformed and then factored by the principal axes method. In metric multidimensional scaling, the distances must be established on a ratio scale of measurement. The more recently developed method, nonmetric multidimensional scaling, requires only that ordinal assumptions be made of the dissimilarity measures (Shepard, 1962). Similarities matrices for both groups of schools were computed from the 12 variables which defined the two factors, derived by factor analysis, describing graduate medical education emphasis and research emphasis. The two similarities matrices were scaled into 3 dimensions and into 2 dimensions using both methods. Thus, 8 models of medical school similarities were developed and compared.

Results

The factor analysis of 33 selected institutional variables produced six major (and two minor) independent dimensions of variation among medical schools, which formed the basis of the subsequent analyses. The six major factors, and the variables from which they were formed, are presented here in Figure 1. The first factor combines a number of variables which assess, in different ways, the degree of graduate medical education emphasis in medical schools. Factors 2 and 3 measure the size and age and the degree of public and private control of the institutions. (In the latter factor, schools with high scores are similar to most private schools, while schools with low scores are similar to public medical schools.) The variables which make up Factor 4, with the exception of the percentage of female medical students, measure the research funding success of the schools on applications for new single-investigator research grants from the National Institutes of Health (NIH). Factor 5 assesses the degree of current growth among institutions, and Factor 6 measures the extent and emphasis of sponsored research activity among the schools.

Factor scores were computed for 110 medical schools on the six factors described above. The factor scores were then used as input to cluster analysis, the results of which are presented in Figure 2. A final cluster solution was derived which enumerated eight clusters of medical schools. The schools which formed each cluster are listed in the left-hand column of Figure 2, and the mean scores for the schools in each cluster on the six factors are graphed as cluster profiles. Cluster 1 is composed of 17 established medical schools which happen to be located primarily in the South and Midwest. These schools were below the average of all 110 schools on each factor except size and age. In comparison, Cluster 2 consists primarily of public schools which are the oldest and largest of any of the groups but which are still growing and developing. Cluster 3 is also composed of public institutions, but, in contrast to the schools in the first two clusters, the schools in Cluster 3 place heavy emphasis on research and are relatively successful in obtaining research funding from NIH.

I. Graduate Medical Education Emphasis
- Average salary of associate professors of basic sciences
- Ratio of housestaff to medical students
- Ratio of medical students to full-time medical school faculty (−)
- Percentage of living medical school alumni in general practice (−)
- Percentage of medical school faculty who are M.D.'s

II. Size and Age
- Number of medical students
- Age of medical school
- Percentage of medical school alumni who are board certified

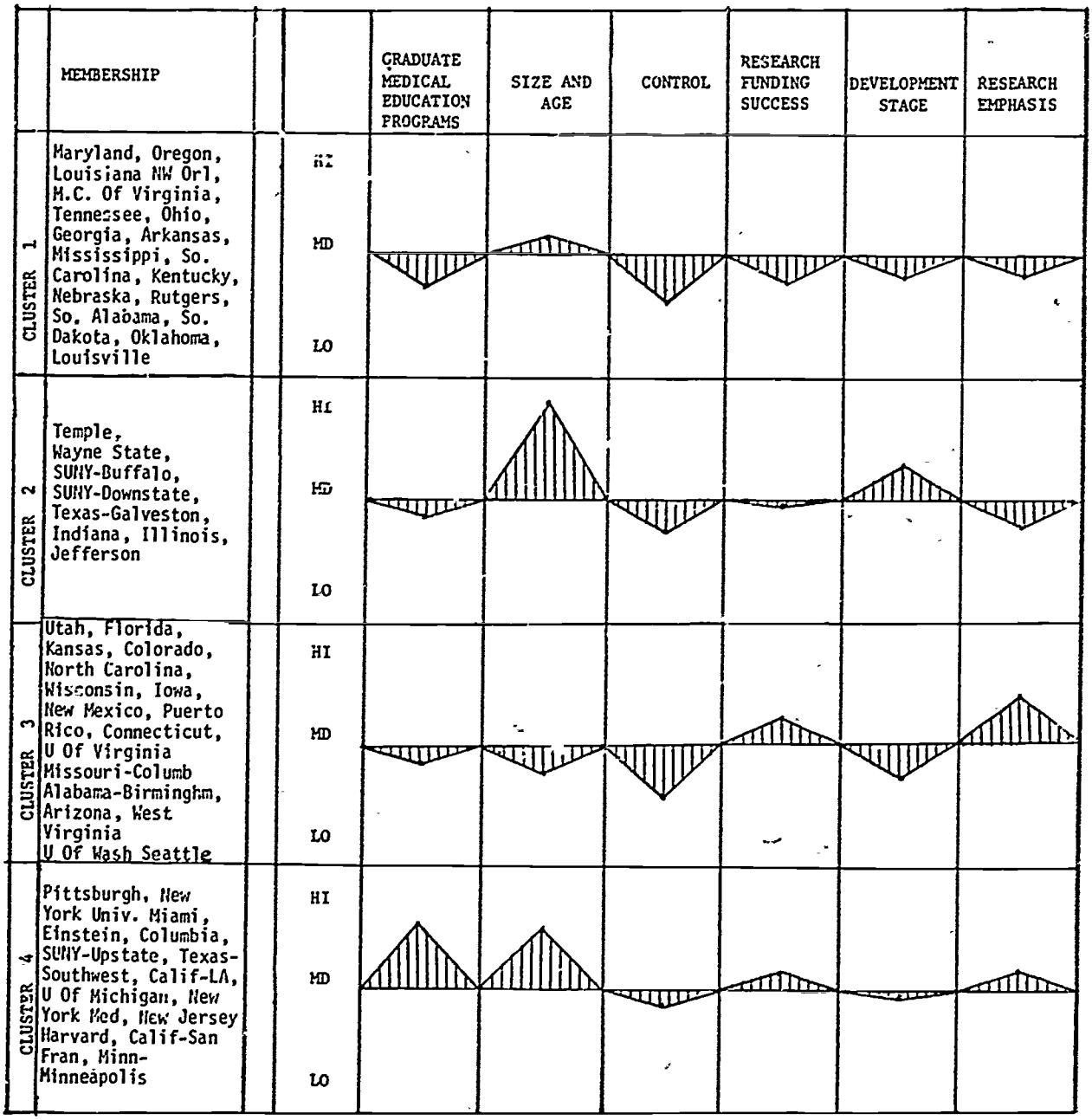
III. Control
- Control (0 = Public, 1 = Private)
- Medical school tuition for in-state students, 1975–76
- Percentage of in-state first-year medical students (−)
- Ratio of applicants to first-year medical students
- Percentage of revenue from federal sources
- Percentage of revenue from gifts

IV. Research Funding Success
- Percentage of requested single investigator research funds awarded
- Mean standardized priority score—single investigator research applications
- Single investigator research application approval rate
- Percentage of female medical students

V. Development Stage
- Ratio of volunteer faculty to full-time faculty
- Percent change in sponsored research from NIH, 1967–74
- Projected annual percent change in enrollment, 1974–79

VI. Research Emphasis
- Number of single investigator research grants approved
- Percentage of total expenditures for administration and general expense (−)
- Percentage of total expenditures for sponsored research
- Ratio of basic science graduate students to medical students
- Adjusted total revenue
- Percentage of first-year medical students with undergraduate GPA's between 3.6 and 4.0

Figure 1. Six factors and component variables derived from factor analyses of medical school characteristics.



(continued on next page)

Figure 2. Cluster membership and profiles of cluster centroids on six factor scores.

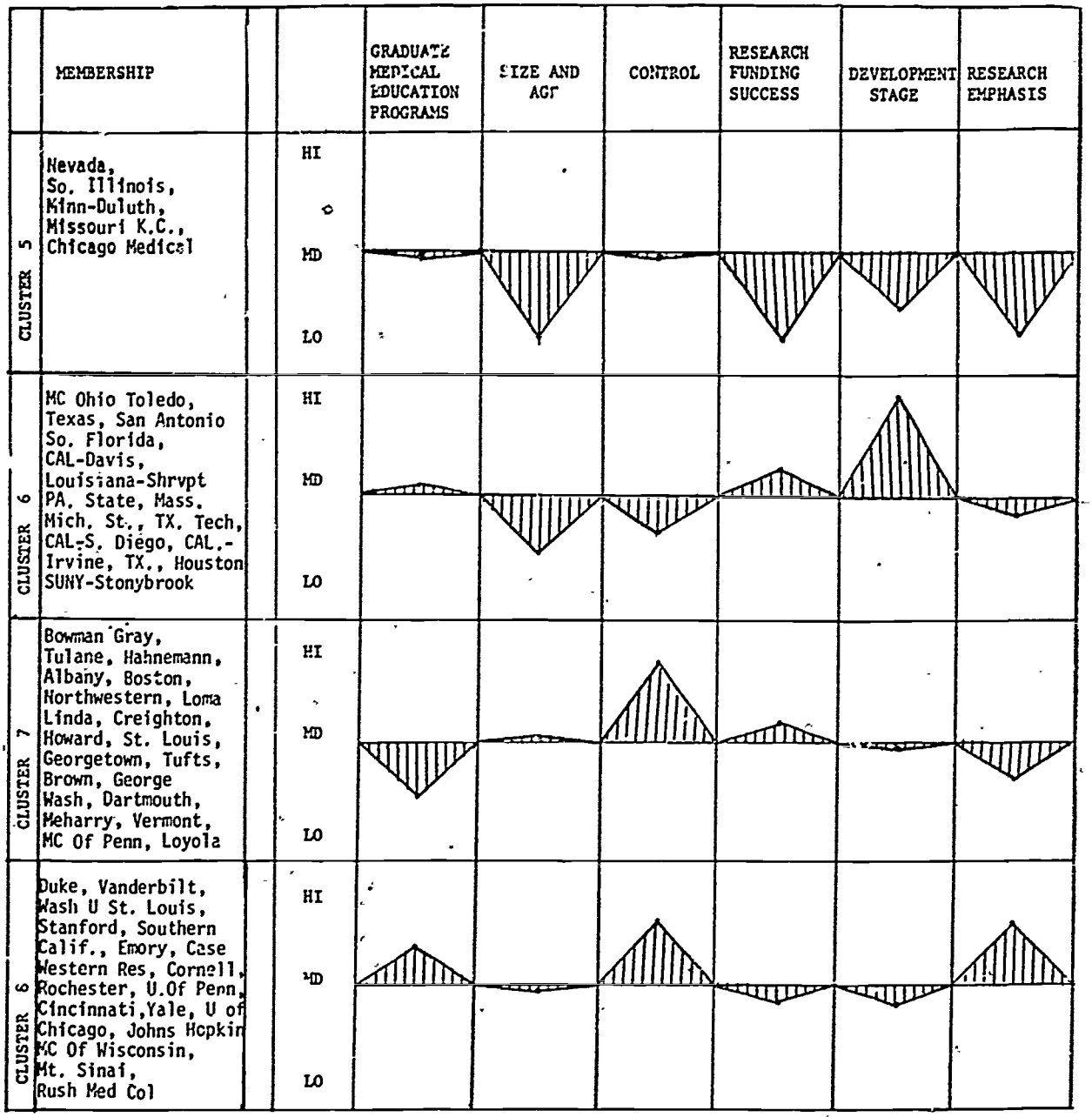
Cluster 4 is evenly divided between public and private medical schools. As a group, these schools have large undergraduate medical education programs and the strongest emphasis on graduate medical education of any of the groups. These schools also place higher than average emphasis on research.

Clusters 5 and 6 are both composed primarily of relatively new, public medical schools. Cluster 5 contains the newest, smallest, and least research-oriented schools of any of the clusters (including two schools, Nevada and Minnesota Duluth, which offer only two-year basic science curricula). The schools in Cluster 6 are also relatively new, but they are the most rapidly developing of any of the groups of schools.

Clusters 7 and 8 are both composed primarily of private medical schools, but the two groups have opposing characteristics. The schools in Cluster 7 are slightly above average in size and age but have relatively low emphasis on graduate medical education or research, whereas the schools in Cluster 8 are slightly below average in size and age but place heavy emphasis on graduate medical education research.

Twelve variables which defined two of the factors derived in the factor analysis, research emphasis and graduate medical education emphasis were used to compute separate similarities matrices for public and private medical schools. These similarities matrices were then used as the basis for multidimensional scaling.

(Figure 2, continued from previous page)



Metric multidimensional scaling produced the "maps" of private schools and public schools presented in Figures 3 and 4. Plotted points represent the schools. Long distances between two points indicate that two schools are different with respect to the emphases they place on research and graduate medical education programs. Schools plotted close together are similar in these respects. The vectors plotted onto the map were derived using regression methods and serve to indicate the meaning of several directions on the maps. The multiple correlation coefficients, R, indicate how well the map summarizes each of several single measures. The orientations (after rotation) of the best described vectors on the public and private maps are highly similar, giving some assurance that the same dimensions of difference are generally applicable.

The nonmetric multidimensional scaling results and their corresponding regression results were not noticeably different from those reported. In all cases, two dimensions seemed sufficient to represent the similarities of schools with respect to the twelve input measures.

Discussion

The objectives of the study were successfully met through the use of factor analysis, cluster analysis, and multidimensional scaling. a large institutional data base was explored for peculi

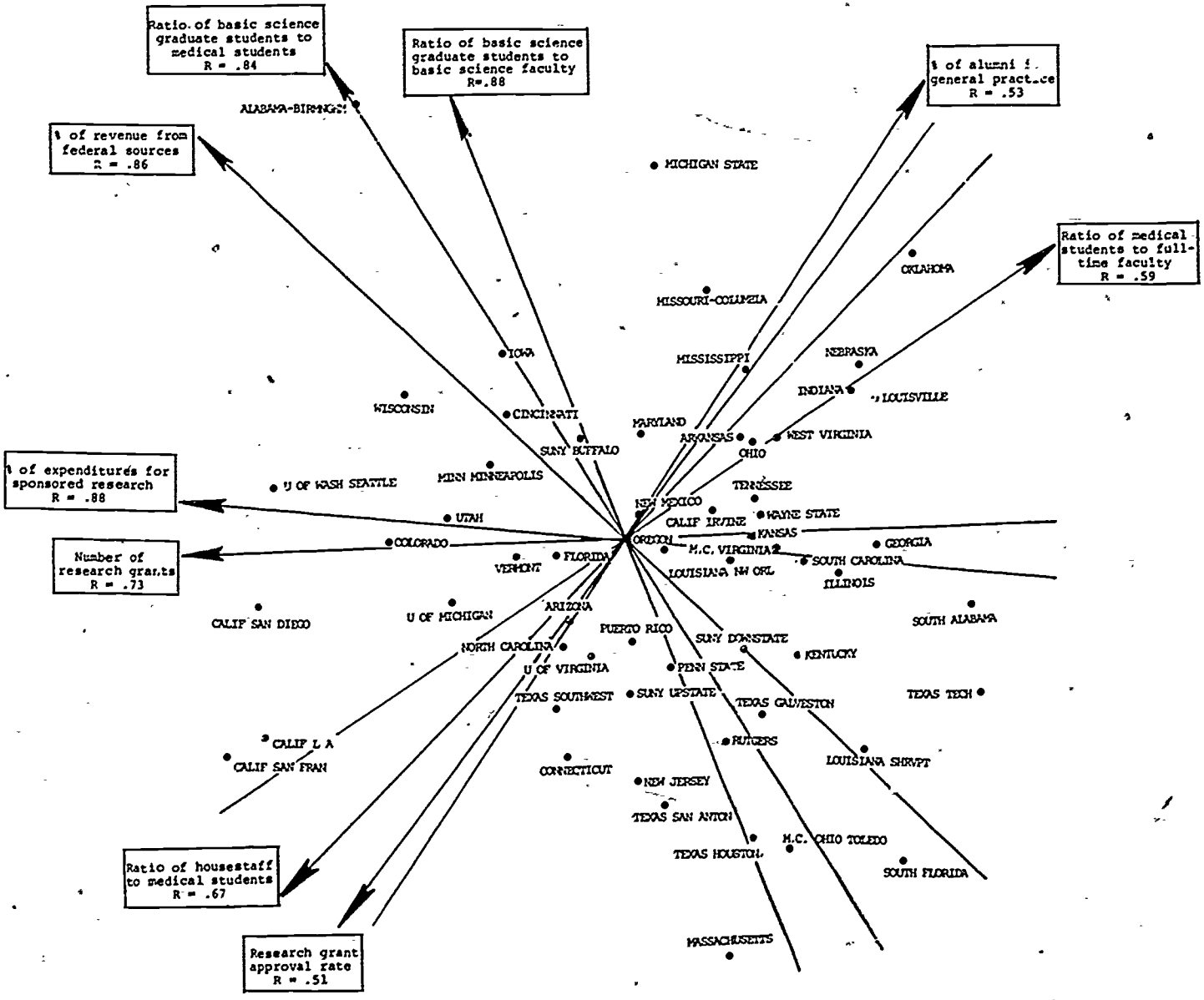


Figure 3. Two-dimensional model of similarities between 44 private medical schools with respect to measures of research emphasis and graduate medical education emphasis, with vectors representing best fit of several individual measures.

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ABSTRACT

A program providing small grants to faculty members to carry out promising proposals for instructional improvement was undertaken at Memphis State University in 1974. Herein are included fifteen reports describing projects conducted during the third year of the program, and a report evaluating the small grant program. The reports focus on: professional reading skill; teaching of experimental design and statistics; computer programming for financial analysis; computer assistance for laboratory problems in petroleum geology; an observational study of undergraduate teaching; graphic conceptual tools for urban planning problems; an intradisciplinary course in language and performance styles; communication skills for graduate students in education; the use of Teaching Information Processing System (TIPS) in chemistry, physics, and economics; videotechnology for bringing local expertise into the classroom, for sophomore physics lab experiments, and for Spanish review; and the use of pseudo-isochromatic plates in art students' color perception. (MSE)

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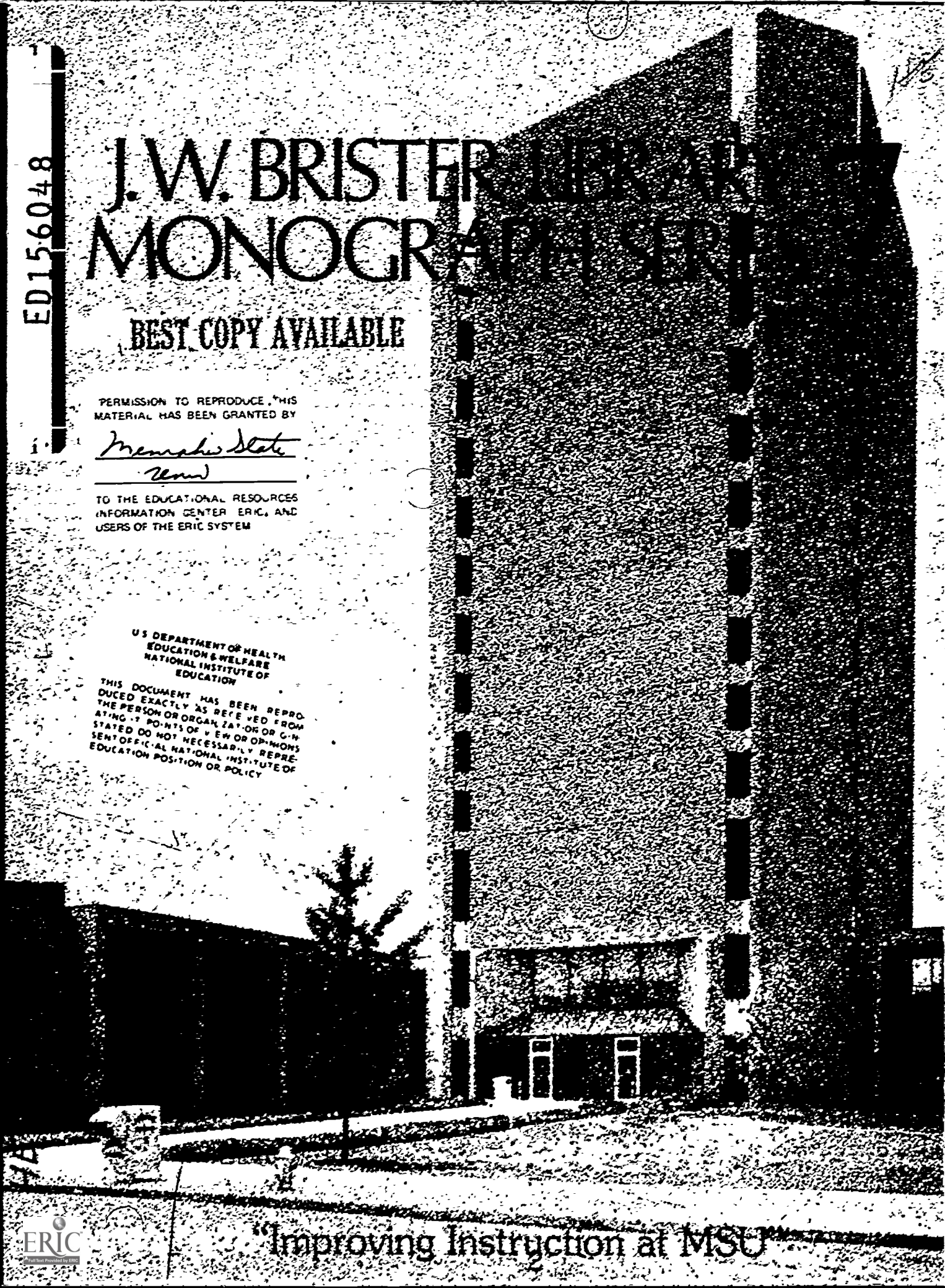

"Improving Instruction at MSU"

IMPROVING INSTRUCTION AT MSU

Edited by

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Memphis State University

Memphis, Tennessee

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PREFACE

In recent years a number of institutions have encouraged their faculties to improve instruction by means of providing small grants to faculty members to carry out promising proposals for instructional improvement. A program of this type was initiated at Memphis State University early in 1974. Fifteen of the reports contained herein describe projects conducted during the third year of the program. Similar documents containing reports on projects conducted during the first and second year were published in 1976 and 1977.

