Public-assisted colleges and universities have been avoiding a fundamental confrontation. What must be faced is that prevalent patterns of instruction in these institutions often run counter to scientific evidence about how and why people learn. Thus, it is not surprising that initially enthusiastic receptions accorded such “innovations” as instructional television, computer-assisted instruction, and so on, usually are temporary. The promise of superior instructional quality at reduced cost often is not realized.

The key concept for public-assisted colleges and universities seems more and more to be efficiency, not learning. The pressures toward efficiency are undeniable: The time is rapidly approaching when half of our high school graduates will enroll for some sort of further training or education. Since privately endowed schools are prone to limit their growth for pedagogical reasons, this burden of increased enrollment is borne almost entirely by the publicly-assisted institutions. The latter cannot severely restrict their enrollment because of the American educational tradition of maximizing the availability of educational resources. Their economic survival depends upon continued public support. And this continued support, in turn, depends upon responsiveness to the clamor for admission.

Consequently these colleges and universities are engaged in a fierce competition for adequately trained faculty members. This competition is reflected in substantially increased costs of staff acquisition and retention. Expenditures for personnel are compounded by the rising costs of needed physical facilities for growing student bodies.

Recognizing the limits upon transmission of these increased costs directly to the consumer (the student or his parents) in the form of increased fees, state colleges and universities typically seek to improve their “efficiency” by such expedients as increasing class
sizes and improving physical plant utilization. There is nothing inherently wrong with a search for greater efficiency in higher education, as almost any trustee, reflecting his business or industrial background, will be quick to point out. However even in industry, simply raising output while holding or reducing costs does not always result in a gain. If quality of the product deteriorates, or if the product is not improved to meet the consumer's changing needs, the increase in "efficiency" is illusory.

Similarly in education, even if many more students can be processed and graduated without a corresponding increase in cost, it is imperative to question the effectiveness of current strategies for providing a greater number of students with satisfactory educational experiences. The problem is not simply to hold the line on educational quality while increasing quantity. We must become concerned with providing better educational experiences than we do now. Our graduates must more and more become flexible innovators rather than passive reactors. They must be individually prepared for technological and societal changes, the specific nature of which cannot be anticipated with certainty by their teachers.

Here, then, is the paradox. In marked contrast with an evident administrative response to pressure for reduction in educational costs, all of the research on human learning indicates that superior instruction is possible only when adapted to the history, needs, interests, and abilities of each student. When society is demanding a less expensive higher education for more young people, researchers have reached consensus that the greatest number of graduates can realize their capabilities only when instruction is custom-tailored to each learner.

Rather than attempting to resolve this conflict, we have tended generally to ignore its existence. The essential importance of individually tailored instruction is sacrificed in favor of economical instruction. The student is a nameless face occupying a seat in the lecture hall or before a TV screen. The teacher knows as little about him when the course is over as he did at the beginning of the term. No wonder that students sometimes demonstrate with IBM-shaped placards proclaiming, "Do not fold, spindle, or mutilate!"

In the process of playing the numbers game, public-assisted colleges and universities have lost sight of the important educational goals. Under no circumstance would teachers, administrators, and students necessarily agree on the purposes of instruction. At the risk of considerable oversimplification, it can be said that teachers seek to communicate something about a discipline in which they have a heavy stake; administrators want the university to impart something about the segment of society in which it has a heavy stake; and students want whatever is conveyed to them to be personally relevant and "real."

This diversity of views of educational purpose by the participants must be sacrificed when instructional practices encourage conformity and sameness. Present university practices implicitly encourage teachers and students alike to concern themselves primarily with the transmission of accumulated information. The teacher dispenses information, often by paraphrasing the text and other resources, and takes comfort in the thought that he has "taught." The student listens, makes copious notes, develops ingenious mnemonics, and thinks he has "learned." The administration counts course credits and believes it has "educated."

Clearly, I have overstated the proportion of effort devoted in universities to simple factual transmission. Also, obviously, every student must learn some facts in a given field before he can learn to synthesize those facts or apply other complex thought processes to them. But non-human systems can convey factual information more efficiently than any teacher. And much human effort devoted to factual acquisition is not justified in a world wherein today's facts are often tomorrow's myths.

The apparent conflict between the demand for increased enrollment and the conditions that make for effective learning can be resolved. In seeking such a solution, I have drawn upon evidence both from my own work and that of other investigators. This evidence is briefly summarized by the four assumptions which follow.

Assumptions About Instruction

Assumption 1. The communication of factual knowledge is, at best, a secondary goal of higher education and should therefore only involve a very small part of the teacher's time and effort. The teacher is valuable; his abilities are rare; and the proper use of these abilities cannot be diluted at the very time when the number of students per teacher is increasing. As a precious and scarce resource, the teacher's efforts should be increasingly directed away from communicating facts and toward motivating students and helping them learn how to synthesize information and generate solutions to problems.
Assumption 2. Increasing class size is not itself a solution to burgeoning enrollments. From a purely technological standpoint, a class need have no registration limit. Instructional television, for example, makes it possible for one teacher to be seen and heard by any number of students. However, when mass instructional techniques are effectively used, it is doubtful that they are less costly than "conventional" instruction for the same number of students. An institution should encourage large group instruction only when relatively pedestrian academic goals are involved — and here only for selected students. For most students even this instructional objective can better be achieved through reading and other forms of independent study than in large classes.

