The Instructional Revolution

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Your conference here today is concerned about innovations in university teaching. In one sense it is embarrassing that the subject of the improvement of college teaching should be such a new issue in higher education. Why hasn't teaching, which is after all , the major enterprise of the univeristy, received constant attention throughout all the years of our existence?

Most people who are talking about faculty development and the improvement of instruction these days assume that college teaching can be improved, and that since we are a rational progressive people, it will be improved. Neither is a foregone conclusion. There are substantial numbers of people who are not certain that college teaching can be improved--either because it is already quite good, or because we do not know how to go about improving it. There are probably fully as many people who are not sure it will be improved--either because we cannot teach old dogs new tricks, or because the structure of higher education is impervious to change. My position is that college teaching can be improved--both because improvement is desperately needed and because we do know how to do it. I am less sanguine that teaching at the college level will be improved, but I do think that there are some encouraging signs on the horizon.

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I think it entirely possible that today's rather timid beginnings into instructional reform will accelerate as we move toward the close of this century, until by the year 2000 an instructional revolution will have changed higher education in fundamental ways. The signs of the emerging revolution are already clear. Faculty development is the hottest topic in higher education today. It is attracting overflow crowds to conferences and workshops. Offices for the improvement of instruction are proliferating like mushrooms after a spring rain. At latest count, there were more than 1000 programs for the improvement of instruction in American colleges and universities, most of them established since 1970. Yet another sign of the times is the rapid spread of pedagogical alternatives. The use of self-pacing methods in community colleges more than doubled between 1970 and 1974, and Keller Plan courses which received their start in South America have swept through university classes in the sciences and social sciences with unprecedented speed (Cross, 1976).

Let me begin my discussion of innovation in university teaching by pointing first to the external pressures responsible for the instructional revolution, and then to some responses on the part of colleges and professors to the challenge.

I count four major pressures for reform in the instructional programs of higher education in the United States. The first and most obvious is the arrival of the no-growth era. In times of expansion, colleges can introduce new practices and ideas through adding new people and new programs. But in the no-growth era which lies ahead for most colleges and universities; improvements of programs and professors must take the form of

remodeling rather than additions. For professors, the arrival of the steady state means the loss of professional mobility and the probable return of loyalty to local institutions. Good teaching may pay off since it is a locally visible activity that contrasts sharply with the nationally recognized research and publications route that upwardly mobile professors have chosen in the past.

The second pressure for the improvement of instruction arises out of society's loss of faith in its institutions. Church, state, and school have all suffered a loss in prestige. Taxpayers are demanding accountability, and students are beginning to see themselves as consumers of education. They expect delivery on the promises made in the catalogue. It is distressing to have to admit that research shows that the intellectual and cultural interests of the senior class are more closely related to the interests of the freshman class four years earlier than to anything that happens inbetween. ~~The new consumers want something more substantial than club membership for their time and money~~.

The third pressure for reform is the result of increased access to higher education. The college degree has lost that part of its glitter that was due to its exclusiveness. As the credential loses value, the competency of the graduates becomes increasingly important. If colleges can no longer select the qualities they would like to see in their graduating classes, then they had better bend their efforts to instilling those qualities.

Finally, I think that New Students, the designation that I reserve for low academic achievers entering open admissions colleges U.S. have done a great deal to force the instructional revolution.

Without knowing it, students with poor academic backgrounds have challenged college instructors to look at their ability to teach. Traditional college students who are selected for their motivation and skills for academic work are no challenge to pedagogy. They seem to teach themselves with a little direction in the form of assignments and modest incentives in the form of grades. But community college teachers who met the first wave of New Students were first distressed and then challenged when they discovered that the traditional, information-saturated lecture was falling on deaf ears. (Parenthetically, the traditional lecture probably falls on the deaf ears of traditional students too, but their study outside of class masks the ineffectiveness of the classroom.) In any event, it appears that some of the most exciting responses to the pressures for instructional reform are being made in open admissions colleges where New Students are heavily represented. Necessity is the mother of invention.

This leads me to some observations about the reaction of colleges in general to the emerging instructional revolution. My blunt assessment is that at the leading edge the reponse is energetic, sincere, and full of vitality. In the dragging middle, the response varies from sluggish to recalcitrant. It appears that the middle is dragging largely because of a lack of knowledge about the teaching-learning process on the part of the average discipline-oriented professor. It has been said before and it will probably be reiterated for the next decade that no professionals have less training for their jobs than college teachers. But it is hard to understand why academicians, who value knowledge, take such perverse

pride in maintaining their ignorance about the process of teaching and learning.