An additional report is included in the present monograph, describing an evaluation of the small grant program at Memphis State. The primary purpose of the evaluation project was to provide a basis for improving the program, but inferences also can be drawn concerning its overall effectiveness.

The procedure used in selecting small grant projects for funding consisted of inviting full-time faculty members to submit proposals which they feel would lead to improvement of learning in their courses and perhaps would have broader applications. It was anticipated that resources available to support such projects would not be sufficient to support all of the proposals that would be submitted. It was also felt that it would be helpful to the faculty to know in advance the basis on which projects would be selected. Therefore, the invitation to submit proposals contained a list of seven criteria in the program and are reported herein. The criteria were as follows:

1) First and foremost, the proposed project should have a good probability of improving learning in the course in which it was undertaken. Stated differently, the basic concern or idea should be sound and capable of effective implementation.

2) If successful, the prospect for continued use of the improvement in the course in which the project was conducted should be good.

3) Projects having a probable "multiplier effect" would tend to receive preference. One aspect of this is the number of students whose learning would be affected. Thus, undergraduate courses having several sections would be good prospects. Another aspect of a "multiplier effect" would be the extent to which improved

learning demonstrated in the course in which the project was conducted could be generalized to a broader spectrum of university courses.

4) The effects of the project should be capable of adequate measurement. Upon completion of the project it is desirable to know to what extent the objectives of the project were achieved, together with any unfavorable side-effects.

5) The project should be more appropriate to the purpose of this small grant program than to other University sponsored programs. For example, projects which test hypotheses concerning the basic nature or conditions of learning were viewed as most appropriately supported by grants for faculty research than by this program. In the case of the present program the necessary basic knowledge already should be available, and the probability should be good that it could be applied to bring about improvement in learning.

6) Instances in which any required faculty released time could be provided by the academic departments concerned, leaving support of other requirements of the project to the small grant program, would receive some preference over projects that required a major part of the grant for faculty salaries.

7) Insofar as practicable, different types of projects and projects from a number of different departments would be selected.

Each of the proposals contained a proposed budget which listed the type of support that would be required and the amount of each item. The budgets for the proposals that were funded ranged from $600 to $1100 with a mean of $950. Budget items submitted in one or more project proposals included expenses for: supplies, equipment, released time for the faculty member, salaries for student assistants, and funds for such services as clerical, photographic, and printing. As it turned out, the fifteen projects fell naturally into five areas: improvement of instruction, development of new courses, Teaching Information Processing System (TIPS) applications, video technology applications, and measurement and evaluation. These topical areas will be recognized as the five parts into which the monograph is divided. The report on the evaluation of the MSU small grant programs, mentioned previously, was included under the fifth area, measurement and evaluation.

The program of small grants to facilitate learning is administered by the Center for Instructional Service and Research. In addition to providing monetary support for approved budget items of the projects, the Center also assists the faculty members conducting each project, to the extent that they desire, in several areas in which the Center purports to have special competence. These areas include systematic course development, development of instructional aids, applications of educational technology, and design of evaluation plans.

As editor, I wish to acknowledge the very obvious contribution of each of the contributors to the monograph, whose names are listed in the table of contents. Thanks also are due to members of the Center for Instructional Service and Research for their constructive participation in a number of the projects, and in particular to Mrs. Barbara Dorsett, who handled the logistic aspects of each of the projects and assumed significant responsibilities in the preparation of the manuscript. Finally, the program of small grants to facilitate learning has received strong support from top administrative officials of the University, including, especially, the office of the Vice President of Academic Affairs and the Dean of each of the Colleges. This support and the support of Dr. Lester Pourciau, Director of Libraries, in proposing that the composite report of the projects be included in the J. W. Brister Library Monograph Series were especially instrumental in bringing the monograph to fruition.

G. Douglas Mayo, Director

Center for Instructional Service and Research

CONTENTS

PART I

IMPROVEMENT OF INSTRUCTION

LEARNING ASSISTANCE PROGRAM: ACCENT ON PROFESSIONAL READING SKILL

Thomas A. Rakes, Department of Curriculum and Instruction

In the past decade, a proliferation of reading and study skills programs, laboratories, and centers has emerged. In a 1974 survey reported by Smith, Enright and Devirian (1975), little continuity or consistency existed between many of those 1,258 colleges and universities surveyed. At Memphis State University a Reading Study Skills Program was established in 1972. This program currently provides instruction through both credit and no-credit continuing education classes. In 1974 the Educational Support Program was opened to provide on-going assistance to college students in the areas of mathematics, English, reading and counseling. As in the Study Skills program, students must seek assistance by attending classes or individual study sessions provided in a designated center or laboratory.

These and other similar programs have been successful, and efforts to reach more students have among other offerings included special seminars on a variety of study skills, special tutorial classes and the availability of individualized learning programs in the library. This project extends such services further by bringing instruction in using selected study skills techniques to students enrolled in content classes.

THE PROGRAM

The realities of teaching in a university include numerous urgent problems, some of an academic or content nature, others of an educational or "dissemination and processing of information" type. The Learning Assistance Program (LAP) focused on providing on-the-spot, content related instruction to students on any one or all of the following procedures: 1) How to read your textbook more efficiently, 2) Note taking strategies, 3) How to study for examinations and take tests, and 4) A readability analysis of the textbook (provided to the instructor).

During the first week of the Spring, 1977, semester, faculty members in six departments were notified as to the availability of the service to undergraduate students upon the request of the instructor and with the consent of the departmental chairman. Participating faculty were then contacted and a class session was scheduled for a study skills presentation using the adapted text for the particular class.

Prior to classroom presentations on study skills, students' notes were collected for study. Within one week notes were returned after a class profile of trends was determined. A minimum of forty minutes was required for professional book reading and note taking skills. An additional twenty to thirty minutes was necessary for presentation of how to study and test taking strategies. All classes used in the study were described as "primarily lecture style" by the instructor.

The presentation and practice of proven study skills techniques in adopted books provided all students a practical opportunity for improved learning and achievement early in the semester. The optional readability analysis of the textbook provided the instructor with useful information relative to using the text. Additionally, students could seek further instruction of a similar or related nature through use of existing courses and services elsewhere on campus.

PROCEDURES

Source of Data

The sample used in the project was those faculty and undergraduate students who volunteered for participation in the program through selected departments within the University. The responsibility for recruitment, presentation of instruction, gathering of data, record keeping and data analysis was assumed by the LAP staff. A total of twenty-four classroom presentations was given with an unequal number of readability analyses, thirty-one in number. Several additional requests for textbook readability analysis were received from faculty members who desired to participate in that phase only. Four additional classes totaling ninety-two students were used as a control group. Both pre-post opinionnaire and class note samples were obtained for comparative purposes.

Collection of Data

One instrument was used. This instrument was a one-page opinionnaire designed to obtain the subject's self-evaluation as to the status and subsequent value of the study skills instruction. The instrument was developed as an evaluation scale similar to the Kropp-Verner (1957). The instrument was administered by a facilitator prior to the instructional sessions and again within six weeks following instruction sessions. Arithmetical means and percentages were employed to analyze results. See Appendix A for the evaluation instrument used. Student class notes were also collected and compared to class trends recorded prior to the conduct of training sessions. Notes were studied to determine student grammatical and organizational levels (high, medium, low).

Textbook analyses were conducted by applying indices of readability, based on the Fry Readability Graph (shown in Appendix B). The Fry Graph is a

widely used measure of reading difficulty for printed materials, K-College level.

Instruction

Two training sessions were available. The initial presentation/simulation was note taking skills and how to read a textbook. An additional session was provided upon req[illegible] to prepare for and perform on tests could be selected in addit[illegible] one preliminary study skills training. Appendix C includes handouts provided participants in the study in addition to examples, demonstrations and suggestions given verbally during actual class visits.

Course instructors were asked to participate in training sessions and were provided one individual follow-up conference after the in-class session was conducted. Information relative to class note taking trends, study attitudes and the readability of the adopted text were discussed.

Results

The purpose of the study was to determine the effect of mini-lessons in note taking and study techniques upon self-rated attitudes and note taking performance of undergraduate University students. The subjects included 624 students from 24 classes, 406 females and 218 males. Participating faculty numbered 31, twenty-four whose classes participated in the study and seven who expressed an interest in a readability analysis of their text without classroom training sessions. Twenty-two of the twenty-four classes received two study skills presentations.

Analysis of Textbooks

Textbook difficulty ranged from 8th grade level through college level with 80.7 percent falling on a 10th grade level or higher. Nineteen per cent of those books analyzed were written on a college level. Table 1 shows the grade level by percentage.

Table 1
(N = 31)

Readability Analysis by Grade Level and Frequency

Level	College	12	11	10	9	8
Percent of total	19.4	22.6	22.6	16.1	13.0	6.5
Number of books	6	7	7	5	4	2

Analysis of Attitude Inventory

Data from twenty-two classes were used. Of the original twenty-four classes, all but two participated in two training sessions and a single post administration of the attitude survey and class notes analysis. Results are based upon response of 541 subjects of an original 584 subjects who participated in the initial training sessions for the twenty-two classes. Subjects reflected a mean pre-training score of 50.4 (range 28.7 to 74.6). Post-training scores ranged from 37.2 to 77.1 with a mean of 61.4. The mean difference noted six weeks after the training session was 11.4 (significant at the .01 level). Due to wide variability of scores between items on the survey and a lack of control to insure subject sincerity of response to the instrument, an item analysis was not specifically useful. Items dealing with vocabulary, rereading, remembering and an interest in a special center were shown to be priority items.

Analysis of Class Notes

A sample of 537 subjects were used for a pre-post training examination of class notes. Table 2 shows the numerical results.

Table 2

Class Notes Analysis

	Pre-Training Grammar/Organization	Post-Training Grammar/Organization	Difference Grammar/Organization
High	80.6	128.9	+ 48.3
Medium	128.9	230.9	+102.0
Low	327.6	177.2	-150.4

All groups, high, medium and low, attained significant total group mobility. Specifically, 63%, 56%, and 54% group shifts upward were found for high, medium and low groups respectively.

Of an original 92 subjects, 81 remained in four control group classes. Nearly 30% (29.6) of the control subjects generated improved note taking scores and slightly higher overall scores on the opinionnaire. Statistically, these differences were minimal.

Discussion

Generalization from the findings of the study are limited due to a bias created by the 1) use of instructor volunteers as a means of obtaining subjects, 2) fact that no data were available as to student grade point average or general level of reading competency, and 3) lack of control and consistency of faculty lecture organization and presentation styles. Still,

a pattern of results obtained make the following conclusions worth noting:

1. "Note taking and study habits of university undergraduates improve as a result of exposure to abbreviated training sessions." If this study were to be improved upon by removing those limitations discussed earlier in this section, the degree of student progress, improved learning in classes and simply, better teaching could be enacted and measured. The sacrifice in class time is justified in view of possible benefits that could improve a student's sustained learning potential in a class.

2. "Faculty members are interested in how well their students take notes." Implied also is a concern for their own teaching style and how it affects student knowledge and test performance.

3. "Faculty members are interested in learning about the readability and organization of their adopted textbooks." Numerous positive comments reflected a genuine need for and appreciation of the readability and note taking conferences held with participating faculty.

4. "A majority of the textbooks surveyed were written on a readability level of the 11th grade or higher." While several books (35.6%) fell below grade eleven, the books currently in use are sufficiently difficult to create reading problems for many university students. This study did not, however, specifically compare book-reader difficulty levels.

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APPENDIX A

Student Number_____ Age____ Sex____ Date_____

Classification_____

DIRECTIONS: Read each of the following statements and mark one of the five categories that best describes you.

Overall, how well do you think you read?
very well well average poorly very poorly

When reading, the vocabulary gives me a problem . . .
rarely sometimes frequently generally almost always

I find I must reread material to understand it . . .
rarely sometimes frequently generally almost always

If a special study center were available for improving my reading I would use it . . .
rarely sometimes frequently generally almost always

I usually look for a single idea in each paragraph . . .
rarely sometimes frequently generally almost always

I examine each of my textbooks for its overall organization . . .
rarely sometimes frequently generally almost always

I have trouble remembering what I read . . .
rarely sometimes frequently generally almost always

I have an effective method for study-reading. . .
rarely sometimes frequently generally almost always

I adjust my reading speed to the purpose and difficulty of the material. . .
rarely sometimes frequently generally almost always

I find it hard to pick out the important points of a reading assignment . . .
rarely sometimes frequently generally almost always

I study two hours or more each day outside of class. . .
rarely sometimes frequently generally almost always

In most classes, I find it difficult to listen and write down the most important points. . .
rarely sometimes frequently generally almost always

I have a dictionary within reach when I study. . .
rarely sometimes frequently generally almost always

I can read for as long as thirty (30) minutes without becoming bored. . .
rarely sometimes frequently generally almost always

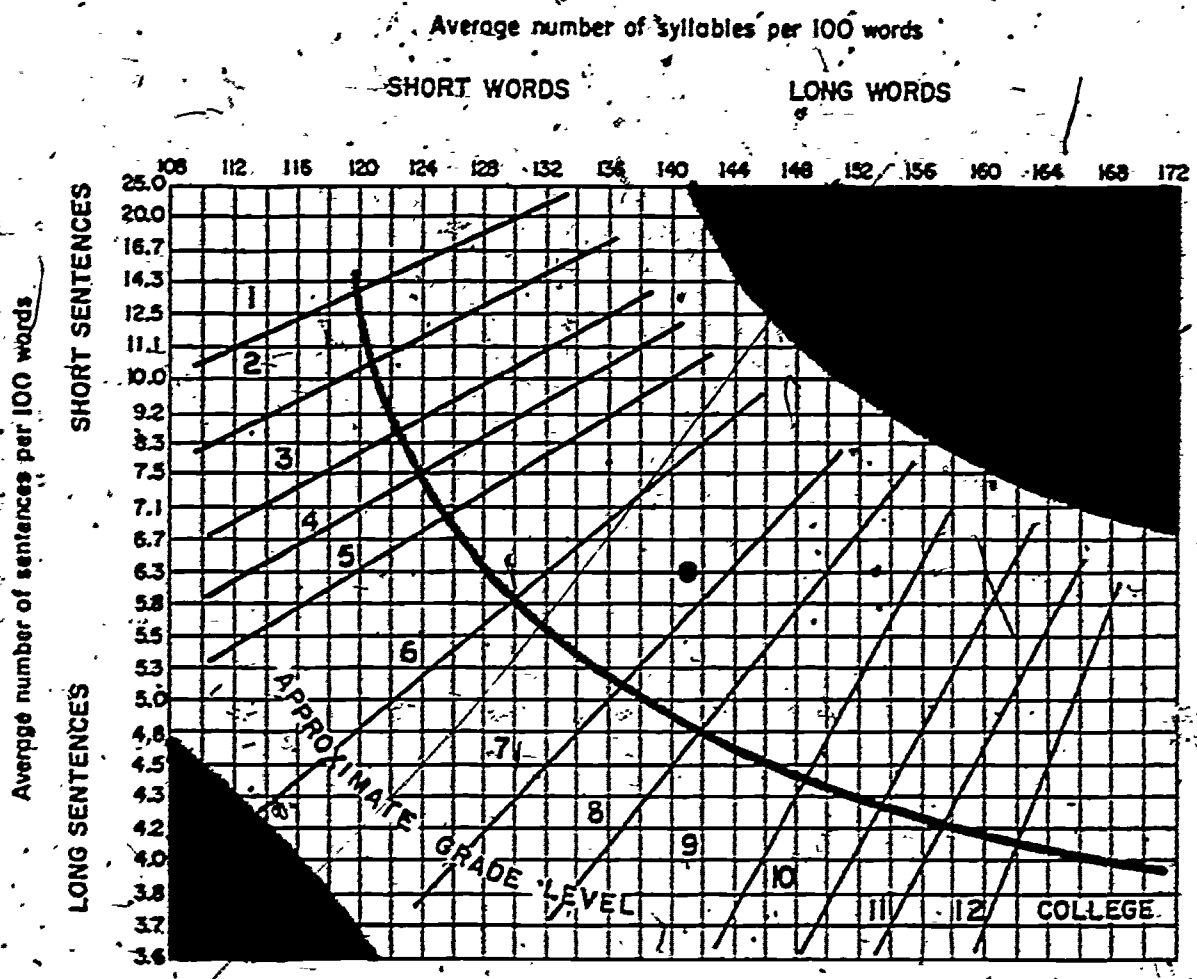
I am comfortable and relaxed when reading. . .
rarely sometimes frequently generally almost always

My eyes tire easily when reading. . .
rarely sometimes frequently generally almost always

How many non-required books do you read per semester? _____

GRAPH FOR ESTIMATING READABILITY

by Edward Fry, Rutgers University Reading Center,
New Brunswick, New Jersey



DIRECTIONS: Randomly select three 100-word passages from a book or an article. Plot the average number of syllables and the average number of sentences per 100 words on the graph to determine the grade level of the material. Choose more passages per book if great variability is observed, and conclude that the book has uneven readability. Few books will fall in the gray area, but when they do, grade level scores are invalid.

EXAMPLE:

	SYLLABLES	SENTENCES
1st Hundred Words	124	6.6
2nd Hundred Words	141	5.5
3rd Hundred Words	158	6.8
AVERAGE	141	6.3

READABILITY 7th GRADE (see dot plotted on graph)

For further information and validity data, see the April, 1968 Journal of Reading and the March, 1969 Reading Teacher.

APPENDIX C

TAKING NOTES ON LECTURES*

1. Attend all lectures. Be sure to arrive on time. It's not only polite, but many professors give an outline of what they intend to cover. Most people benefit from a minute or two to settle their thoughts prior to class beginning.

2. Keep separate notes for each class. An 8½ x 11 inch looseleaf notebook with dividers is generally best. Use the dividers to label each subject and to keep your notes organized.