Assumption 3. Learning is an idiosyncratic process. Its progress is determined by a complex interaction between a learner with unique needs, abilities, strengths, and weaknesses, and a teacher with unique needs, abilities, strengths, and weaknesses. The outcome of this interaction is colored by the physical and emotional setting in which learning is to take place. There is one learning environment that best facilitates the realization of a particular instructional goal by each student. Thus, from a pedagogical standpoint, it is necessary to custom-tailor higher education to the needs, abilities, strengths, and weaknesses of each student. Although this is impractical on an individual basis, it is entirely feasible to distinguish groups of learners within the university and to shape particular instructional experiences for each of these groups.

Assumption 4. As a corollary to the above, the most effective teaching for synthesis and problem-solving requires that the teacher know about the history, needs, interests, and abilities of each of his students, and that he somehow be aided in teaching students rather than classes.

A Critique of Research on Large Group Instruction

The emphasis upon individually tailored instruction expressed in the foregoing assumptions may seem, quite correctly, to conflict with a large body of educational literature purporting to demonstrate that instructional technique does not affect learning outcomes. Studies of "large group" instruction are cases in point.

Although the effectiveness of large group instruction has been the subject of research for quite some time, efforts to evaluate these teaching procedures were intensified after World War II. In anticipation of the college-age population explosion, university administrations wanted to know whether their adherence to "conventional" class sizes of 25-30 students was simply an instance of academic featherbedding.

In the typical research procedure the same instructor taught two or more different class sections of his course. The students registered for the course were randomly assigned to one or another of these sections. One section served as a "control"; the enrollment was limited to about 30 students and the instructor taught in his usual manner. The other(s) were "experimental"; they were varied in size and manner of presentation. Analysis of the final examination scores earned by students in the control and experimental groups usually failed to reveal any significant performance differences as a function either of class size or instructional procedure. Groups of students seemed to learn as much (or as little) regardless of how they were taught.

This empirical finding was a difficult one to assimilate, however, partly because of academic inertia and partly because of the fact that it was contrary to admittedly subjective and uncontrolled impressions. Many faculty members, administrators, and researchers could recall a teacher who affected their destiny; a course that helped shape their future; an experience in class that either lit a fire or put one out.

Upon closer examination of the evidence at hand, it appeared that at least three factors combined to produce spuriously reassuring findings in support of large group (including televised) instruction over alternative methods:

One was that the criterion measures were crude. The final examination or its derivative, the course grade, has such an honored place in the protoplasm of a university that it has often been pressed into service as a research criterion for assessing instructional outcomes. Unfortunately course examinations written by most teachers tend too much to sample rote factual recall and too little to require students to synthesize, and apply knowledge. Recall questions are easier to phrase and simpler to grade. Hence these examination scores were shown to correlate most highly with tests of memory or general academic ability, and with other course grades. It was unreasonable to expect these criteria to reflect modifications in instructional procedure except in a very superficial way.

In this regard it is important to note that in the infrequent instances where students were seen to perform differently in different types of classes, the criterion was a process designated "critical thinking," "problem solving," "synthesis," and so on. That
significant differences with these criteria were not obtained more frequently is mute testimony to the relative lack of concern, until recently, with ways in which this kind of behavior could be encouraged by college teachers.

A second reason for the ever-present finding of no-significant-difference among instructional methods is that the research procedure itself masked important differences. An average performance score, used as a basis of comparing one procedure with another, was seen to be comprised of scores made by a number of students some of whose scores fell below and above the average. Further, it could be shown that, given any kind of instruction, some students would perform relatively well and others, rather poorly. The group average obliterates this important piece of information. When two averages, derived from two different procedures, are compared, we discover only how groups fared under these procedures; we lose the important interactions between the individual and the specific procedure. Thus the usual statistics of control-group comparison obliterate the possible finding that whereas instructional television, let's say, is better for Student A than for Student B, a seminar with much opportunity for discussion is better for Student B than Student A.

In passing, I wish only to mention a third source of difficulty with many of the instructional comparisons reported in the educational research literature: the instructional procedures constituting the experimental conditions tend to be too grossly defined. What do we mean, for example, by lecture instruction, discussion instruction, televised instruction, or conventional instruction? There are literally as many varieties of each of these as there are teachers to provide them and combinations of students to fill the classes.