3. Date each lecture.

4. Use only one side of a page for notes. It is distracting to flip back and forth through your notes while studying.

5. Come to class prepared to take notes. Do not try to take notes on an envelop or a paper towel.

6. Write legibly. The use of standard size papers is a help here. The use of abbreviations is probably necessary, however, try to limit them to standard, or easily recognized forms. It is not necessary to write complete sentences, but it is important to write complete thoughts.

7. Be alert to key phrases such as "note this," "the important point here is," or "You'll see this later." It is rare to find a professor who uses the "I've Got a Secret" method of teaching and testing. However, it is common to see students ignoring these cues as well as what is written on the blackboard or other visual aids.

8. Use some system of organizing your notes as you take them. One of the most common is to take notes on the right side of the page leaving a large margin on the left. Use the margin to reduce the lecture to major topics and to key important ideas from the text to the lecture.

9. Pay as close attention to the end of a lecture as to the beginning. If the lecturer has not paced himself, he may have to try to cram important content into the last few minutes of the lecture.

10. After a lecture, take a few minutes to review your notes. Have a cup of coffee with a friend, and together outline and organize the lecture you've just heard.

11. At least once a week take the time to reflect on the content of the class, lectures, and texts. Some students attempt to write and answer questions they think the professor may ask.

12. Space your study across time. Cramming for an exam is rarely effective.

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*Learning Assistance Project, Department of Curriculum and Instruction Reading Center, Center for Instructional Service and Research, Memphis State University, Spring, 1977.

IMPROVED TEACHING AND LEARNING OF EXPERIMENTAL DESIGN AND STATISTICS

S. P. Wong, Department of Mathematical Sciences
and
John V. Irwin, Department of Audiology and Speech Pathology

Statistical methods courses are usually taught without any mathematical proof or derivation, even in mathematics departments, due to the time factor or the background of the students. Students are spoon-fed the formulas, methods, and testing procedures. Thus, they have a lot of difficulty in understanding the basic concepts and often do not know when and why a certain test is better than others. To help students gain some insight and justification about statistical procedures, an instructor may make use of a large collection of samples obtained from certain populations. There are computer programs that would generate data from some populations. But, as far as we know, there are no programs that would generate data for analysis in experimental design.

In many instances, an instructor finds it difficult to develop suitable data to use as examples in class, homework, or examinations. In lower division courses data may be found in books. But still sometimes data pertinent to a certain topic, like experimental design data, are not generally available.

The purpose of our project was to create a package of computer programs that would generate data from different kinds of models (populations). We have developed programs that generate data for 1) one way model (independent normal populations), 2) correlated normal populations, 3) two-way fixed effects model, 4) two-way mixed effects model (block design), 5) two-way random effects model, and 6) three-way fixed effects model. Sample or cell sizes need not be the same in 1), 2), 3), and 6). The data generated can have the format used either in SPSS or BMD statistics packages and can therefore be analyzed using the packages without any extra recording. Since one sample t-test is not given in SPSS or BMD, it is incorporated in both 1) and 2). The programs can be used on a time-sharing terminal, and no background in computer programming is required.

The difficulties in learning or teaching statistical methods can be greatly reduced if data are easily accessible through the computer. For example, some of the basic concepts in statistics, like significance level, power, confidence interval, etc., can be explained by the use of many samples from

a population. Also, when and why a block design is better than a one way model can be illustrated by creating many samples. An instructor can create different kinds of data, analyze and use them as examples, or create and store the data in files for homework or examinations.

In addition, a practical obstacle faced by students in statistical methods, especially in experimental design, is the time they have to spend reproducing data from one source to the other, like key punching or coding. Students need to learn to analyse different kinds of data to familiarize themselves with the different tests and statistical programs. Usually the data are not stored in the computer or the stored data are not suitable for different statistical procedures. Hence, the time spent on reproducing data can amount to a great deal. As already noted, the data generation system described essentially eliminates this problem because the data format can be used in other SPSS or BMD statistical packages.

The programs were used in the statistics methods courses taught by the authors during the fall semester, 1977. After trying them and improving them as necessary, the programs are now available to other statistics instructors. Further, the skills acquired in developing the programs would definitely be helpful if in the future we want to computerize our teaching of statistics.

DEVELOPMENT OF COMPUTER PROGRAMS FOR FINANCIAL ANALYSES

Tye Kim,[1] Department of Finance, Insurance and Real Estate

As teaching instruments, two computer programs were developed. One program, called FUTVAL, computes future values of a one dollar investment; the other program, called STOCKVAL, computes investment values of common stock shares. Both programs were designed to be used in such courses as Business Finance, FIR 3410; Investments, FIR 3710; Managerial Finance, FIR 4440; Analysis and Control of Business, FIR 7610; and Seminar in Investment Management, FIR 7710.

The rationale and characteristics of the programs are explained below:

FUTVAL

The principle of compounding an investment is a very important concept utilized in various types of economic and financial planning. To facilitate teaching and application of the concept, different versions of compound interest and annuity tables have been published. The Brister Library of Memphis State University has a two-volume set of tables, and finance textbooks usually contain small-scale tables.

The available tables are, however, less than ideal in demonstrating the power of compounding for three reasons. First, since two-digit rates of inflation have occurred in the past several years, the compounding principle should be demonstrated with higher rates of growth than those in currently available tables. Second, the available tables cannot accommodate a time period longer than 150 years. Third, with the compounding tables in the finance textbooks, future value of an investment at *daily* compounding cannot be computed easily.

The program, FUTVAL, was written to make up for the shortcomings of available tables. It accommodates time periods up to 400 years, nominal interest rates up to 15% per year, and compounding frequencies up to 365 times per year. In a computer run, the user may specify up to five time periods, five growth rates, and four compounding rates on each data card.

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[1] Dr. Kim accepted a position at another institution at the end of the 1976-77 school year. Dr. Leslie S. Scruggs, Department of Finance, Insurance, and Real Estate, is looking after the utilization of the programs that were developed by Dr. Kim.

STOCKVAL

In the field of finance, valuation of financial assets, such as bonds and stocks, is an important subject to teach. There are three components in the valuation process. They are selection of a mathematical model, provision of input data, and computation. But classroom teaching of the valuation process is usually limited to explanation of models and very simple numerical illustration of the models. The reasons are: 1) providing realistic data often involves the difficult task of estimating a given financial asset's future benefits and associated risk; 2) the computation required is usually tediously repetitive and requires much time. This is especially true in the valuation of common stocks.

The purpose of the program, STOCKVAL, is to facilitate the student's learning of common stock valuation by minimizing his involvement in generating input data and in computation.

The following common stock valuation model was programmed:

$$PV = \sum_{t=1}^{T} \frac{D_t}{(1+k)^t} + \frac{P_T}{(1+k)^T} = \sum_{t=1}^{T} \frac{E_o(1+g)^t Q}{(1+k)^t} + \frac{E_o(1+g)^T M}{(1+k)^T}$$

where:

PV = the investment value (or present value) of a share of a given common stock at the beginning of the planning time horizon.

E_o = the per share earnings for the subperiod preceding the first subperiod of the planning time horizon.

E_t = the per share earning for subperiod t.

D_t = the per share cash dividends paid at the end of subperiod t.

T = the length of the planning time horizon (e.g., T=20 years).

P_T = the per share market price at time T, the end of the planning time horizon.

Q = the constant cash dividend payout ratio.

M = the price-earnings ratio at the end of planning time horizon.

g = the rate of growth in per share cash dividends per subperiod.

k = the investor's required rate of return per subperiod.

In order to estimate the investment value of a given common stock share, the user of the program needs to specify only his required rate of return, k, and his planning time horizon, T. All other input data are estimated by the computer, based on the stock issuer's past performance records. Since the program is linked to the COMPUSTAT data bank of Memphis State University, the user may select any of about 2600 large U. S. companies. If the user wants to evaluate any stocks not included in the COMPUSTAT, it is necessary for him to furnish all input data.

As to the output, for each given required rate of return, the program prints out five present value tables, one for each price-earnings ratio. Within each table there are forty-nine present values, each of which present a unique combination of a growth rate in cash dividends and a time horizon. The wide range of present values is shown in order to take sampling errors into consideration and also to reveal the sensitivity of the present values to a change in any item of the input data.

EXPET:
A COMPUTER ASSISTED LABORATORY PROBLEM FOR PETROLEUM GEOLOGY

David N. Lumsden, Department of Geology

This lab problem is designed to familiarize the student with the techniques and difficulties involved in the exploration for petroleum. It is essentially one long study broken up into segments in which various geologic aspects of petroleum exploration are highlighted. This approach has turned out to be more realistic and interesting than more conventional methods of a one-problem-per-week nature.

GENERAL METHOD

All students work in the same geographic area. The area is sub-divided into "drilling units" on which the students bid for the rights to drill. Each week a specific type of problem is assigned (structure map, lithofacies map, etc.). The student turns in his best interpretation of available data and is graded on each week's problem. The student must also "drill wells" at a minimum rate. The computer serves as a 1) storage place for data, 2) housekeeper for accounting the student's "funds," 3) a producer of maps to aid the student's interpretation. At the end of the semester the "winners," i.e., those who make money, receive a bonus on their grade; losers do not get a bonus nor do they suffer a grade loss.

SPECIFIC METHOD

The Camp Breckenridge, Kentucky area was selected as the exploration area. This is convenient because 1) of the instructor's familiarity with the area, 2) well logs are available, 3) there are multiple pay zones, and 4) the lithology is quite variable.

There are 112 useable, logged wells in the three drilling tracts of the area. Every well has been given an identification number and a location coordinate on an arbitrary grid system (map attached). At the start the students are given the logs of three wells all students get the same logs. They are taught log interpretation and log analysis for the first two labs. The Lab Schedule is shown on the following page. The third lab is used to teach EXPET procedures. Thereafter, students are required to drill at least one well per week, more if the class is small. This number is controlled by the need to drill all 112 wells by the end of the semester.

LAB SCHEDULE FOR PETROLEUM GEOLOGY

Week	Problem
1	Log Interpretation (recognition of lithologies)
2	Log Analysis (porosity, salt water, hydrocarbons)
3	Use of EXPET
4	Structure Contour Maps (I)
5	Stratigraphic Cross Section
6	Isopach Map (I)
7	Panel Diagram
8	Structure Contour Map (II)
9	Isopach Map (II)
10	Lithofacies Map (I)
11	Paleotopography and Petroleum
12	Lithofacies Map (II)
13	Examination of Well Cuttings
14	Lab Exam

Each student is assigned an oil company name——let's say Exxon. He enters the program and receives a position statement for that week which consists of the following:

1) his financial position
2) the number of wells he owns and their location
3) the drill sites he owns

He may then decide to buy more drill sites or drill a well where he already has rights. This decision is based on maps of a variety of types that he *must* draw to satisfy the specific "problem of the week" as well as the success or failure of his wells. The schedule of maps is given in the lab schedule.

EXPET has a mapping program option with its system. The student can have maps drawn by the computer on his data at any time. The instructor alone will have access to a "correct" data file and will be able to evaluate the student map by comparing the "correct" and student maps.

The student has one week of private knowledge about the success or failure of each well he drills. After one week the well log and results are available to all members of the class.

FIXED EXPET PARAMETERS

Starting Finances

Each student has one million dollars with which to start, plus an unlimited credit line (i.e., he can go into debt endlessly).

Debits

a) Each student is debited the cost of the well he has caused to be drilled. Well costs are 10 dollars per foot for the first 1,000 feet, 15 dollars per foot for the next 500 feet, and 25 dollars per foot for footage over 2,000 feet up to a maximum cost per well of $50,000.

b) Each student loses $80,000 per week to overhead costs.

c) Each student suffers financial reversals to uncontrolled factors (strikes, embargos, federal restraints, environmental problems, lawsuits, etc.). These costs are determined by a random event subroutine in EXPET. Every time a well is drilled the student is open to these costs, to a maximum of $50,000 per event.

d) Each student is debited for the costs of the drilling rights of each drilling unit he obtains. Minimum bid is $500 per drilling unit.

Credits

Successful wells are presumed to pay out for 20 years at the initial rate of production. Oil is presumed to be worth $12 per barrel. For example, a well producing 20 barrels of oil per day will pay $1,752,000.

THE PROGRAM

A listing of program EXPET is shown at the end of this report. It is written in interactive BASIC and the student need know nothing of computer programming to operate the system. Each call of the program supplies the student with a status summary of his "company." The student then is asked to select among three paths.

Option 1 - draws a map of the geologic unit selected by the student

Option 2 - "drills" a well specified by the student and enters that well in the student's company account

Option 3 - terminates the program

Three files are needed for running the program:

1) a current data file for each "company" identified by a color

Exxon	Green	Union	Black
Phillips	Red	Shell	Brown
Texaco	Yellow	Gulf	White
Amoco	Blue	Chevron	Gray
Standard	Purple	Mobil	Orange

The first line in each file contains 1) the company's net worth. The second line contains the coordinates of drill sites owned by the company but yet undrilled. Line 3, through a variable amount, gives vital statistics on each well so far drilled: well ID, X & Y coordinate, pay zone (if any), production (if any), total depth, well cost, well revenue (if any). When a color file is read in, the following program arrays are filled: Q (I)—well number, E (I)—X coordinate, F (I)—Y coordinate, H$ (I)—pay zone (if any), Ø (I)—barrels per day production (if any), P (I)—depth, R (I)—cost, and T (I)—profit (if any).

2) A student map file: Each company has its own map data file which needs weekly updating. These are: Exxon—Gremap, Phillips—Redmap, Texaco—Yelmap, Amoco—Blumap, Standard—Purmap, Union—Blamap, Shell—Bromap, Gulf—Whimap, Chevron—Gramap, and Mobil—Oramap. These files contain geologic data as follows:

Well ID	Tar Spring isopach
X coordinate	Hardinsburg isopach
Y coordinate	Cypress isopach
Third Penn isopach	Vienna structure
Waltersburg isopach	Barlow structure

These data are determined for each well by the student. Uncertain or unknown data are indicated by a 999.

3) The third file is a protected file with "correct" geologic data on each well. This file is used by the instructor to determine the accuracy of the student map.

LISTING OF PROGRAM EXPET

```
FCL
COPY EXPET TO LP
1 * PROGRAM EXPET
2 * A COMPUTER AIDED PETROLEUM GEOLOGY LAB PROBLEM
3 * STUDENT ENTERS THE PROGRAM WITH A COMPANY NAME
4 * EG EXXON.  THREE DATA FILES ARE NEEDED 1) A FILE OF
5 * COMPANY DATA 2) A FILE OF COMPANY GEOLOGIC DATA
6 * 3) A  CENTRAL WELL FILE
30 DIM Q(20),E(20),F(20),H$(20),O(20),P(20),R(20),T(20)
35 DIM Y(20),D(20)
40 PRINT "WHAT IS THE NAME OF YOUR CORPORATION";
45 INPUT N$
50 PRINT
55 PRINT
60 IF N$="EXXON" THEN 120
65 IF N$="PHILLIPS" THEN 135
70 IF N$="TEXACO" THEN 150
75 IF N$="AMOCO" THEN 165
80 IF N$="STANDARD" THEN 180
85 IF N$="UNION" THEN 195
90 IF N$="SHELL" THEN 210
95 IF N$="GULF" THEN 225
100 IF N$="CHEVRON" THEN 240
105 IF N$="MOBIL" THEN 255
110 PRINT "RETYPE CORRECTLY THIS TIME"
115 GO TO 40
120 OPEN "GREEN" TO #2,INPUT
125 X$="GREEN"
130 GO TO 265
135 OPEN "RED" TO #2,INPUT
140 X$="RED"
145 GO TO 265
150 OPEN "YELLOW" TO #2,INPUT
155 X$="YELLOW"
160 GO TO 265
165 OPEN "BLUE" TO #2,INPUT
170 X$="BLUE"
175 GO TO 265
180 OPEN "PURPLE" TO #2,INPUT
185 X$="PURPLE"
190 GO TO 265
195 OPEN "BLACK" TO #2,INPUT
200 X$="BLACK"
205 GO TO 265
210 OPEN "BROWN" TO #2,INPUT
215 X$="BROWN"
220 GO TO 265
225 OPEN "WHITE" TO #2,INPUT
230 X$="WHITE"
235 GO TO 265
240 OPEN "GRAY" TO #2,INPUT
245 X$="GRAY"
250 GO TO 265
255 OPEN "ORANGE" TO #2,INPUT
260 X$="ORANGE"
265 INPUT #2,M1,M2
270 FOR I=1 TO M2
275 INPUT #2,Y(I),D(I)
280 NEXT I
```

```
285 INPUT #2,N$
290 FOR I=1 TO N$
295 INPUT #2,Q(I),E(I),F(I),H$(I),O(I),P(I),R(I),T(I)
300 NEXT I
305 CLOSE #2
310 PRINT TAB(10)"PETROLEUM NEWS OF THE DAY"
320 PRINT TAB(10)"**********************"
325 G1=RND(M1)*1
330 G1=INT(G1)
335 IF G1=0 THEN 385
340 IF G1=1 THEN 400
345 IF G1=2 THEN 415
350 IF G1=3 THEN 435
355 IF G1=4 THEN 450
360 IF G1=5 THEN 465
365 IF G1=6 THEN 480
370 IF G1=7 THEN 500
375 IF G1=8 THEN 515
380 IF G1=9 THEN 530
385 PRINT "PRICE OF OIL INCREASES 5%. "N$" PROFITS AN EXTRA $10,000"
390 M1=M1+10000
395 GO TO 540
400 PRINT N$" SPENDS $10,000 IN CAPITAL"
405 M1=M1-10000
410 GO TO 540
415 PRINT TAB(5)N$" SCIENTISTS DISCOVER NEW IMPROVEMENTS IN THE PRODUCTION OF"
420 PRINT TAB(5)"OIL SHALE! "N$" GAINS $20,000"
425 M1=M1+20000
430 GO TO 540
435 PRINT "CONGRESS PASSES A PRICE FREEZE BILL! "N$" IS SET BACK $20,000"
440 M1=M1-20000
445 GO TO 540
450 PRINT N$" DISCOVERS NEW COAL RESERVES IN WEST VIRGINIA! "N$" GAINS $30,000"
455 M1=M1+30000
460 GO TO 540
465 PRINT "FIRE DESTROYS "N$" OFFICE BUILDING! $30,000 WORTH OF DAMAGE"
470 M1=M1-30000
475 GO TO 540
480 PRINT TAB(5)N$" CHEATS U.S. GOVERNMENT OUT OF $40,000 WORTH OF TAXES!"
485 PRINT TAB(5)"HE IS STILL UNDETECTED"
490 M1=M1+40000
495 GO TO 540
500 PRINT N$" IS FINED $40,000 BY ENVIRONMENTAL PROTECTION AGENCY FOR OIL SPILL"
505 M1=M1-40000
510 GO TO 540
515 PRINT "GOLD IS DISCOVERED BY "N$" IN NEVADA! "N$" GAINS $50,000"
520 M1=M1+50000
525 GO TO 540
530 PRINT "GEOLOGISTS FROM "N$" GO ON STRIKE! "N$" IS SET BACK $50,000"
535 M1=M1-50000
540 PRINT "*************************************************************"
545 PRINT
550 *
555 *  IF A CORPORATION IS BANKRUPT THEY WILL BE REQUESTED TO SEE TEACHER
560 *
565 IF M1>0 THEN 595
570 PRINT "GO SEE DR. LUMSDEN FOR YOU ARE BANKRUPT"
575 PRINT
580 *
```

```
585 *  A SUMMARY OF THE CORPORATION'S HOLDINGS IS PRINTED OUT.
590 *
595 PRINT TAB(10);"= CORPORATION SUMMARY="
600 PRINT TAB(5)"====================================="
605 PRINT "AMOUNT OF MONEY OWNED ----------$";M1
610 PRINT "DRILLING LOCATIONS OWNED------";M2
615 PRINT "NUMBER OF WELLS OWNED -----------";N5
620 PRINT
625 PRINT "WELL #  , LOCATION    COST   DEPTH DRILLED   PRODUCTION    GAIN"
630 PRINT "======  ========   ======  =============   ==========   ======"
635 FOR I=1 TO N5
640 PRINTUSING 650,Q(I),E(I),F(I),R(I),R(I),O(I),T(I)
645 NEXT I
650 :##   , ### ###  $######   , ####.     #### BAR./DAY  ########
653 PRINT
654 PRINT
655 PRINT "LOCATION OF DRILL SITES  X COORD      Y COORD"
656 FOR I=1 TO M2
660 PRINT TAB(27);Y(I);O(I)
670 NEXT I
675 PRINT
680 PRINT
685 OPEN X$ TO :2,PRINT OVER
690 PRINT :2,M1,M2
695 FOR I=1 TO M2
700 PRINT :2,Y(I),O(I)
705 NEXT I
710 PRINT :2,N5
715 FOR I = 1 TO N5
720 PRINT :2,Q(I);E(I);F(I);H8(I);O(I);P(I);R(I);T(I)
725 NEXT I
720 CLOSE :2
735 PRINT "CODE"
740 PRINT "1-----DRAWS A MAP"
745 PRINT "2-----DRILLS FOR OIL"
750 PRINT "3-----TERMINATES THIS PROGRAM"
755 PRINT "WHAT WOULD YOU LIKE FROM ME? (TYPE 1,2, OR 3)"
760 INPUT C9
765 IF C9=1 THEN 790
770 IF C9=2 THEN 1470
775 IF C9=3 THEN 1935
780 PRINT "TYPE 1,2, OR 3"
786 GO TO 760
790 *  THIS SECTION OF THE PROGRAM PRINTS OUT A CONTOUR MAP
795 *  OF 9 EQUALLY SPACED CONTOUR BANDS;THE PROGRAM WILL READ
800 *  DATA FROM A DATA FILE IN WHICH THE NAME OF THE FILE WILL
805 *  BE INPUTED INTO THE COMPUTER. THE DATA FILE SHOULD
810 *  CONTAIN THE FOLLOWING:
850 *    FIRST  LINE--1)NUMBER OF OBSERVATIONS (N)
865 *    SECOND LINE--1)EAST-WEST CO-ORDINATE
870 *                   COMMA
875 *                 2)NORTH-SOUTH CO-ORDINATE
880 *                   COMMA
885 *                 3)DEPENDENT VARIABLE
890 *    FOURTH THROUGH N LIKE--SAME AS LINE #3
895 *=================================================================
900 DIM G(100,3),A(100),V(60,100),B$(100),A$(12)
901 *
902 *  READS DATA FILE AND CALCULATES MAP PARAMETERS
```

```
900 *
905 RE 0,00,02,03,04
910 DA A 10,0,21,0,10,0,140,0
920 PRINT "WHAT IS THE NAME OF THE FILE FROM WHICH THE DATA WILL BE READ"
925 INPUT K$
930 OPEN K$ TO 1,(NPJI
940 INPUT #1,N,M
945 FOR I=1 TO N
950 FOR J=1 TO M
955 INPUT #1,G(I,J)
960 NEXT J
965 NEXT I
970 CLOSE #1
975 PRINT
980 PRINT
985 PRINT "PLEASE BE PATIENT"
990 PRINT
995 PRINT
1000 I=70
1005 I=42+(04*33)/(22*20)
1010 C=(22*20)/(I1*I1
1015 C=(C*33)/(I2*I1)
1020 S=((C1*C1)+(C2*C2))/10000
1025 *
1030 *  CALCULATE MAP VALUES
1035 *
1040 FOR I=1 TO I2
1045 Q=0
1050 FOR J=1 TO I1
1055 *
1060 *  CALCULATE  DISTANCE**2 BETWEEN CURRENT GRID POINT AND ALL DATA POINTS
1065 *
1070 FOR K=1 TO N
1075 W(K)=(Q1-G(K,1))**2+(Q4-G(K,2))**2
1080 NEXT K
1085 *
1090 *  FIND THE 6 NEAREST DATA POINTS AND CALCULATE SUMS
1095 *
1100 S1=0
1105 S2=0
1110 FOR L=1 TO 6
1115 I1=1
1120 FOR K=2 TO N
1125 IF W(K)<W(I1) THEN 1220
1130 NEXT K
1135 IF W(I1)<51 THEN 1190
1140 D=SQR(W(I1))
1145 S3=S3+G(I1,3)/D
1150 S2=S2+1/D
1155 W(I1)=9*10**35
1160 NEXT L
1165 *
1170 *  CALCULATE GRID POINT AND STORE IN MATRIX
1175 *
1180 V(I,J)=S3/S2
1185 G  TO 1195
1190 V(I,J)=G(I1,3)
1195 Q=Q1+C1
1200 NEXT J
```

```
1205 Q=Q4+C2
1210 NEXT I
1215 G  TO 1245
1220 I=K
1225 G  TO 1130
1230 *
1235 *  FIND LARGEST AND SMALLEST VALUES IN MAP
1240 *
1245 Y=V(1,1)
1250 Y2=Y1
1255 FOR I=1 TO I2
1260 FOR J=1 TO I1
1265 Y3=V(I,J)
1270 IF Y3<Y1 THEN 1285
1275 IF Y3>Y2 THEN 1305
1280 NEXT J
1285 NEXT I
1290 G  TO 1330
1295 Y1=Y3
1300 G  TO 1280
1305 Y2=Y3
1310 G  TO 1280
1315 *
1320 *  PRINT MAP ONE LINE AT A TIME
1325 *
1330 A$(1)="1"
1335 A$(2)=" "
1340 A$(3)="2"
1345 A$(4)=" "
1350 A$(5)="5"
1355 A$(6)=" "
1360 A$(7)="A"
1365 A$(8)=" "
1370 A$(9)="B"
1375 FOR I=1 TO I2
1380 B$(I)=" "
1385 FOR J=2 TO 71
1390 Y=((V(I,J-1)-Y1)/(Y2-Y1))*9+1
1395 Y=INT(Y+.5)
1400 IF Y>9 THEN 1430
1405 B$(J)=B$(J-1)+A$(Y+1)
1410 NEXT J
1415 PRINT B$(71)
1420 NEXT I
1425 G  TO 1440
1430 Y=9
1435 G  TO 1405
1440 C3=(Y2-Y1)/9
1445 C=Y1+.5*C3
1450 PRINT
1455 PRINT"REFERENCE CONTOUR=";C+
1460 PRINT "CONTOUR INTERVAL=";C3
1465 G  TO 735
* ****************
* DRILL SECTION
*******************
*
* USES CENTRAL WELL FILE CALLED "WELL"
*      FIRST LINE = # OF WELLS(N6)
```

```
*     SECOND TO LINE 46.= WELL ID, X AND Y COORD., PAY
*     ZONE,BBO,TD,COST
1470 DIM U(100),Z(100),C(100),A$(100),L(100),S(100)
1480 PRINT "WHAT IS THE ID NUMBER OF THE WELL YOU WISH TO DRILL"
1485 INPUT Z3
1490 PRINT
1495 OPEN X$ TO 13,INPUT
1500 INPUT #3,N1,N2
1505 FOR I=1 TO N2
1510 INPUT #3,Y(I),D(I)
1512 PRINT Y(I),D(I)
1515 NEXT I
1520 CLOSE #3
1550 OPEN "WELL" TO #4,INPUT
1555 INPUT #4,N6
1560 FOR I=1 TO N6
1565 INPUT #4,U(I),Z(I),C(I),A$(I),I(I),L(I),S(I)
1575 NEXT I
1576 FOR I=1 TO N6
1577 IF U(I)=Z3 THEN 1620
1578 NEXT I
1580 PRINT "THIS WELL IS EITHER NON-EXISTENT OR HAS ALREADY BEEN DRILLED FOR OIL"
1585 PRINT
1590 PRINT "WOULD YOU LIKE TO DRILL ANOTHER WELL"
1595 INPUT A$(11)
1600 CLOSE #4
1605 IF A$(11)="YES" THEN 1480
1610 IF A$(11)="Y" THEN 735
1615 GO TO 1590
1620 J=I
1630 FOR I=1 TO N2
1631 IF Z(J) = Y(I)  THEN 1641
1632 GO TO 1642
1641 IF C(J) = D(I) THEN 1685
1642 NEXT I
1643 GO TO 1650
1650 PRINT "YOU DO NOT OWN THIS PROPERTY"
1655 PRINT "WOULD YOU LIKE TO TRY DRILLING SOMEWHERE ELSE(TYPE YES OR NO)"
1660 INPUT A$(10)
1665 CLOSE #4
1670 IF A$(10)="YES" THEN 1480
1675 IF A$(10)="Y" THEN 735
1680 GO TO 1655
1685 GO TO 1705
1705 N=N6+1
1710 N2=N2+1
1715 PRINT
1720 PRINT
1725 PRINT "YOU HAVE DRILLED WELL NUMBER "J(J)
1730 PRINT "TOTAL DEPTH DRILLED ------"L(J)" FT"
1735 PRINT "COST OF DRILLING  ------$"S(J)
1740 PRINT
1741 IF I(J)>0 THEN 1750
1745 Z=0
1750 PRINT "YOU HAVE DRILLED A DRY HOLE"
1755 PRINT "BETTER LUCK NEXT TIME"
1758 GO TO 1765
1760 Z=365*12*23*I(J)
1765 PRINT "CONGRATULATIONS! YOU HAVE STRUCK OIL"
```

```
1770 PRINT "PRODUCTION IS "I(J)" BARRELS PER DAY"
1775 PRINT "PAY ZONE WAS THE "PS(J)" FORMATION"
1780 PRINT "RETURN MAIN IS "Z7
1785 M=M1+Z7+S(J)
1790 CLOSE 14
1795 OPEN "WELL" TO 15,PRINT OVER
1800 PRINT 15,N6
1805 FOR I=1 TO J+1
1810 PRINT 15,U(I);Z(I);C(I);M$(I);I(I);L(I);S(I)
1815 NEXT I
1820 IF J>N6 THEN 1340
1825 FOR I=J+1 TO N5+1
1830 PRINT 15,U(I);Z(I);C(I);M$(I);I(I);L(I);S(I)
1835 NEXT I
1840 CLOSE 15
1845 OPEN X$ TO 15,PRINT OVER
1850 PRINT 15,M1,N2
1855 FOR I=1 TO N2
1860 PRINT 15,Y(I),D(I)
1865 NEXT I
1870 PRINT 16,X5
1875 FOR I=1 TO N5+1
1880 PRINT 16,D(I);E(I);F(I);M$(I);O(I);P(I);R(I);T(I)
1885 NEXT I
1890 PRINT 16,U(J);Z(J);C(J);M$(J);I(J);L(J);S(J);Z7
1895 CLOSE 16
1900 GO TO 735
1905 END
```

AN OBSERVATIONAL STUDY OF TEACHING: UNDERGRADUATE LEVEL

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In order for college teachers to be effective in their classroom procedures, there is a need to know which teaching attributes are considered essential. Many research studies have been undertaken to identify these characteristics. Carpenter, Zgmond, and Kochem (1965) questioned 125 students as to the teacher traits which they deemed most important. The identified characteristics were grouped into three categories by instructor types. In the study, each student indicated his preference for a pragmatic, authoritarian, or counselor type teacher in a certain situation. The results of preference for each instructor type varied greatly and no single type was consistently preferred as the situation variable changed.

Champlin (1931) asked some 275 college students, who had completed a study of educational objectives, to rank order 35 attributes desired in college instructors. The first five in order of rank were:

1) Thorough knowledge of subject matter.
2) Interesting presentation of subject matter.
3) Interest in the profession.
4) Careful organization of the materials.
5) Enthusiasm for the work.

Bousfield (1947) reported that 507 university students assigned the following order to 19 items:

1) Fairness
2) Mastery of subject matter
3) Interesting presentations
4) Well-organized materials
5) Clearness of exposition
6) Interest in students
7) Helpfulness
8) Ability to direct discussion
9) Sincerity
10) Keeness of intellect
11) Enthusiasm
12) Wide range of information
13) Sense of humor
14) Good voice
15) Tolerance
16) Poise
17) Good appearance
18) Research accomplishments
19) Reputation as scholar

Coffman (1954) reported on a study conducted at Oklahoma State University of 50 teachers who were rated by approximately 2,000 students. The rating scale consisted of 18 specific traits with each trait scaled from a high to low evaluation. The results indicated high correlations with: 1) ability to arouse interest in students, 2) sense of humor, 3) feeling between instructor and student, 4) tolerance and liberality, and 5) general estimate of instructor as teacher.

Breed (1977) found no significant differences between the ranking of desirable instructor qualities by some 56 faculty members and 100 of their students.

Trabue (1950) found that 419 liberal arts college presidents selected these teaching attributes as most important out of a list of 26 qualifications:

1) Inspires students to think for themselves and to express their own ideas sincerely.

2) Is emotionally stable and mature.

3) Organizes materials and prepares carefully for each meeting with class.

4) Is friendly, democratic, tolerant and helpful in his relations with students.

Later, Stauffler (1956) submitted Trabue's 26 qualities to 281 deans and 526 teachers. The above-named four traits were again rated as most important.

It is reasonable to conlude, based on these studies representing a forty-year period, that desirable traits for college teachers are identifiable, remain basically the same, and can be grouped into specific categories.

STATEMENT OF THE PROBLEM

This pilot study provided instructors with a means of analyzing and evaluating teaching, considering individual teaching styles and teacher effectiveness. It attempted to measure the individual's perception of teaching, as well as the perception of colleagues and students. The procedure offered a process for systematic observation of teaching and an improvement cycle for undergraduate instruction.

The hypotheses developed for the study were:

$H0_1$ There will be no significant difference between the pre-test and post-test means on the *Student Description of Teachers - Medium Length - Form (SMF)*.

HO_2 There will be no significant difference between the means for the total group of participants on the *Student Description of Teachers - Medium Length - Form* (SMF) as perceived by students, colleagues and instructors (self-perception).

HO_3 There will be no significant interaction between pre-test/post-test and on the *Student Description of Teachers - Medium Length - Form* (SMF) as perceived by students, colleagues, and instructors (self-perception).

SIGNIFICANCE OF THE STUDY

On many college campuses increasing concern for the quality of instruction is being expressed. This has led to a search for better means of evaluating teaching effectiveness both to provide feedback to individual instructors and to reward effective teaching. Also, as an accountability measure, university instructors are being called upon to show evidence of their teaching effectiveness. There remains a need for a simple systematic, easily administered procedure for evaluating instruction. In this pilot study, the researchers have developed an evaluation process and identified an instrument that provides a systematic procedure for meeting this need.

SUMMARY OF PROCEDURES

The following outline provides a procedural summary of the study:

January 14, 1977	Randomly selected participants; N=10. Distributed outline of study.
January 21, 1977	Met with participants to discuss study.
February 7 - 18, 1977	Scheduled individual observations to complete instrument (pre-measure).
February 21 - March 4, 1977	Scheduled conferences with instructors for feedback.
April 4 - 15, 1977	Conducted individual observations to complete instrument (post-measure).
April 18 - 29, 1977	Scheduled conferences with instructors for final evaluation.

The researchers conducted a search for an instrument which would meet the needs identified for the study. Specifically, an instrument that could be easily administered and scored; one which would provide instructional feedback to teachers; and one which would offer an opportunity for instructors to contribute items appropriate for their teaching. In addition, the

researchers were concerned with the amount of time necessary for the evaluation process. The time factor and length of teaching evaluation instruments often become extremely burdensome, difficult to manage, and provide little or no real value for instructors.

The researchers identified the *Student Description of Teachers - Medium Length - Form (SMF)* questionnaire which would meet the criteria for the study. The questionnaire selected was developed as part of a study of teaching and teacher evaluation conducted by the Center for Research and Development in Higher Education, University of California at Berkeley. The scales and items which focus on a description of teaching enable the individual instructor to profile his teaching behavior. The questionnaire categorizes the previously mentioned attributes into general categories. The evaluation questions provide information on the overall perceived effectiveness of teaching practices. It consists of thirty-six items which focus on a description of teaching. These items are grouped into five subscales summarized as follows (Wilson, 1971):

1) Analytic/Synthetic Approach (items 1-7) - Has command of the subject, presents materials in an analytic way, contrasts various points of view, discusses current developments and relates topics to other areas of knowledge.

2) Organization and Clarity (items 8-14) - Makes himself clear, states objectives, summarizes major points, presents material in an organized manner, and provides emphasis.

3) Instructor-Group Interaction (items 15-22) - Is sensitive to the response of the class, encourages student participation and welcomes questions and discussion.

4) Instructor-Individual Student Interaction (items 23-29) - Is available to and friendly towards students, is interested in students as individuals, is himself respected as a person and is valued for advice not directly related to the course.

5) Dynamism/Enthusiasm (items 30-36) - Enjoys teaching, is enthusiastic about his subject, makes the course exciting and has self-confidence.

STATISTICAL ANALYSIS

Two and three factors analyses of variance were used to analyze the data. The factors considered were:

Time (T)	pre/post test measures
Perceivers (P)	student/colleagues/instructor

-Subscales (S)

Analytic/Synthetic Approach
Organization and Clarity
Instructor-Group Interaction
Instructor-Individual Student Interaction
Dynamism/Enthusiasm

The data were computer analyzed using procedures in the *Statistical Package for the Social Sciences* (Nie, 1975).

SUMMARY OF RESULTS

The study provided instructors with a means of analyzing and evaluating teaching. The questionnaire, *Student Description of Teaching - Medium Length - Form* (SMF), considered individual teaching styles and teacher effectiveness as perceived by students, colleagues and instructors (self-evaluation). The procedure offered a means for systematic observation of teaching and an improvement cycle for instruction.

Table 1 indicates that all hypotheses were accepted at the .05 level. When the data were analyzed, no significant differences were found between the pre-test and post-test means (HO_1), the means for the total group of participants (HO_2), or the interaction of the pre-test and the post-test means (HO_3).

Table 1

Summary of the Two Factor Analysis of Variance for Total Scores of the *Student Description of Teachers - Medium-Length Form* (SMF) by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	1.326	1.326	2.053
within error	9	5.813	.646	
Perceiver (P)	2	8.679	4.340	1.128
within error	18	69.268	3.848	
Interaction (TxP)	2	2.096	1.048	.897
within error	18	20.900	1.161	
Total	59	531.298	9.005	

Tables II, III, IV, V and VI represent the summaries of the two factor analyses of variance for scores on each of the subscales of the instrument. No significant differences were found between the means of the pre/post test measures on each of the subscales as perceived by students, colleagues, and instructors.

Table 2

Summary of Two Factor Analysis of Variance for Scores for Analytic/Synthetic Approach, Subscale I, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.002	.002	.026
within error	9	.673	.075	
Perceiver (P)	2	.105	.052	.211
within error	18	4.435	.246	
Interaction (TxP)	2	.163	.082	.612
within error	18	2.417	.134	
Total	59	32.763	.555	

Table 3

Summary of Two Factor Analysis of Variance for Scores on Organization and Clarity, Subscale 2, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.204	.204	3.300
within error	9	.557	.062	
Perceiver (P)	2	.650	.325	1.477
within error	18	3.957	.220	
Interaction (TxP)	2	.298	.149	1.404
within error	18	2.576	.143	
Total	59	36.403	.617	

Table 4

Summary of Two Factor Analysis of Variance for Scores on Instructor - Group Interaction, Subscale 3, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.308	.308	2.995
within error	9	.927	.103	
Perceiver (P)	2	.507	.253	1.841
within error	18	2.477	.138	
Interaction (TxP)	2	.210	.105	1.405
within error	18	1.799	.099	
Total	59	16.530	.280	

Table 5

Summary of Two Factor Analysis of Variance for Scores on Instructor - Individual Student Interaction, Subscale 4, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.003	.003	.064
within error	9	.410	.045	
Perceiver (P)	2	.548	.274	1.292
within error	18	3.816	.212	
Interaction (TxP)	2	.006	.003	.157
within error	18	.350	.019	
Total	59	10.965	.186	

Table 6

Summary of Two Factor Analysis of Variance for Scores on Dynamism/ Enthusiasm, Subscale 5, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.020	.020	.169
within error	9	1.064	.118	
Perceiver (P)	2	.487	.243	1.330
within error	18	3.296	.183	
Interaction (T×P)	2	.127	.063	1.139
within error	18	1.004	.056	
Total	59	36.110	.615	

A summary of the comparison by time, perceiver and subscale is presented in Table 7. The analysis shows that the F-ratio of the subscales was significant at the .05 level. The Student Newman-Keuls procedure indicates that subscale #4, Instructor - Individual Student Interaction, is significantly higher than the means of the other subscales.