In view of the foregoing interpretation of available evidence, the most balanced assessment of the place of large group instruction in the university's structure is that it is neither a panacea for coping with increased enrollments nor a totally untenable arrangement for doing so. The key issue is not the simple one of whether it is less economical to have smaller rather than larger classes. Instead a much more complicated issue arises: one that must take account of what the instructor does with his class, what goals he is attempting to realize, and what kinds of students are enrolled. Given certain goals, students, and teacher behavior, large group instruction may be the procedure of choice regardless of cost considerations. With other goals, students, and teacher behavior, large class instruction is clearly unsuitable regardless of any potential financial advantage to the institution.

The Instructional Gestalt: A Paradigm for Research, Theory, and Practice

It was from considerations like those given above that my wife and I decided to use an entirely different strategy in attempting to understand what goes on in a college classroom. The paradigm we sought would enable us to investigate the unique mix of instructor behavior, environmental circumstances, and learner characteristics, comprising a particular instructional setting. We were specifically interested in the interaction between learner characteristics (e.g., motivation, academic ability), instructor action (e.g., the kinds of examinations administered, the type of personal interaction — if any — he has with students), and features of the learning environment (e.g., amount and type of supervision). This mix is what we have termed the "instructional gestalt".

It is not appropriate here either to describe this paradigm in detail or comprehensively to discuss the conclusions to which it has led us. The interested reader is referred elsewhere for a presentation of these matters. Thus, ignoring our findings, let me simply mention some of the implications of this paradigm.

Instead of thinking of the best way to teach something, it assumes (or at least makes it possible to demonstrate) that there are optimal ways to teach something to particular students. What "works" for one student need not work for another. The burden of investigations following this paradigm is to discover what works for whom and why.

Thus the learner assumes his proper place in the center of the educational stage. But because there are many different kinds of learners, and many different kinds of instructional objectives, any course is really a series of plays running concurrently in spite of the fact that they are all running in the same theatre. The paradigm was developed to help us discover why some of these are "hits" whereas others are "flops". Its payoff comes when we can identify those principles enabling us to maximize the attainment of particular objectives by each of the students and to translate these principles into action. This is no longer some ill-defined pot at the end of some infinite rainbow. Enough of the principles have already been derived from solid evidence in such diverse fields as psychology, communications, sociology, and so on, to begin
to restructure the goals and practices of higher education.

**Instructional Goals and Practices in the Future**

How can universities provide opportunities for custom-tailored instruction in the face of severe pressures for enrollment increases? In contrast with the spirit of discovery under which instructional research is usually conducted, and on the basis of which existing practice is open to challenge, undergraduate curricula and instructional practices have become enslaved by the traditions of which they were born.

Although aware that prevalent instructional patterns run counter to scientific evidence about how people learn, administrators and instructors alike are reluctant to change. For this reason, as much as for any other, whatever we have seen in the way of an educational “new look” is really just a minor modification of the existing structure. The campus has been receptive only to those modifications that seem capable of providing an extension of traditional practices to an ever increasing student enrollment. If there are too many students for a “conventional” section of a course, change the instructional format to a lecture. If students in a lecture course are unable properly to see and hear, change the format to instructional television.

Such changes are minor. They are based upon the erroneous belief that the only needed modification in existing instructional goals and procedures is to extend them to accommodate more students. There are limits to how many such minor modifications can be superimposed upon the existing educational edifice. As with a building, a foundation will accommodate only so many changes in facade, rearranged partitions, and patched plaster, before the entire building creaks, cracks, and finally collapses.

Instead of implementing such relatively minor changes, the faculty, students, and administrators together must give thought to more drastic alterations perhaps less compatible with existing institutional structures and philosophies.

Change for its own sake is obviously not very useful, and is not implied above. However, the press of society, and particularly of our most recent college graduates, is toward a broader conceptualization of the role and purpose of higher education. Perhaps because of the failure of other social institutions, like the family and church, the universities face increased demands for contributing to the affective as well as the intellectual development of the students. The more articulate students ask for encounter, confrontation and dialogue. They wish to establish their personal identity in the face of technology which they see as compelling sameness.

The problem will not disappear if we but dismiss these student demands as invalid and regard the university as an improper social institution for their satisfaction. Colleges and universities must become increasingly sensitive to the changing world if they are to provide effective intellectual and social leadership. Otherwise they will merely reflect where we have been.

Given appropriately revised instructional goals, attention must be given also to revisions in instructional practice capitalizing upon the idiosyncratic nature of the learning process. The notion that knowledge can be compressed into neatly delimited disciplines, presented in tidy instructional blocks, and that these blocks can be summed as course credits, is outdated. It reflects an earlier era when there was less to teach and less to learn; an era in which graduates of public colleges and universities were receiving advanced vocational training.

The university of the future must reorient itself in the direction of educational flexibility rather than conformity. It must not reinforce artificial separations between disciplines that are either interrelated or simply different perspectives from which to view unitary phenomena. It must not require sequences of instruction in areas that are not ordered sequentially. And it must not continue to impose external demands for performance (like grades) to the detriment of intrinsic, and hence more personally relevant, appeals to the students.

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1Readers interested in more technical discussions of some of these matters are referred to

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