Table 7

Summary for the Analysis of Variance for Scores on *Student Description of Teachers - Medium-Length Form* (SMF) by Time, Perceiver, and Subscale

Source	df	ss	ms	F
Time (T)	1	.340	.340	2.807
within error	9	1.090	.121	
Perceiver (P)	2	1.811	.906	1.183
within error	18	13.782	.766	
Interaction (TxP)	2	.345	.172	.727
within error	18	4.252	.236	
Subscale (S)	4	12.396	3.099	7.509*
within error	36	14.856	.417	
Interaction (TxS)	4	.198	.049	.690
within erorr	36	2.540	.071	
Interaction (PxS)	8	.484	.061	1.039
within error	72	4.194	.058	
Interaction (TxPxS)	8	.459	.057	1.064
within error	72	3.883	.054	
Total	299	145.350	.486	

*p < .05

DISCUSSION AND SUMMARY

Since there were no significant differences between mean scores on the pre/post measures as perceived by students, colleagues, and instructors (self-perception), the results infer that the time factor between the pre/post measure may not have been adequate. There may be a need for a longer period of time in which participants reflect on feedback and effect changes in methodology. Also, there may be a need for more conferences with participants

to analyze and provide continued focus on the improvement cycle.

Individual conferences conducted with the participants after the pre-test were received favorably by the instructors. All stated that the procedure offered constructive feedback for improving their teaching. Nine of the ten participants stated they would like to continue to use the procedure, indicating that the conferences had personal value for them. All participants indicated they were dissatisfied with the present teacher evaluation procedure. It is incomplete, offers no concrete suggestions for improvement and is based solely on student perceptions.

Each individual conference was conducted using the following organizational structures:

1) Positive reinforcement.
2) Constructive comments based on pre-test results.
3) Development of improvement cycle.
4) Positive summary of experience.

The researchers were very much aware of individual levels of anxiety demonstrated by the participants during the observational and conferencing procedures. These were discussed openly with the participants and appeared to subside as the study progressed.

The mean scores of the pre-test measure as perceived by students, colleagues and instructors differed by less than .5 of a point. This finding suggests a similar perception of teaching on the part of all three perceivers. At a time when universities are using student evaluations as a measure of teaching, this may suggest that students' perceptions of teaching are comparable to colleague and instructor (self) evaluation. This finding is supported by the research compiled by Breed (1977): One could also reason that student evaluations of teaching may be a wasted effort. Since the mean scores on the pre-test between the three groups (i.e., students, colleagues, instructor) were comparable, one could infer that colleague and instructor (self perception) evaluation would serve the same purpose. However, two sets of data would tend to validate the procedure.

Another factor to be considered is that students often reason that they will be more successful in the classroom if they can develop a personalized relationship with the instructor. The reciprocal could also be true for faculty. Since many universities are using student evaluations to measure teaching, faculty may encourage closer student relationships to achieve a higher student evaluation. Further study is needed in these areas.

Four subscales of the questionnaire which deal with different characteristics of teaching were not found to be significant. The first two measure a teacher's ability to analyze, synthesize, organize and clarify subject matter. The third subscale measured an instructor's ability to interact with the total class. Subscale five was concerned with the instructor's

personal traits.

Subscale four, Instructor - Individual Student Interaction, was found to be significantly higher than the means of the other subscales. This finding could be a direct result of emphasis placed upon competency based teacher evaluation (CBTE) by the College of Education at Memphis State University during the past five (5) years. It could also be a direct result of the current interest and effort in designing individualized, student-centered teaching approaches by these instructors involved in the study. Most of the participants in the study are advocates of individualized programs and use them in their teaching.

To conclude, the study offers a procedure for analyzing and evaluating undergraduate teaching. The participants indicated they were pleased with the organization and personal value they received during the study. The results offer additional considerations and present new questions concerning the process of measuring teaching. There remains an urgent need for continued research in this area.

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DEVELOPMENT OF GRAPHIC CONCEPTUAL TOOLS APPLIED TO URBAN PLANNING PROBLEMS

Subbarayan Prasanna, Department of Planning[1]

This project was developed to provide specific visual aids material to help in conceptualization of analytical problems in urban and regional planning. The material developed is in the form of analytical graphics dealing with several stages and sequences of decision making in urban planning problems. The graphics are formulated with accompanying annotations in such a manner as to enable being evolved into a monograph, regarding an aspect of the curriculum for the Master's degree in City and Regional Planning. The material produced is therefore illustrative of the available techniques for application in professional and research pursuits.

In addition, it is hoped that the material will assist in the development of conceptual processes to secure and integrate thoughts/idioms conducive to a set of objectives in an organized manner and communicable format in planning situations.

INNOVATIVE ASPECTS

The graphics produced emphasize the interpretation and adaptation of professional and research work examples suitable to the classroom medium of instructional discipline. Past experience, over several years, indicates that a large area of development in conceptualization is lost on the students due to lack of exposure to the graphic medium. This is especially acute in the case of planning curriculums as they start the professional education at the graduate level, drawing students from several undergraduate backgrounds, some professional and others non-professional. A main problem is faced in the integration of techniques with professional objectives. Another lies in the area of development and evaluation of appropriate techniques themselves. A third is observed in the formulation of analytico-synthetic approaches. Fourthly, the most important problem lies in bridging the gap between the perception of morphological changes in planning environments and the rationalization of policies implemented on such environments.

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[1] Valuable assistance was provided by Ms. Beth Cooper in conducting this project.

The graphic material produced in this project is being developed into a monograph. This monograph is expected to serve as a reference volume for students in the Planning program, as well as provide visual aids to instructional material in several courses in the planning curriculum.

THE PROJECT

This project derived and used material from a number of professional, research and academic activities in which the author and several of his colleagues have worked during the past eight years. Their locales included several regions in and outside the United States.

The following is a list of major projects from which the graphics were developed. These are divided broadly into 1) Research and demonstration studies supported by grants in aid and 2) Professional studies undertaken to help decision making by specific clients.

Research and Demonstration Projects

1) *The Bellingham Project:* Investigation of Urban design elements within the comprehensive planning process in Bellingham, Washington, with a view to demonstrate conceptual and operational possibilities of urban design efforts for towns of equivalent size and population characteristics. This project was funded by the United States Department of Housing and Urban Development under title 701 (b) program and amended to the University of Washington, Seattle. The project was completed in the year 1969-70.

2) *The Ham-Mond Project:* Investigations of form determining forces in two typical towns of the Northwest to demonstrate the conceptualization of process-form relationships in an environment of public policies, growth patterns and options of spatial accommodation were undertaken. The project was funded by the National Humanities Foundation in 1970.

3) *The Urban-Coastal Region Project:* A curricular laboratory in graphic analysis developed on the empirical conditions of the urban coastal region of the Puget Sound - summer and fall 1974, at the University of Washington, Seattle. The project was supported by a Mellon grant.

4) *The Columbia Basin Investigations:* These were primary and secondary materials of information that developed over several years in the Columbia River Basin of the Pacific Northwest. A part of the investigations resulted in a Ph.D. dissertation at the University of Washington dealing with transformations in the settlement patterns of towns and regions in the Basin in 1975.

Academic Abstractions out of Professional Experiences

1) *The Sentinel New Town Project, Western Australia:* Investigations of conceptual options of spatial forms and land use inter-relationships suggestive of the three-dimensional outcomes related to a mining settlement project in the deserts of western Australia.

2) *A Large, "New town-in Town" Project in KaKaaKo, a sector of Honolulu, Hawaii:* Investigations of conceptual options of spatial forms and land use inter-relationships, and structural stereotypes of accommodation in a planning and design perspective of 30 years, identifying alternative means of sequencing the achievements/targets over the time perspective.

3) *Dyersburg Project; Tennessee:* This project is in process. It deals with the investigations of impact possibilities of the new freeway I-55 and bridge across the Mississippi River on the town and the county. Long-term and short-term projections are being made and analyzed as to the impact on several sectors and interests in the communities.

4) *Kansas City, Mo./Brunswick, Ga. Multimode Transportation and Utility Corridor Project:* This project is just beginning now. The project is aimed at developing analytical procedures to help the states of Missouri, Arkansas, Tennessee, Mississippi, Alabama, Georgia and Florida in planning to develop a comprehensive transportation corridor across several regions from Kansas City to Brunswick, a distance approximately 1,200 miles through several urbanized, amenity, resource, agricultural, recreational regions and metropolitan industrial concentrations. Several interesting graphics are expected to result from this project. No project of this type and scale has been undertaken before in planning in this country.

The resulting graphics have been formulated into five areas of interest in planning analysis. These areas cover 1) goal-form interactions, 2) schematics of end-states rationalizations, 3) process-form relationships, 4) time perspectives and growth pattern perceptions, and 5) dimensional analysis of decision sequences. Figure 1 presents a summary view of the typical graphic derived from each of the aforementioned planning studies.

The comprehensive efforts of this project carry over from those of several years in the past. Many students, faculty members and professional planning consultants have contributed to this directly and indirectly. A major part of the effort was achieved in Seattle during the years 1974-75 and was supported by a faculty development grant from the Mellon Foundation. The present effort is supported in part by the Center for Instructional Service

and Research at Memphis State University under the "Seed Grants Program." The Grant supported and helped in the educational development of one student Research Assistant, Ms. Beth Cooper, in the Graduate Department of Planning, who helped in the development and production of graphics. Additional time has been contributed by Ms. Cooper and the author towards fulfillment of the project. A monograph is expected to be produced during this year incorporating all these efforts.

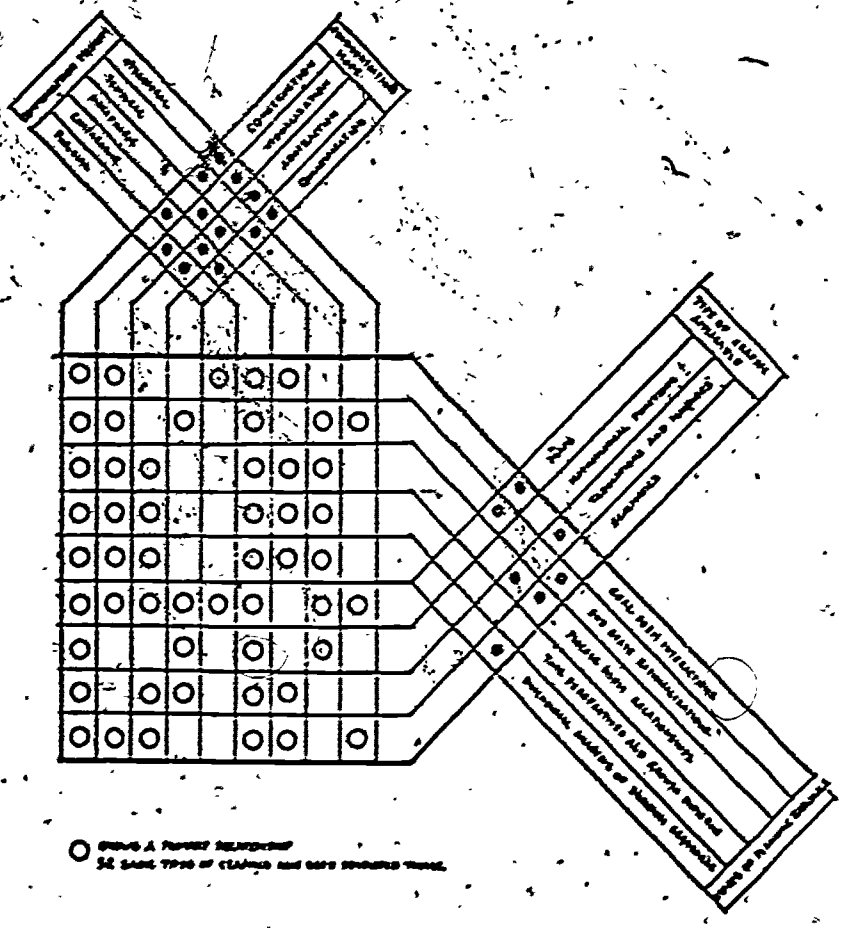

Figure 1. Diagram Showing Types of Graphics Developed.

PART II

DEVELOPMENT OF NEW COURSES

INTRADISCIPLINARY COURSE: LANGUAGE AND PERFORMANCE STYLES

Lea Queener, Department of Speech and Drama

Language and Performance Styles was conceived as an intradisciplinary course required of all Speech and Drama graduate students to meet three departmental needs:

1) Perceived relationships between the area disciplines which make up the structure of the department - theatre and oral interpretation; rhetoric and public address; radio, TV, and film. Although these conglomerates are all dedicated to the exploration of the values, functions, and influences of the symbolic image as it relates to the fundamentals of human life, increased area specialization over the last decade has promoted minimum integration - rather, isolation. Many graduating Master of Arts students take jobs in small colleges where they are expected to function in breadth rather than impractically circumscribed specialities and find themselves unfamiliar with the various terminologies, sources, and methods of the several areas they are required to act within.

2) Demonstrated relevance between research methods and research content. Two courses in research methods were being taught, in theatre and in communications, which students found tedious, excessive, and often irrelevant to their interests. They complained of "busy" library work which seldom related to their course work or career goals.

3) Establishment of a community of scholars and performers, both faculty and students. Many of the faculty and students did not know their colleagues and peers in other areas, nor their interests, expertise, and achievements.

Language and Performance Styles was conceived as a course which would demand that the student explore and relate the fundamental and common element of theatre and communication arts - language - from the points of view of the various contexts and functions of the department's areas and which would at the same time give him increased motivation to apply research methods to his interest areas. And by bringing faculty and students from the various areas

together for a common study, it was believed that a departmental community would flourish.

DESCRIPTION

The course is predicated on the notion that all language is performance, and all performance, language; it defines language as "the image in performance," that which speaks - the word, the body, and the environment. Such speaking images were examined in the art of performer: 1) the verbal image; 2) the body, or gestural, image; and 3) the environmental image, including the electronic environment. Each type of image was explored as it functions in performances on the stage and platform, in the electronic media, and on the written page.

All graduate students were required to take the course, with the exception of those who had already completed one of the research methods studies. With 41 students enrolled, the course was team taught by Leonard Lee (radio, TV, and film), Michael Osborn (rhetoric), and Lea Queener (theatre and oral interpretation), with 17 other faculty members of the department participating in one or more of the class sessions. Lea Queener served as course coordinator.

A summary outline of the class calendar suggests the course content:

Sessions	
1 - 3	Professional resources: organizations, journals, and library holdings were explored. The research paper was discussed in structure and style.
4 - 9	The verbal image - theories and approaches: lecture and discussion developed theories and approaches to the symbolic image, making use of Susanne Langer, Benjamin Whorf and his followers, Kenneth Burke, the phenomenologists, and Noam Chomsky.
10-12	Nonverbal languages: gesture and mime; space-time, visual-aural, and environmental forms. Lecture and discussion was augmented by demonstrations, slides, and videos.
12-14	Film language: Point of view, composition, montage, and process were examined in videos of *David and Lisa* and "The Making of a Documentary."
15	Organization of a class project to translate Auden's poem, "The Shield of Achilles," into video language - to be completed by the semester's end.

Sessions

16-20 The dramatic play: scenes from *Macbeth*, Pinter's *The Homecoming*, and Hakim's *The Tree Climber* were presented in the styles of stage, readers theatre, solo, and film. The same scene from *Macbeth* was presented in each of the four media and discussed in terms of the verbal and nonverbal language functions previously explored. Scenes from *The Homecoming* were viewed in the styles of stage, readers theatre, and solo, with Walter Smith and Jerry Chipman as guest performers.

21-23 The public speech: Martin Luther King's "I've Been to the Mountain Top" was heard and discussed, with particular emphasis on the clash between the images of King's and Memphis' environments. The rhetoric of systems (i.e., diplomatic and institutional) and media was then explored.

24-26 Comparative forms: image transformations occurring between the novel, play, and film forms were explored with Kesey's *One Flew Over the Cuckoo's Nest*.

27-28 The poetic image: Auden's "The Shield of Achilles" was examined as poem and video presentation.

29 Final assessment and celebration: an evening of discussion and reviews of student papers preceded the final examination.

Student assignments included specific readings in the image content and structure of the diverse areas, three major research papers (one of which was focused on comparative forms and functions), and participation in the class performances and video project.

Procedures

The course met on Tuesday and Thursday afternoons, 4:30-6:00, in order to avoid class and production conflicts. The media room of the Speech and Drama building, with its platform and video system, met most of the course needs, although an occasional move was necessary (e.g., the department's Studio Theatre for *The Homecoming* and the Memphian Theatre for *One Flew Over the Cuckoo's Nest*). A location trip to the Mason Temple for consideration of Martin Luther King's speech was planned but did not materialize.

Class format consisted of lectures, panel discussions, and performance images which became the subject of class discussion. Professors Lee, Osborn, and Queener were present at all sessions and attempted to provide continuity through the succession of visiting lecturers, discussants, and performances.

Materials

Fifty books selected from all areas were placed on reserve, with five ordered for student purchase. Hand-outs included extensive area bibliographies (often annotated), listings and descriptions of the many professional organizations of the diverse areas, programs and scripts, and occasional summaries. Videos and slides were generally selected from the departmental and individual faculty holdings (excepting *One Flew Over the Cuckoo's Nest*, which required special arrangements).

Faculty

Guest faculty included Professors Acey, Bakke, Baster, Bensman, Gantt, Gee, Helming, Koertge, McFaddin, Malin, Sloan, Smith, Strickland, Swanson, Ranta, White, and Yellin - all in the Speech and Drama Department. The three full-time instructors met weekly to discuss course plans, projects, and problems; and Lea Queener met with visiting faculty members for briefing on the preceding lecturers and activities and objectives of their own presentations in the course, with an attempt at coordination of theme and terminology.

Evaluation

At the end of the semester a meeting between three students and interested faculty was held to discuss the course and suggest ways to solve its problems. A formal evaluation involving all students was planned for the spring semester but did not materialize because the course coordinator was away on leave of absence.

Of the 41 students who enrolled, 29 received final grades: 12-A, 11-B, 4-C, 1-D, 1-F; 5-Drop, 7-Withdrawn. Class attendance for those who remained in the course was generally good.

Values

1) Both students and faculty were exposed to a variety of materials and perspectives spanning the whole of the departmental areas. Terminologies, relationships, and the problems and possibilities in coexistence of the diverse areas were explored. Students who go to jobs where they are expected to teach courses in areas other than their specializations will have materials and insights with which to begin their preparations.

2) Better understanding and cooperation was apparent among both students and faculty, many of whom had not previously known each other.

3) Deficiencies in background, as well as strengths, of new graduate students were quickly apparent to a wide spectrum of the faculty.

Problems

1) The late afternoon hour created a poor psychological environment for a high pressure course.

2) Because all graduate students who had not previously completed a research methodology course were required to enroll in Language and Performance Styles, part of the enrollment consisted of students who were in their last semester of graduate work and who resented having to forfeit a last elective to a departmental requirement. In general, the absolute nature of the required course status was a strong negative force.

3) Too much was attempted; too much was done; too many faculty members were included in the course; too many topics were considered. Consequently, the focus was dispersed, discussions were sometimes too elementary, and the rush of topics and faculty led to frustration and discontinuity. Although it was hoped and urged that all participating faculty attend all classes in order to achieve the desired goals, a busy departmental schedule prevented that achievement. The efforts at preliminary briefing before a visiting lecture or panel discussion seldom succeeded in establishing the continuity of theme desired; thus establishing relationships and cross-referencing between the areas was sometimes difficult. And the crowded class calendar seldom allowed enough time for clarification and pointing out connections by the team instructors, of questions from students.

It should be noted, however, that in spite of the above major problem, an inherent corollary value emerges in discovering what will and will not work, what deletions need to be made, and which faculty function best in such a course environment.

4) Because class time was not available for pursuing problems with research methods and writing style, extensive conferences with students were necessary with every writing assignment, thereby creating problems for everyone. Students who were advised to seek help from remedial sources in the English Department were too busy with departmental productions to do so.

FOLLOW UP OF THE PROJECT

The team instructors continue to believe the course has valuable potential and is worth pursuing. The establishment of the new College of Communication and Fine Arts offers additional possibilities which have yet to be explored. In the meantime, tentative plans have been made for offering the course again in the fall semester of 1978, with the following implementations:

1) Offer the course as an elective rather than a requirement.

2) Addition of a one-hour laboratory per week for those who are deficient in writing and research skills.

3) Schedule more time for class discussion, breaking occasionally into small interest groups for special examination of the performance images experienced together.

4) Realistic parameters in the scope of the course. Although there are apparent values in exposing incoming graduate students to the many areas and expertise in the department, the difficulties outweigh the values at this time. Greater focus should be given to depth exploration of key issues by faculty who can sustain the course continuity.

CONCLUSION

The excitement generated by the course concept and its possibilities led to a proliferation of ideas and plans in an effort to accommodate the multiple interests of the department. The course represents a truly cooperative effort. In the future, however, firmer leadership must be asserted, with a more modest thrust into the cosmos of language and performance styles.

COMMUNICATION SKILLS FOR GRADUATE STUDENTS IN THE COLLEGE OF EDUCATION

John H. Sloan, Department of Speech and Drama

This past summer (1976), Dr. Robert Saunders, Dean of the College of Education, asked me to meet with his Department Heads to pursue the possibility of a special course in communication skills for graduate students in the College of Education.

There was virtually unanimous agreement that many graduate students in the College were deficient in such basic communication skills as information management, extemporaneous presentation, management of questions and answers, and a variety of nonverbal communicative skills, including body language. Indeed, the only substantive debate over the need for such a course dealt with two issues:

1) Would one course be adequate to cover the large number of problems perceived?

2) Could the course be broadened in scope to include M.A. candidates as well as doctoral students?

The meeting concluded with the concensus that a 7000 level graduate course in communication be developed and implemented spring semester, 1977, using an existing Speech & Drama course as a pilot basis. I agreed to develop and teach the pilot section, with the understanding that additional courses would be considered in the future if things worked well.

This past fall a formal proposal was submitted for a Seed Grant to Facilitate Learning to the Center for Instructional Service and Research of Memphis State University dealing with the proposed new course in education. The proposal, in the amount of $1,000, was approved.

A course syllabus was developed along the guidelines suggested in the proposal for the grant. Twenty-five memorex audio cassettes were purchased for student use in the course - the concept being that students would have a personal record of their competency during the beginning, middle, and end of the course. Funds for this purpose were provided by the Center. Recording equipment was to be provided by the Department of Speech & Drama. Additionally,

the Department was to videotape the final performances of the students, which could be purchased by the students at cost (approximately $20.00 each for color cassettes). Reading materials and a bibliography were prepared which were to be provided by the Department. Secretarial funds provided by the Center were applied to these functions.

When the Spring Schedule was developed last fall (1977), Dean Saunders and I agreed that Speech 7933, Seminar in Problems in Speech Education, would be the most appropriate course title for the pilot section. We scheduled the course at a time we thought would be popular - 4:30 to 6:00 p.m. on Tuesdays and Thursdays. I was listed as teacher of record and planned to teach the course as a self-imposed overload.

Much to my personal disappointment, the course did not make. Only one person signed up and was assigned to another graduate course in communication. (Interestingly, she was not clear as to the nature of the course she had originally signed up for - it apparently was scheduled at a convenient time.)

While it is difficult to pin-point the reasons for the demise of the course, I plan to take the following steps to guarantee that it gets a fair test in the future (possibly this summer - more likely next fall).

1) The course title may have been misleading. Perhaps 7993 (Special Problems) with a specific published course description would be more popular.

2) Clearly, the nature of the course needs more promotion by the College of Education. I plan to visit the Department Heads, and even more vital, with key advisors to describe the nature and function of the course.

3) Finally, I am personally convinced that, once taught, the course will be a useful and popular elective in the College of Education. I will submit a follow-up report when the course becomes a reality.

PART III

TEACHING INFORMATION PROCESSING SYSTEM (TIPS) APPLICATIONS

TIPS IN CHEMISTRY 1111

James E. Bulger, Department of Chemistry

Approximately 300-500 students enroll each semester in Principles of Chemistry (Chemistry 1111-2) with the majority coming from the pre-medical, biology, and engineering areas. A large number of these students apparently find general chemistry difficult. Approximately half of the students originally enrolled in the course either withdraw or fail. It is generally thought the cause of many of these "failures," as well as underachievement by other students, is insufficient time spent on the application of lecture material to problem solving.

The Teaching Information Processing System (TIPS) developed by Allen C. Kelly seemed to provide an appropriate device for improving student performance. The system as originally developed provides computer programs to process multiple-choice quizzes taken by the students. In addition to grading the quizzes, TIPS provides output to each student in the form of a message from the professor based upon the student's performance on the quiz. A summary of class performance is also provided to the professor. This system was used in two sections of Chemistry 1111 in the fall of 1976 by Dr. Bulger. Multiple-choice quizzes were given at weekly intervals, except when major exams were scheduled. The quizzes consisted of four to eight questions and/or problems. After the quizzes were graded, individual messages were returned to each student. Students who scored 100% on the quiz were congratulated and credited with one point towards their final grade. Those who performed poorly or were absent were admonished and assigned problems based on the questions missed on the quiz. When these assigned problems were turned in, one point was credited toward the final grade of that student. In this way it was possible for all students to receive credit by either achieving 100% on the quiz or by completing the problem assignment. Seven quizzes were given and nearly all students turned in assigned problems.

Student response to TIPS was excellent. Many students stated that mandatory problem assignments were beneficial to them and that they would not have done the work otherwise. The students' attitude toward both the course and the professor also seemed better, perhaps because of the increased interaction. Many students also expressed disappointment that TIPS was not being offered in Chemistry 1112. (A TIPS program is presently being compiled for Chemistry 1112 - thanks to the support from the Center for

Instructional Service and Research.)

Whether class performance was actually improved is difficult to determine. As judged by final examination grades, it was not possible to draw any firm conclusions. The two sections that utilized TIPS were sections six and seven of Chemistry 1111, Section six outperformed all other sections on the final examinations and generally had a more positive attitude towards TIPS, the course in general, and the instructor. Section seven, an evening course, did slightly below average on the final examination and had a slightly less positive view towards TIPS and the instructor. In any case, the students claimed to have studied more. According to a survey carried out by Mr. Charles Hart ("Student Attitudes Towards TIPS - A Computer Based Instructional Technique"), the students felt that they had studied more consistently in Chemistry 1111 and that the mandatory assignments probably had a salutogy effect on the students' study habits.

TIPS will be offered in Dr. Bulger's Chemistry 1111 section in the fall of 1977 with several modifications aimed at simplifying bookkeeping of problem assignments and mechanics of the computer access.

THE USE OF TIPS IN PHYSICS 1111

Robert R. Warchini, Department of Physics

The TIPS system was used in Physics 1111, Foundations of Physics, in the fall semester, 1976, and again during the Spring semester, 1977. Physics 1111 is a conceptual type physics course which uses multiple-choice examinations. The enrollment in the fall semester was 104 students, and there were 120 students enrolled in the spring semester.

There were nine surveys given during the semester and each survey covered three or four concepts. The surveys were computer graded and the learning prescriptions were returned to the students by way of a mailbox located outside the physics auditorium.

The evaluation of TIPS as an aid to the students is not straightforward. On one hand the students strongly felt that TIPS was a valuable program and should be continued. In fact, 85% of the students felt TIPS was helpful. Eighty-four per cent said that the weekly surveys were worth the loss of lecture time and 91% said the system helped them find their strengths and weaknesses.

Despite these student opinions, there was no detectable improvement in student performance. The student performance on major exams was approximately the same as before TIPS. Student attendance was the same. (Students did not seem to make a special effort to come to class on survey days.) The failure-withdrawal rate with TIPS was up slightly over the failure-withdrawal rate without TIPS. The increased failure-withdrawal rate might be explained on the basis that the students had more feedback on their lack of progress in the course and thus knew enough to drop the course.

The benefits of the course may be summarized as follows:

1) TIPS makes dialog possible between the teacher and every student in a very large class.

2) It forces the teacher to organize his course and examine his text. The course must be broken into digestible units.

3) The students like it and it helps their confidence to know such a system is being used for their benefit.

4) Some students benefit from the system. They feel their performance on major exams was improved by TIPS.

5) It is a low cost way to keep track of students in the course. It would seem to be a much more cost effective method of using a computer in education than a system which would require extensive hardware to enable the students to carry on a dialog with the computer.

6) Most students are incapable of diagnosing their own weaknesses in a course. Through TIPS the teacher is able to diagnose each student's weaknesses and recommend an appropriate course of action.

The deficiencies in the TIPS program can be summarized as follows:

1) Some students claim the method is too impersonal. They resent being told that they are deficient in statements prepared before they had graduated from high school. I do not feel that this is a valid objection to TIPS; it is certainly no more impersonal than dialog methods, such as PLATO, since these prescriptions also were written in advance by their teacher. Secondly, from long experience in teaching this course no more than three or four per cent of the students ever seek help.

2) The disparity between good students and poor students seems to be increased. The good students take advantage of the system and improve, while the poor student ignores the prescriptions.

3) The program seems to use computer storage in a very inefficient manner.

4) The manuals furnished are not as helpful as they might be. The system seems full of little cliches that are not explained in the manuals.

In conclusion, TIPS seems to provide a useful service for the students, but the question still remains as to whether or not it is worth the time of the teacher to implement it. It would seem that further testing of the system by other instructors will be necessary before that question is resolved.

TIPS IN PRINCIPLES OF ECONOMICS-I

Michael J. Gootzeit, Department of Economics

TIPS, or Teaching Information Processing System, is a computer based method of instruction, which is designed to help administer large "principles-type" classes of between 50-600 students. Frequently, students feel a lack of contact with the instructor and the material because of the size of such classes and the lack of familiarity with the material. The TIPS program corrects this problem in an extremely effective fashion.

In the application described here the system provides "feedback" based on the nine surveys or quizzes the student takes during the semester. This feedback is in the form of "learning prescriptions" and is tailored by each instructor to each specific survey. First, the survey is taken; it is constructed in multiple-choice format so it can easily be computer graded; a response sheet is handed back to the student after each survey. This feedback sheet lists correct responses to the survey versus actual responses made by the student; it then states corrective actions for each wrong answer. These are the prescriptions which were prepared in advance by the instructor and programmed into the computer. The surveys and each separate response sheet form a convenient record of the course for the students; they can be used to study for full period exams and also to review the course in the future. TIPS was first applied at MSU to economics principles courses during 1975 by David Ciscel; it was then applied by Michael Gootzeit (the current author) during fall 1976 and spring 1977. Professor Ciscel applied TIPS to Principles II (Econ. 2120) and Professor Gootzeit applied TIPS to Principles II (Econ. 2110).

The fundamental importance of TIPS is its quality as an organizational tool. It helps beginning economics students by offering: 1) a clear list of weekly reading assignments, the knowledge of which is required for the upcoming survey; 2) a review of recent class material in the form of a weekly survey which "encourages" studying; 3) feedback from instructor to each student. If a student takes all the nine surveys and keeps a record of the correct answers and also keeps a record of the learning prescriptions he receives back for each survey, he will have an excellent course record, which can be used effectively to study for each full period examination and for the final. It can also be used in the future as preparation for standardized economics examinations such as those administered by the "College Entrance Examination

Board," for entry into graduate school.

Besides providing reading assignments, the current author provided an "Organization of TIPS," which described the overall system and helped explain the grading system. He also provided a "Basic Course Outline" which divided the subheadings of the "Basic Course Structure" into two through four major elements. This was provided to the student as a guide for studying the text and as a handy tool for reviewing notes taken in class before each full period examination.

The rationale for applying TIPS to economics principles is that:

1) Economics is considered one of the most difficult fields in the Business School, especially at the "principles" level. Large numbers of students have problems with the beginning course and either drop it or take a low grade. Furthermore, the beginning two-semester principles courses are required for all majors in the College of Business Administration.

2) The large lecture classes in the principles courses average about 100 students, and a better form of administration is required for these courses. Improved management of the course should result in improved learning.

3) TIPS requires, once implemented, a minimum of attention, and it therefore helps both students and faculty.

Students learn more material in the same length of time and the faculty is encouraged to concentrate on the more difficult aspects of the instructional material. Furthermore, constant feedback from students is received in the weekly survey quizzes and the student received prepared responses each week from faculty, via the TIPS computer program. This TIPS project, as well as one carried out simultaneously by Professors Bulger (Chemistry Department), Marchini (Physics Department), and Ciscel (Economics Department), was evaluated in a report: "Student Attitude Toward TIPS - A Computer Based Instructional Technique," by Charles K. Hart, graduate assistant, Center for Instructional Service and Research, MSU, March 1977 (mimeoed). This report was based on a questionnaire filled out by the students in these various principles classes which had used TIPS during the fall semester 1976, and it was administered one week before the end of class.

The result of this evaluation illustrated that "student attitudes towards TIPS were generally positive." But, it was not clearly demonstrated that "more consistent study arose from exposure to TIPS in all courses. In order to motivate such study, Professor Bulger assigned additional problems for handing in, "according to the number of incorrect responses on the surveys." This is a significant result which should be used by subsequent users of TIPS in the classroom.

The current author utilized TIPS once again in Economics 2119, during spring 1977 with similar results to those just described. He wishes to next apply TIPS to another required course for majors in the College of Business Administration: Money and Banking. This course is somewhat similar to Principles I, but it is more detailed and theoretical; hence, it requires more attention, and it would be useful to the students to apply the TIPS organizations scheme.

PART IV

VIDEO TECHNOLOGY APPLICATIONS

THE DEVELOPMENT AND USE OF COLOR VIDEOTAPES AS A MEANS OF BRINGING LOCAL EXPERTISE INTO THE CLASSROOM

Donald A. Dellow, Department of Foundations of Education

The particular activity of this project was designated for the Department of Foundations of Education graduate course entitled, "Adolescent Psychology Applied to Education." (EDPS 7112/8112) The bulletin description of the course is as follows:

> 7112-8112. Adolescent Psychology Applied to Education. (3) Advanced academic and laboratory study of the psychological environments of adolescents. Particular emphasis is placed on behavioral antecedents and consequences in adolescents as these relate to secondary school personnel or others who work with adolescents.

In essence, the course was designed and is presently being offered primarily for secondary education majors and counseling and guidance majors.

Generally the course is offered in the evening to allow those students employed during the daytime an opportunity to take the course. This works out well for the convenience of those needing the course in their program, but the time the class is scheduled (6:30-9:15 p.m.) generally obviates against any kind of a laboratory experience as described in the graduate bulletin. The purpose of the laboratory experience in the course was to allow for students to develop first-hand experience with local "expertise" and services that related to adolescents. On several previous occasions, outside speakers were invited to the campus to share their views with the students. This activity was as close to a "laboratory experience" as could be formulated. The students responded favorably to this more "applied" portion of the course. A myriad of factors made it difficult, however, to get the speakers when they would be of most benefit. In addition, there were numerous problems with cancellations.

PROJECT PURPOSE

It was the object of the project to supplement the content of the EDPS 7112/8112 course with color videotapes that would provide current local perspectives

on adolescent characteristics, problems, advice to educators, and descriptions of related local services. It was assumed that local "experts" would be willing to be videotaped in an interview situation and/or a live class presentation. The videotapes would serve to give Memphis State University students enrolled in EDPS 7112/8112 a current picture of certain adolescent problems as well as some indication of possible remediation activities and resources.

PROCEDURES

1) A graduate assistant was trained in the use of the color videotape equipment and advised of the procedures for working with the Instructional Television staff of Center for Instructional Service and Research in taping interviews in the studio.

2) A series of tentative high-interest topics was identified, local "expertise" contacted, and tentative arrangements made with speakers. The following list represents the presentation topics and activities videotaped for the project.

a. Workshop on Human Sexuality (8 hours)
b. Music and Adolescents (2 hours)
c. Sex Education (2½ hours)
d. The Memphis City Schools Drug Education Program (2 hours)
e. Children Being Assessed on the Concept Assessment Kit (2 hours)
f. Videotaped Episodes of Young Children (2 hours)

Total 18½ hours

3) The videotapes were utilized in graduate and undergraduate classes during the spring 1977 and summer 1977 semesters. Formal and informal student reactions were obtained from the students previewing the videotapes.

EVALUATION

The evaluation of a project such as this one is of necessity a combination of the reactions of both the instructor and the students. The evaluation will thus provide the views of sponsoring faculty member as well as the formal and informal reactions of students.

Student Evaluation

In the spring semester 1977, the faculty member utilized the Purdue Teacher Evaluation service provided by Memphis State University. The Purdue instrument was administered to the graduate class in adolescent psychology and

contained three questions that were included to evaluate the four videotapes that were viewed by the class. The class members were specifically requested to answer the three questions on the basis of their reactions to the videotapes. The three questions and the student response frequencies are provided below:

	SA	A	U	D	SD
"The guest speakers contribute significantly to the course."	10	14	3	1	2
"The speakers who addressed us communicated effectively."	11	15	1	0	1
"An appropriate number of outside lectures was used."	7	15	2	2	4

Although the questions do not relate to any technical qualities of the videotapes, they do reflect the practical consideration of whether the students thought they contributed effectively to the course content. The results of the three questions are interpreted as offering positive support for the videotaped topics and the speakers involved. The combination of "agree" and the "strongly agree" responses accounts for a minimum of nearly seventy-five percent of the students.

In the first summer session 1977, one of the videotapes was utilized as part of the course content of the graduate course EDPS 7112/8112. After viewing the tape, the students were asked to respond to three questions. The responses given by those students are reported below:

1) The videotape was:

	N	%
Very interesting	6	21
Interesting	19	68
Undecided	1	4
Boring	2	7
Very boring	0	0
	28	100

2) The videotape was:

	N	%
Very valuable	4	14
Valuable	22	78
Undecided	1	4
Of little value	1	4
Of no value	0	0
	28	100

3) I would recommend:

	N	%
Continued usage of tape in class	27	96
Discontinue usage of tape in class	1/28	4/100

Clearly, the vast majority of students responded to the videotaped presentation positively. The students perceived the tape as valuable, interesting, and recommended its usage in the class.

Another dimension of student response to the videotapes is provided by the informal responses of both graduate and undergraduate students who have viewed the tapes in class or independently. Students have offered very positive responses and particularly comment on the interesting information about local services and adolescents. Several of the videotapes have been requested by students for independent viewing after hearing about their value from fellow students.

In summary, the student response to the videotapes has been very positive and encouraging. Students seem to view as good educational practice the use of videotaped presentations.

Instructor Evaluation

It was originally intended in this project that videotapes would be made of interview situations where the instructor and the invited guest would follow a script containing specific questions. In discussing this idea with guest speakers, it became obvious that this was not the preferred format. Consequently, it was arranged for the speakers to make presentations to the graduate class and have them videotaped "live" in the ITV studio. This procedure was utilized for three speakers and accounted for approximately seven hours of videotaping and was ultimately the most successful activity in terms of usable videotape footage.

In an effort to take advantage of a timely and relevant seminar on campus, arrangements were made to videotape several of the major presentations. Although a total of eight hours of videotape was made with black and white portable equipment, the net result of usable footage was a one-hour videotape.

It is evident from that experience that many seminars, symposia, and workshops do not lend themselves to videotaping. Speakers tend to have an informal style that works well for interacting with workshop participants but does not provide very interesting videotape replay.

Anyone who has arranged for "live" guest presentations in class knows that there is a risk of the sessions going badly. A heuristic benefit that accrued from this videotaping project was the ability of the instructor to know how the presentation was going to go before class. The instructor could select and present only the best of his taped sessions to the class. In fact, with editing, the presentations can be tailored to very specific needs. This is considered to be one of the outstanding benefits of using videotaped presentations.

The instructor feels the videotapes did provide interesting and relevant content to the class sessions. The previously reported student responses and the nonverbal behaviors of the students indicate the tapes make a valuable contribution to the course content. To date, the most serious criticism of the tapes relates to their length. If the students watch a tape for more than 30-45 minutes, they begin to get restless and lose interest. Maximum effectiveness would seem to accrue where tapes could be edited to provide highly specific information within a 30-minute time span.

The overall reaction of the sponsoring instructor is that the making and subsequent use of videotapes is well worth the time and effort involved. The Instructional Television Studio (ITV) facilities seem to be very complete, and the staff are able to produce high quality work. It is highly recommended that other faculty members take the opportunity to supplement their class content with videotaped presentations.

COLOR VIDEOTAPED INSTRUCTIONAL SYSTEM FOR SOPHOMORE PHYSICS LABORATORY EXPERIMENTS

C. C. Ijams, Department of Physics

On June 14, 1976, a formal proposal was submitted for a Seed Grant to Facilitate Learning to the Center for Instructional Service and Research of Memphis State University by the Department of Physics. The proposal was for a "Color Videotape Instructional System for Sophomore Physics Laboratory Experiments." The Center was completing its new color television studio at the time of submission, and all of its facilities were made available to us for implementing the project.

On June 21, 1976, approval was given for a grant of $1,000 to cover the partial expenses of two graduate students, Miss Loretta Diana Pruett and Mr. Louis Benjamin Marshall, who assisted in the actual videotaping of the ten basic experiments performed by all physics students enrolled in the Physics 2111 and Physics 2511 series of laboratory exercises at Memphis State University. Both of these graduate students were experienced individuals. Miss Pruett teaches in the Shelby County public school system and was the individual who actually appeared on the taped instructions. She has had several years experience in teaching basic physics courses. Mr. Marshall, with a background in public relations at International Harvester and General Motors, assisted in both the development of the instruction and the actual taping by Miss Pruett.

Each devoted a minimum of twenty hours per week for the period covered by the proposal and received a remuneration on an hourly basis at student employment rates. The total amount for both of these individuals did not exceed $1,000, each receiving a maximum of $500.

From Physics Department funds, all color equipment necessary for the use of these color videotapes had been purchased. Two complete sets of this equipment were secured from Bluff City Distributing Company. In addition to this basic hardware, the Department of Physics secured forty Memorex videotape cassettes, purchased from Nolan's Ideal Pictures Company. The total expenditure for this equipment and cassettes approximated $5,000.

The ten basic experiments to be recorded on color videotape constituted the basic core of our sophomore physics courses, normally taken by approximately 500 students annually.

These include:

1) Measurement - The Metric System
2) Graphing
3) Vectors - The Force Table
4) Acceleration Due to Gravity
5) Centripetal Acceleration
6) Momentum - The Ballistic Pendulum
7) Moment of Inertia
8) The Simple Pendulum
9) Simple Harmonic Motion
10) Resonance - The Velocity of Sound in Air

It was a source of real pleasure and pride that the entire project was completed in time for use in the 1976 fall semester of Memphis State University.

When the first tapes were shown to the staff of the Department of Physics, including all graduate assistants as well as teaching staff, to say that the response was overwhelmingly complimentary is simply stating it mildly.

Student response was also most gratifying. Used by 165 students enrolled in Physics 2111 and 120 students in Physics 2511; comprising a total of 10 different laboratory sections, the tapes insured that each pupil secured the same instructions, complete in every detail. Moreover, they could be used for other group presentations as well as for individual instruction for make-up and other learning situations.

So pleased were all concerned that we plan to utilize this same system in all basic laboratory courses, including freshmen as well as sophomore courses. Presently, this will include an average student enrollment of approximately 1,000 students per semester.

In fact, an additional complete set of equipment has been ordered, thus enabling the Department of Physics to operate three color videotaped instructions simultaneously. By astute scheduling, we can thus provide this instruction to all basic laboratory sections.

Moreover, the graduate assistants are so pleased with the system that they themselves plan to tape the instructions on their own time during the 1977 spring semester.

Future plans for the system include:

1) Re-editing some of the present tapes for greater clarity and adaptability.

2) Requesting the Center for Instructional Service and Research to make an in-depth evaluation of student learning responses to the system.

3) Making the finished tapes available to other institutions.

We feel that such a system represents a distinct break-through in basic physics laboratory instruction, which has always been a source of concern to physics departments throughout the nation.

VIDEO SPANISH REVIEW PROGRAM

Franklin O. Brantley, Department of Foreign Languages

As an aid to students having difficulty in first-year Spanish, a special video program was produced by Memphis State during the 1976-77 academic year. The program consists of a series of review lessons covering the first-year course, each video lesson being a summary of the week's work in the classroom. Mr. José Upegui, a tutor with the Educational Support Program in the Foreign Language Department, acted as the video instructor; the program was produced in the Instructional Television Studio of the Center for Instructional Service and Research. As each lesson was completed, the tape became available to students in the Learning Media Center in Brister Library. By the end of the academic year, all of the tapes for the first-year course were completed; and, no doubt, they will be used by students for years to come.

Although conceived primarily as a remedial device for students needing more than the usual amount of instruction, this video program in elementary Spanish was actually used by students at all levels of competence in the first-year course. This is understandable for the program provides an excellent means of reviewing course material and allows each student to proceed at his own rate.

During the spring semester 1977 Mr. Sam K. Rushing conducted a study of the effectiveness of the tapes. Mr. Rushing coordinated the project for the Center for Instructional Service and Research and assisted with several aspects of it. The following information is based on a report of this work. The study collected information concerning the extent to which the tapes were used and compared the degree of use by individual students with grades made in the course by the students. Figure 1 shows the number of times that tapes were viewed by individual students, plotted against the final course grade assigned to each student.

Number of Times Tapes Viewed	Course Grades					
	A	B	C	D	F	Drop
10+	1	0	3	0	0	0
7 - 9	0	4	1	2	0	0
4 - 6	2	2	5	1	0	0
1 - 3	10	12	14	6	1	10
0	69	69	56	41	30	125

Figure 1. Use of Videotapes Plotted Against Student Grades

Since it was desired to use the χ^2 test of statistical significance and a number of cells of Figure 1 did not contain enough observations in several cells to satisfy the requirements of the χ^2 test, the values in adjacent cells were combined. The grade cells were modified to reflect "satisfactory" and "unsatisfactory" instead of letter grades. The category "satisfactory" includes grades A through C; "unsatisfactory" includes D, F, Drop, and Withdraw. The "student use" cells were combined to reflect "nonuse," "one-time use," and "use two or more times," as shown in Figure 2. The χ^2 test applied to these data indicated a high degree of statistical significance, less than .001 - indicating less than one chance in 1,000 that the observed cell frequencies could be attributed to chance. Figure 3 shows the cell frequencies that would be expected if use of the tapes were completely unrelated to performance in elementary Spanish. Thus, if there were no relationship between viewing the tapes and satisfactory performance in the course, one would have expected the number of students who did not use the tapes but performed satisfactorily to be about 208, but only 194 students who did not use the tapes performed satisfactorily. Similarly, one would have expected about 24 students who used the tapes only once to perform satisfactorily if use of the tapes and performance were unrelated; instead, 30 of these students had a satisfactory level of performance as shown in Figure 2. The largest relative difference

Number of Times Tapes Viewed	Satisfactory Grades	Unsatisfactory Grades	N
2+	23	5	28
1	39	16	46
0	194	196	390
N	247	217	464

Figure 2. Observed Cell Frequencies χ^2 = 13.958, df = 2, significant at the .001 level

Number of Times Tapes Viewed	Satisfactory Grades	Unsatisfactory Grades	N
2+	14.905	13.094	28
1	24.487	21.512	45
0	207.607	182.392	390
N	246.999	216.998	464

Figure 3. Cell Frequencies that would be Expected if Student Use of Videotapes and Grades Were Unrelated

occurred in the case of students who used the tapes two or more times; here a number of students that would have been expected to perform satisfactorily, had there been no relationships between use of the tapes and satisfactory performance, would have been about 15, while actually 23 of the students who viewed two or more of the tapes performed at a satisfactory level.

The results are interpreted to indicate an association between satisfactory performance in the Spanish course and viewing of the videotaped lesson summaries. The findings do not necessarily indicate that watching the tapes *caused* performance in the course to improve. The findings do indicate, however, that the students who used the videotaped reviews tended to be the same students who performed satisfactorily in the course.

One final point, there was some disappointment that a relatively small proportion of the students enrolled in elementary Spanish availed themselves of the opportunity to use the tapes. Subsequent classes are receiving more encouragement to use the tapes than was true during the spring, 1977, semester, to use the tapes, and this increased promotion of the tapes is expected to result in their use by a substantially larger number of students.

PART V

MEASUREMENT AND EVALUATION

UTILIZATION OF PSEUDO-ISOCHROMATIC PLATES IN THE PERCEPTION OF COLOR OF STUDENTS IN ART

Richard L. Boffoly, Department of Art

The purpose of this paper is to discuss the utilization of Pseudo-Isochromatic Plates (PIC) in ascertaining the status of the perception of color of students in an art ambience. It is also the aim of the report to attempt to make the testing of variance in color perception more generally known in art and to art instructors; furthermore, it is the author's firm conviction that testing of color perception of students in art should become a standardized procedure in every art department much as it has been accepted by the Art Department, Memphis State University. Instructors who are concerned with art in any of the three majors areas as in Art Education, Art History, and Studio Art have a greater requirement to utilize color as a phenomenon of Aesthetics since they deal directly with this particular element of design rather constantly.

It is reported that approximately 10% of the general population has some variance in the perception of color (Burnham, et al., 1963). In the year 1963, Burnham stated that there were more than ten million people with the red-green color defect in the United States. The blue-yellow color anomaly is of little consequence for this study since its occurrence is exceedingly rare.

In reference to these claims, art curricula do not have any requirements that test the variance of color perception of students. The testing of art students for variance in color perception has never been attempted before, although in other civilian and military occupational specialities color perception has been extensively studied. In addition, no attempt has ever been made possibly to organize some instructional material so that people who teach art can detect and possibly offer assistance to students who may have variance in color perception.

The rationale concomitant with this study is as follows. If a person has a deficiency in some color, this person would fail to appreciate some part of the visual spectrum (color). When such students attempt to mix colors (pigments) in order to produce a specific color effect, as in matching colors from a landscape, they may over or under compensate in mixing colors without being aware of it. Such students may very well add or subtract colors that they cannot perceive as hue in their attempt at color mixing. This deficiency becomes readily discernable in painting and is evident

when color is used for various aesthetic purposes in art classes.

A caveat must be issued here, that is, in the testing of art students for color variance. It is not the purpose of this study to identify students in art who have variance in color perception with the ultimate aim of weeding them out of an art program. However, it must be stated that this is often done primarily because the art instructor does not have a fundamental concept of the student's actual color deficiency or anomaly.

Furthermore, Pickford (1972) states, "In general, artistic ability is not correlated with the absence of colour vision defects. Many colour defective students could become very good artists." He continues, "Art teachers, however, may not be the ones to deal most adequately with students who have variance in color perception."

Little information is available in terms of the dialogue the instructor utilizes concerning variance in color perception. It is no wonder that art instructors have not been considered as adequate to the task of dealing with such students. Testing of variance of color perception is a tricky business at best, since no one test alone can provide a definitive diagnosis of color variance, if indeed this is necessary in an art context.

This paper presents information relative to the characteristic ways in which art students with color variance may perceive color. In addition, one simple test for identifying variance in color perception is discussed. Such a combined approach may greatly assist the art instructor in offering assistance to his students who exhibit color variance.

In a study of color perception, the author conducted a more definitive investigation and analysis of works completed by students in art with color variance. Six different screening instruments were utilized to test students for color variance. The students who indicated that they possessed a variance in color perception were required to complete an acrylic painting of a landscape by matching one which served as the model painting. In essence, the students with variance in color perception were to match the hues, in value, and intensity of a model which was a pre-designed painting arranged by the author. From this study, information was compiled relative to the characteristic ways in which art students perceive and depict color on to a canvas.

There has been a variety of paradoxical investigations that have been conducted in the field of color. There is extensive, even massive, information on color. However, most of the studies have reference to the physical, physiological, and psychological use of color. Cruz-Coke (1970) discusses in detail, theories of color vision. Burnham, et al. (1973), discuss the complexities of colorimetry, etc. These studies, the latter and the former, are somewhat in the nature of sophisticated information relative to color perception, and as such may not be comprehended by the average art instructor.

Therefore, such studies will not be referred to in this paper.

The author took the prerogative and simplified the taxonomy of variance in color perception in order to accommodate the practical art instructor who may not have extensive knowledge concerning the perception of color. It would be beneficial to the art instructor and student, if both were cognizant of the rudiments of the theories of color vision. It will be assumed that the art instructor and student will, therefore, become cognizant of such theories.

Goethe (Pickford, 1972), Liebreich (1872), and Angelucci (1908) have discussed defective color vision in relation to art; in addition, the authors have identified well-known artists in the past who were thought to have variance in color perception as indicated from their paintings. Pickford (1972) studied the paintings of an artist who was considered to have a Protanomalous color deficiency and another who was an extreme Protanomalous. The former artist used saturated reds, blues, golden yellows, and black very freely and to some extent green. But the artist by and large avoided greens and to a greater extent he avoided red-green contrasts.

The second artist with variance in color perception noted by Pickford used blue, yellows, and browns freely with little red or green; he was an extreme Protanomalous. He had very poor red-green discrimination and learned to avoid these colors in his paintings. Another aritst is mentioned by Pickford, this artist was a complete Protanope. He used yellow ochres, oranges, blues and blacks but very little red-green. All of these reports of color deficiency, it appears, were not done under any sign of controlled conditions. They simply were observations of paintings which the artists completed.

The classification of color deficiency was derived from von Kries (1895); Pitt refined it in 1944, and the present classification is based on Wright's system (1946). The total classification system of "Color Blindness" is as follows:

I: Monochromat

II. Dichromat
- A. Protanope
- B. Deuteranope
- C. Tritanope

III. Trichromat
- A. Anomalous
  1. Protanomalous
  2. Deuteranomalous
  3. Tritanomalous
- B. Normal

I. The Monochromat - has only achromatic visual reponses and is not commonly found and not considered in this study.

II. The Dichromat - here the individual is able to perceive only two primary colors and can match all colors with two of the three primaries.

A. The Protanope (protanopia) is red deficient.
B. The Deuteranope (deuteranopia) is green deficient.
C. The Tritanope (tritanopia) is blue deficient but is rarely found.

III. The Trichromat requires three colors to match all color stimuli; but these matches are not like the matches of the normal person; they differ from the normal in the amounts of each color mixed. This type has three subgroups.

A. The Anomalous protan (protanomalous) is weak in the perception of red.
B. The Anomalous deutan (deuteranomalous) is weak in the perception of green.
C. The Anomalous tritan (tritanomalous) is weak in the perception of blue. This condition is found so infrequently, if ever, that it is not considered further in this study.

Essentially, the people who are involved in art should be concerned with only the red-green deficiency in color perception since this is the type that is more prevalent. Therefore, only the variance in red-green color perception need be discussed in this paper; this refers to the protanope (red deficiency) and deteranope (green deficiency) both of which are more severe in color deficiency than the color confusion found in the protanomalous or deuteranomalous student.

METHOD

Subjects

Ss were graduate and undergraduate college students who were enrolled in some class in art; they were all volunteers for this study, and there was no age restriction in order to become a subject for the study. The total number of Ss was 309.

Apparatus

In this study, the author utilized six Color Perception Tests to measure.

variance in color perception of students. The tests were:

1) American Optical Pseudo-Isochromatic Plates (PIC).
2) Tokyo Color Vision Test
3) HRR-Pseudo-Isochromatic Plates
4) Ishihara Test for Color Blindness
5) Farnsworth-Munsell 100 Hue Test
6) Anamoloscope (by Schmidt and Haensch)

The most utilized test for measuring variance in color perception in this study was the AO-PIC Test. This is the color perception test that is currently available in print and which the author suggests be utilized for testing Ss for variance in color perception by art departments.

The AO-PIC Test is one which involves the perception of chromatic dot patterns on a background of different chromatic dots (Hardy, et.al., 1946). Both the figure and the background on a PIC plate are composed of many dots or disks which vary irregularly in the lightness they produce; the figures in the AO-PIC Test are of Arabic numerals. If the testee fails on more than five of the plates, he is considered to have a red-green color defect.

Procedure

The procedure of the AO-PIC Test simply is done under luminant C or blue light or overcast daylight; the subject reads the numbers on each plate and then flips over each plate until the 14 plates are completed. It is an individualized test and is not adapted for group testing. It requires three minutes to administer the entire test.

RESULTS

Of the total number of 309 Ss in this study who were screened, 105 were male, and 204 Ss were female. From this total number of Ss, 22 missed five or more plates; this number consistuted a valid or sufficient degree of color variance for further study. However, of these latter Ss, who represented seven percent of the total who indicated color deficiency, only eight Ss made themselves available for completion of the study, i.e., to duplicate a landscape painting after a control model.

It would appear in interviewing these Ss, that the stigma of having fellow students or instructors know that one has a color deficiency was a major reason for these students not to continue in the study. Of the Ss remaining, three were females and five were males. In the female group, one woman was identified as red deficient while two women were stated to be green deficient. In the male group, three were red deficient and two were green deficient.

In a further analysis, the following was found: see Table I - Anomalous Perception of PIC Plates.

Table 1
Anomalous Perception of PIC Plates

Number of Plates Missed	Ss	Percentage of Total
1 or more	176	57
2 or more	86	28
3 or more	34	11
4 or more	31	10
5 or more	22	7

DISCUSSION

We will discuss only the red-green color variance since the blue-yellow variance, as stated earlier, is not a significant amount. Uncovering a variance in color perceptions by utilizing only one test instrument is not very reliable; in this context it must be reinforced and verified by color variances (color errors) that may be discernable in the students' paintings. The latter has reference to over or under compensation in the use of red or green and also of their mixtures with other hues. The typical hues of the visible spectrum and their wave lengths are now presented (Burnham, et al., 1963).

Wavelength Regions (in millimicrons mu)	Hues
380 - 470	Reddish Blue
470 - 475	Blue
475 - 480	Greenish Blue
480 - 485	Blue-Green
485 - 495	Bluish Green
495 - 535	Green
535 - 555	Yellowish Green
555 - 565	Green-Yellow
565 - 575	Greenish Yellow
575 - 580	Yellow

Wavelength Regions (in millimicrons mu)	Hues
580 - 585	Reddish Yellow
585 - 595	Yellow Red
595 - 770	Yellowish Red

In general, the Protanope (erroneously called red blindness) seems to confuse hues that are red and bluish green with neutral tones. This individual may perceive only those hues that go as far as 680 mu; to him the visible spectrum is shortened; he sees primarily blues and yellows (two hues). The spectrum may have a neutral grey at about 492 mu. He may not be able to discern red entirely.

The deuteranope sometimes referred to as green blindness, a misnomer, tends to confuse bluish red and green with neutral tones. He also perceives two hues, blue and yellow primarily; he may have a neutral zone in the bluish-red area around 498 mu. He may not be able to discern green entirely. The protanope has a tendency to see the long wavelengths more dark. Now the Protan or protanomalous student is weak in the perception of red-green but is more red weak than he is for green. He may require a greater than normal amount of red in his matching and mixing of colors. He may have a neutral grey in the 540 mu wavelength. The Deuteranomalous has a green weakness; he may require more than the normal amount of green to match and mix colors.

A point to be noted here is that an art student, or anyone else for that matter, who has a color variance, say red-green, will mix and match colors in one of the three different avenues of approach.

1) He may over compensate for his color deficiency and thus include more amounts of this color in his depicting of a color. Thus, a Protan (red-deficient) may add much more red to his color mixtures than he is aware of. The painting may appear to the normal person as an overabundant use of red.

2) Continuing with the example in number one, that Protan may select to undercompensate in red in his color mixtures; so his paintings may be devoid of red.

3) The person with a red-green deficiency may be able to guess at the "correct" amount of red or green required for his color mixing or matching.

If the student has simply a Protanomalous or Deuteranomalous color deficiency, it may have little effect on his color work, because he may have good hue discrimination although his scale of hues may differ from the normal.

It is not the purpose of this paper to require that a student with variance in color perception be identified by the art instructor according to a specific classification title. All the instructor is required to do is become aware of his students who confuse colors in a systematic manner. Thus, reds may be painted much darker; red may be confused with dark brown or even black; also, pale blue may be painted as rose pink, this being the perception of color of a Protanomalous student.

Students may paint red as black, while green, yellow, and brown may all be painted alike or with little differentiation between them, this being the Protanope.

The most typical example of red-green deficiency would be when the student cannot distinguish between browns, greens, and reds; he will have little difficulty with blues and yellows. Certain colors may be difficult for a red-green deficient student to discriminate (as between brown and green) when the colors are separated; but when these colors are juxtaposed, the student may be able to differentiate between them.

Also typical of the red-green students' variance in the perception of color is to paint colors of indigo, violet, and purple hues as of one dark or even lighter tone or tint. The general tendency of students with either red or green color deficiency is to make their colors more dark rather than more light, but they do tend to resort to either of these methods of depicting colors.

The manner in which students with red-green deficiency complete a painting (i.e., as a landscape) is to darken and make most colors greyer. Thus the total composition may appear as though the sun had hidden behind a cloud. The students of this type of color deficiency also seem to make the composition more warm, depict both in the same composition greater contrasts of reds and greens, and also have areas that appear both light and dark. These students may have a complete color reversal, such as painting a tomato emerald green or may simply paint the red tomato a dull brown; the same applies for green colored objects, these being painted red. It is the pale hues that are also confused; pale pinks and pale greens are constantly confused as being of other hues, as blue or brown, etc.

The student with a variance in color perception may also have considerable difficulty in matching hues that occupy a small circumscribed area in the composition. The color deficient individual may tend to combine or perceive different hues as being alike or without differentiation; these may be:

Blues and violets
Green yellows and fawns
Greens, moles and grey
Greens and browns
Light greens and yellows
Pale greens and pink
Greens may be matched with grey, lavenders and blues

Recommendations

A list of recommendations is presented whereby an art instructor may be able to suggest ways for a student to consciously avoid horrendous color errors in paintings; to possibly help the students in handling color harmony in his work; and to possibly satisfy the student's personal color scheme in his painting.

1) The student should be made cognizant of his color variance, if indeed he does have such a deficiency. This may be uncovered in the initial testing of color perception of which the art instructor will be aware.

2) The instructor should assist in arranging the student's palette possibly to follow the sequence of colors of the visible spectrum. This arrangement may allow a student to select a hue in which he may be deficient, to better mix another hue.

3) The student should be totally familiar with modular hues; he should utilize the color notation on the tube to give him guidance in using and mixing new colors.

4) If the student has a color variance, he may find it advantageous to utilize the Munsell Color Notation paper, preferably in large sheets. The larger the area of color used as a stimulus, the more vivid an impression on the student's sensory system it may have. He may use the Munsell color paper, which is notated by the designation H V/C (hue, value, and chroma), to make comparisons between colors. The instructor can be of great assistance in this aspect.

5) The student should maintain a pocket notebook in which to make reference as to conditions that assist him in identifying colors with which he may have difficulty.

6) He should be well aware that specific objects are characterized by specific colors, i.e., as a tomato is generally red.

7) The student should be made aware of tints, tones, and shades that require special treatment by any of the suggestions listed above or avoid them.

8) Lighting is most important; for less confusion of colors, the students would do well to paint under a source of illumination, if possible, referred to as CWX (cool white delux) fluorescent tube. This lighting provides a truer rendition of color (Boffoly, 1967). At least, working under an illumination that in itself will least influence the perception of colors is a step in the right direction.

This study should be a continuous process of screening art students every semester, especially in beginning design courses.

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EVALUATION OF THE M.S.U. SEED GRANT PROGRAM

G. Douglas Mayo, Betty Gee, and George Graham, Center for Instructional Service and Research

During the fall semester, 1977, a comprehensive evaluation was conducted of all functions performed by the Center for Instructional Service and Research. The following information is based on data collected for the evaluation but pertains only to one of the functions, the Seed Grant Program. The primary purpose of the evaluation project was to provide information needed to improve the various services provided by the Center for Instructional Service and Research. The rationale for the procedure used in the evaluation was arrived at in the following way.

1) The mission of the Center, "to facilitate student learning throughout the University," derives directly from one of the major objectives of the University, that of providing quality instruction at the undergraduate and graduate levels.

2) Since it is through the faculty that the University achieves its instructional objectives, it follows that providing assistance to the faculty is the primary means by which the Center can accomplish its mission. Thus, the faculty becomes a prime source of information concerning how well the Center is accomplishing its mission and what steps may be taken to improve its performance.

PROCEDURE

The first step was to make explicit the objective of each of the 19 functions of the Center. In the case of the Seed Grant Program, the objective was stated as follows: "To provide resources and assistance to faculty members who wish to improve their courses, develop new courses, or improve student learning by various means." The next step was to construct a survey form which included four items. The first was concerned with how important the objective was considered to be by the faculty member responding to the survey. Both faculty members who had participated in the Seed Grant Program during the 1976-77 school year and a sample of those who had not were asked to respond to the question. The remaining three items were responded to only by faculty members who had participated in the Seed Grant Program during the year. One of these questions asked how well the objective was being achieved; another asked whether the objective itself should be eliminated,

modified, augmented, or left as it was. Amplifying comments were invited concerning the response given. The final item on the form asked how the performance of the Center for Instructional Service and Research could be improved in the area of Seed Grants to Facilitate Learning. This last question did not follow the multiple choice format used in the first three items but instead required a constructed response. The survey form may be seen in Figure 1.

RESULTS

As shown in Table 1, the survey was sent to the 30 faculty members who had participated in the Seed Grant Program during the preceding year. Twenty-eight faculty members completed the form, for a 93% return. However, some did not complete all parts of the survey; the number completing each part is shown in the column labeled N. Table 1 shows that 100% of the faculty that had participated in the Seed Grant Program and replied to the survey stated that the objective of the Seed Grant Program was "Very Important." In replying to how well the objective was being achieved, 63% said "Exceptionally Well," 33% said "Satisfactorily," and 4% said "Marginally." None said that the objective was "Not Being Achieved." These responses were among the most positive received concerning the 19 objectives of the Center.

Table 2 shows how the participants in the Seed Grant Program responded to the third item, concerning possible actions that might be taken with respect to the program. The most frequently selected alternative was that the program should be augmented, with 52% selecting this alternative. The second most popular was "Leave As Is." Forty-three percent selected this alternative. Five percent selected the option indicating that the program should be modified, and none said that it should be eliminated.

The second part of this question asked for amplifying comments, as appropriate. Sixteen members of the group made comments. These comments were classified according to affective tone and also according to content. These classifications are shown in Table 3. Thirteen of the sixteen responses were classified as "Neutral," two as "Favorable" and one as "Unfavorable." In the content categories the most frequently occurring classification was "Constructive Suggestion For Improvement" with ten of the sixteen responses being classified in this category. Two fell into the "Praise" category, two in "More Resources Needed," and two into extraneous categories that were not readily classifiable. None of the responses was classified as "Negative Criticism" and none indicated that "More Information to Faculty Concerning Service" was needed. The verbatim responses to this item are shown in Figure 2.

The responses made by 18 faculty members to the last item on the survey, concerning how the Center could improve its performance with respect to the Seed Grant Program, also were classified according to affective tone and according to content. This information is shown in Table 4 and the

EVALUATION SURVEY-1.3

Function: Seed Grant Program

Objective: To provide resources and assistance to faculty members who wish to improve their courses, develop new courses, or improve student learning by various means.

Questions:

1. How important is this objective? (Mark one)

   _____ a. Unimportant
   _____ b. Limited Importance
   _____ c. Important
   _____ d. Very Important

2. Based on your experience with the Center, how well is the objective being achieved?

   _____ a. Not being achieved
   _____ b. Marginally
   _____ c. Satisfactorily
   _____ d. Exceptionally well

3. In your view should the objective be: (Mark one)

   _____ a. Augmented
   _____ b. Modified
   _____ c. Eliminated
   _____ d. Left as it is

   Please comment or amplify as necessary _____

4. Based on your experience with the Center, how could the performance of the Center be improved in this area?

Figure 1. Survey form completed by faculty members who had participated in the Seed Grant Program during the past year (September, 1976, through August, 1977)

COMMENTS -

1) I believe the word "encouragement" should be included in objective. In my own work, I received almost no encouragement within my department and thus had many doubts as to its being worthwhile.

2) Achieve better integration with other campus elements to allow full use of the results.

3) Secure increase in funding for student assistants in carrying out approved grants. Try to secure summer salary for staff involved.

4) Made more available.

5) It should include a statement of a general nature that would allow funds to be allotted to some studies that do not fit into other categories.

6) Might be expanded as funds are available.

7) I think a yearly emphasis on one program and helping the several "innovators" work together would help the process of innovation.

8) The objective is most important as far as I am concerned. However, I question its importance to the University. We seem to be more concerned with quantity rather than quality!

9) I believe many worthwhile course improvements are being made, especially with regard to using learning media in standard courses.

10) The Center was specific with respect to requirements and goals, helpful in preparation, and prompt in its decisions.

11) Guidance for constructing projects and assistance for planning budgets.

12) The problem is more than "seed" grants can solve. TIPS, for example, cannot be managed for a large number of sections without continuing support. Departments do not have the resources to provide this support.

13) While the Center recognizes and encourages such objectives, the departments do not seem to comprehend the necessity for continuous development of courses, instructional methods, and syllabi. The Center may augment its activities and push such interests by monitoring and evaluating all the departments as to their developmental activities, with a view to securing cooperation and improvement.

14) More money!

15) Reduce reports and other paper work.

16) Develop a system to bring "topical groups" of seed grant participants together to share results and conclusions with an eye toward taking the "next steps" in a particular sequence of research or instructional development.

Figure 2. Amplifying comments concerning suggested actions that might be taken with respect to the Seed Grant Program.

Table 1

Importance of the Objective of the Seed Grant Program and How Well the Objective is Being Achieved

No. of Surveys Sent	Surveys Returned	Importance (% of responses)					How Well Achieved (% of responses)				
		N	1	2	3	4*	N	1	2	3	4**
30	28	28	0	0	0	100	25	0	4	33	63

*1 - Unimportant
2 - Limited Importance
3 - Important
4 - Very Important

**1 - Not being Achieved
2 - Marginally
3 - Satisfactorily
4 - Exceptionally well

Table 2

Suggested Action Concerning the Seed Grant Program

No. of Responses	Action Suggested (% of responses)			
	Eliminate	Modify	Augment	Leave As Is
22	0	5	52	43

HOW SEED GRANT PROGRAM COULD BE IMPROVED

1) Coordinate plans and results with library, budget projections, etc.

2) Funding for assistants, both graduate and undergraduate, is a MUST if the program is to succeed.

3) Inform the faculty.

4) Center has served my needs well - more research grants available to faculty could be helpful.

5) To seek more funds.

6) I think the Seed Grant Program is being run well. Some attention may be needed in the area of evaluation of proposals and performance as requests for funds increase in the future.

7) Based on my experience with the Center, I find they could not be more cooperative and receptive to suggestions, changes, etc.

8) If it had more money, it could lend more support.

9) Since many persons on campus are only dimly aware of the Center's function (and, in some cases, even its existence), some modifications of the methods by which its work is publicized might be indicated.

10) Make SEED grants every month if possible, better than once or several times a year.

11) In an ideal world, the total amount and freedom of use in funding would be increased. But present limitations are very workable.

12) I believe a conference between the director of the Center and the faculty member whose proposal has been approved would be extremely helpful (Immediately after approval and before the project is begun).

13) I am not sure but I believe that many faculty are surprisingly ignorant of the services and support available through this program.

14) The interplay of the SEED grant provisions vs. faculty release time and teaching loads is still muddy.

15) Continuing support!

16) More money could be made available to CISR for its functions.

17) No comment. I'm happy.

18) Secure more funds for more seed grants.

Figure 3. Responses to question concerning how the Center Performance in the Seed Grant area could be improved.

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Figure 3. Responses to question concerning how the Center Performance in the Seed Grant area could be improved.

verbatim comments are shown in Figure 3. As in the previous case, the most frequently occurring classification under affective tone was "Neutral;" fourteen of the responses were so classified. Four responses were classified as "Favorable" and none as "Unfavorable." In the content classification all categories received some entries with the exception of "Negative Criticism." Six Seed Grant participants said that "More Resources Were Needed;" three said that "More Information to Faculty Concerning Service" was desirable; five were classified in the "Constructive Suggestion for Improvement" category; two were classified as "Praise;" and the remaining two did not fit readily into any of the categories that were being used.

As previously mentioned, faculty who had not participated in the Seed Grant Program were surveyed with respect to their views concerning the importance of the Seed Grant Program but not with respect to the issues addressed by the other items. The omission of the last three items was due to this group's not having an adequate basis for responding to these items. For purposes of convenience, this group will be referred to as the "Non-user" group. It should be added that this group consisted of a random sample of MSU full-time faculty who had not participated in any of the functions of the Center. A survey including the first item, pertaining to the importance of the objective of the Seed Grant Program (and the other 18 objectives of the Center), was sent to 100 Non-users. Sixty of these faculty members completed the survey form. The way in which they responded to the item, concerning the Seed Grant objective, is shown in Table 5. Eighty-six percent of the group selected the "Important" or "Very Important" alternative with the proportions divided equally between these two categories. Twelve percent of the non-users said that the objective was of "Limited Importance," and two said that it was "Unimportant." The responses of the Non-users express a generally positive view of the Seed Grant Program, although not nearly so much so as the responses of faculty members who participated in the program, 100% of whom said that the objective was "Very Important."

In addition to the information presented in the tables, a summary quantification of the importance of the Seed Grant Program was computed for the User and Non-user groups. This was done by assigning values of one through four to the response alternative (Unimportant - 1; Limited Importance - 2; Important - 3; and Very Important - 4), multiplying these values by the number of times the response was selected, and computing the mean value. Thus the highest possible mean score was 4.0; the lowest possible mean score was 1.0. A mean of 2.5 might be thought of as an essentially neutral score. In the case of the group that had participated in the Seed Grant Program, the mean score was 4.0, and the mean score of the Non-user group was 3.28. A similar computation concerning how well the Seed Grant objective was being achieved yielded a mean score of 3.75 for the group that had participated in the Seed Grant Program. The Non-user group was not asked to give its views on this point. As noted previously, when presenting Tables 1 and 5, responses concerning the Seed Grant Program were among the most favorable of those received concerning the 19 functions performed by the Center.

Table 5

Importance of the Seed Grant Objective as Viewed by Faculty Members Who Had Not Participated in the Program

No. of Responses	Per Cent Selecting Each Alternative			
	1	2	3	4*
60	2	12	43	43

*1 - Unimportant
2 - Limited Importance
3 - Important
4 - Very Important

DISCUSSION

The primary purpose of the evaluation was to obtain information as to how the Seed Grant Program could be improved. The comments shown in Figure 2 and Figure 3, and to some extent the classification of these comments in Table 3 and Table 4, are among the best sources of this information on this point. Tables 1 and 2 already had shown that both faculty who had participated in the Seed Grant Program and those who had not felt that the program was worthwhile.

In reviewing the comments made by faculty members who had participated in the program during the past year, one finds a number of references to the desirability of increasing the resources of the program. This is expressed in several ways, including a plea for a larger number of projects, more funds for projects, broadening the scope of projects that would be funded, and providing more graduate and undergraduate student assistants. Doubtless, these responses were predictable, but at the same time they are important. Under the present program, approximately $1,000 is as much as is likely to be approved for a single project. If the faculty member who proposes a project does not have to have part of his summer salary or released time during the regular school year taken from the grant, he usually will have enough funds for student workers, supplies, and stenographic services. But if part of his summer salary must come out of his grant, there is very little

if anything left for other budget items. If larger grants could be made available, it is probable that additional projects that are not now being submitted for consideration would be attracted to the program. While it is not clear that additional funds can be made available for Seed Grant purposes, one of the first steps in this direction is to know that there are a number of informed faculty members who feel that increased resources within the program are highly desirable.

The matter of continuing support after the Seed Grant has ended was mentioned by several participants. This problem has been recognized by many grant programs, especially those of foundations that give substantially larger grants than the ones available in the Seed Grant Program. It probably is not desirable for the Center to continue support of projects completed under the Seed Grant Program on an indefinite basis. The responsibility for support of instruction belongs with the academic department concerned, but it is possible that the Center has not done all that might be done to encourage department chairmen to provide the relatively small amount of resources that are needed to continue to obtain the benefits of an instructional innovation that has been completed under the Seed Grant Program. In short, these comments suggest that the Center may have responsibilities that extend beyond the completion date of the various Seed Grants.

One comment was to the effect that it would be helpful if the Center took a more active role in the final planning and execution of the various projects. Doubtless, this is a good point with respect to at least some of the Seed Grants. The extent to which the Center has been involved in planning and execution of Seed Grant projects has varied widely from one project to another. In a number of projects, in which videotapes or other audio-visuals were being prepared, the Center has worked on an almost day-to-day basis with the directors of the Seed Grant projects. There are other instances, however, in which the participation of the Center has been largely confined to providing the director of the project with supplies and personnel. The difference in the level of activity has been due largely to the nature and needs of the project and to the desires of the project directors as understood by Center personnel. This understanding may have been imperfect in some instances. In communicating with Seed Grant project directors during the year the point is made that the Center stands ready to assist in any way it can, but it is possible that this invitation to call on the Center is a bit too general to be taken seriously by all of the faculty members participating in the program. In a related comment a statement was made that encouragement by the Center should be a part of its Seed Grant objective. These are areas in which the Center can perhaps improve its performance now that it is known that the problems exist.

The matter of a central theme of special emphasis on a particular area for a given year was suggested. This has been done with some considerable success in the case of the TIPS (Teaching Information Processing System) projects and in the case of the production of instructional videotapes. It is possible

that this approach could be extended profitably to other areas. This would also have the advantage mentioned in two comments concerning the desirability of faculty members who are working on similar projects discussing them and exchanging information concerning them.

One comment was concerned with a reduction of reports and other paperwork. At present, three documents are required: a proposal, which may be any length desired; a progress report of between 150 and 250 words; and a final report which normally is between four and eight pages in length. The progress report is used to give recognition to the Seed Grant project directors and to the program itself through a faculty newsletter which receives wide distribution within the University and a limited distribution to other institutions. The final reports, such as those included in this monograph, serve the dual purpose of providing a description of the salient points of each project for a variety of uses and also give a degree of recognition to the faculty members who conducted the projects. There is also the prospect that the accomplishments of the Seed Grant Program must be documented if it is to continue to receive budgetary support. While it is true that the value of a project to the department in which it was conducted is not enhanced very much by writing a report concerning it, it seems probable that the positive aspects that have just been mentioned outweigh the negative aspect of requiring time and effort to complete a report. However, it has taken considerable prodding to obtain a few of the final reports, and it may be worthwhile to consider various alternatives to the present reporting procedure.

CONCLUDING COMMENT

The information provided by the evaluation of the Seed Grant Program provides a confirmation of the importance of the program to the faculty of the University and reflects a generally positive view of the way in which the program is being conducted. A number of points also were made concerning how the present program could be extended and improved. Some of the suggestions for improvement cannot be implemented within present resources, but some of them can. In the case of both those that can and those that cannot, the first step toward improvement is the recognition of the problem. The evaluation has been successful in identifying some of the problems involved.

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