There is difference of opinion about how to remedy such ignorance in view of the fact that it is not recognized by many university professors. Most offices of faculty development take a low-profile counseling-bureau approach -- offering a variety of services but waiting for faculty to come to them for assistance. UCLA's James Popham, however, shows impatience with this timorous approach to the improvement of instruction. He writes that "the quality of instruction at the university level is infinitely more inept than most people realize. ...(but) We would not dream of insulting our professional colleagues by describing (instructional development programs) as 'inservice education,' even though almost all of them failed to experience anything resembling 'preservice education.' No, we must gentle up to the college professors with seductively labeled schemes which will entice them to improve, ever so incrementally, their instructional endeavors.... While the current efforts to improve university teaching should be applauded, let's make it clear that such applause should be mild (1975, p. 27).'

It is hard to know what to do for more vigorous applause when the reality is that instructional improvement is dependent upon faculty cooperation. One common practice that I am certain we should not perpetuate is that of pretending that years of experience or even scholarly reputation are necessarily related to the quality of undergraduate instruction. As college professors are quick to point out in these days of enthusiasm for granting credit for experiential learning, experience alone does not constitute knowledge.

Yet too many faculty workshops today attempt to legitimize themselves by opening the conference with an address by a respected campus scholar who knows a lot about his discipline but very little about the learning process. After catching the spirit of a scholar addressing a workshop on instructional improvement, I drafted some remarks for the unlikely day when the educator might be invited to address a meeting of scientists on their specialty. The two scenarios go like this: First, the distinguished scholar addressing the faculty development workshop:

> "I have never had a course on teaching, and I know nothing of the various theories of learning. I have, however, taught in a college classroom for 25 years. While I am not familiar with so-called teaching methods and techniques, I hope that my experience and observations will be helpful and useful to other teachers.
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> There is, of course, no real science of education in the sense that experts can predict with certainty who will succeed in college, nor do we know how to create the most desirable learning conditions. Therefore, it seems to me that I, who am in the classroom every day, can probably be as helpful in understanding learning as can researchers who rarely teach in the reality of the classroom.
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> While I admit that there are some techniques that can probably be used to improve the performance of the average teacher -- instructional objectives and faculty evaluation perhaps -- the master teacher is not dependent on tools and techniques. He has a sensitivity for learning -- a feel for when real learning is taking place. A teacher who loves his subject and who personally experiences the joy of learning is probably in the best position to create such satisfactions for others."

Now let us parallel this real-life story with the unlikely scenario in which a distinguished educator who knows a great deal

about teaching and learning is invited to address a group of scientists -- in this case meteorologists who are eager to lend credibility to their work because of recent criticism of their weather predictions. In this fantasy, there is the familiar exploitation of the professor's distinction to the unrealistic hope that his personal experience with weather will contribute important insights to their workshop on meteorology. His remarks might go like this:

> "I have never studied meteorology, and I know nothing of the various theories on the subject. I have, however, lived in the physical world for 45 years. While I have no idea what causes certain weather patterns or how to induce rain when we need it, I do put on the snow tires in winter and carry an umbrella when it rains. I hope my experience and observations will be helpful and useful to professional meteorologists.
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> There is, of course, no real science of weather in the sense that experts can predict with certainty whether it will rain on a given day, nor do we know how to bring about the most desirable weather conditions. Therefore, it seems to me that I, who live with the weather every day, can probably be as helpful in understanding it as can researchers who rarely venture into the reality of a rainstorm or a blizzard.
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> While I admit that there are some techniques that can probably be used to improve the performance of the <u>average</u> meteorologist -- barometers and weather maps perhaps -- the master meteorologist is not dependent on tools and techniques; he has a sensitivity to the weather, and perhaps a good arthritic knee. A meteorologist who loves weather and who personally experiences the joys of beautiful days is probably in the best position to create such satisfactions for others."

My analogy between the science of meteorology and the science of teaching was carefully chosen. Neither is an infallible science. Both are better at predicting than at creating desirable climates for growth. Nevertheless, the weather bureau has a significantly better understanding of climatic conditions than some farmers would like to admit, and educators and psychologists know a lot more about learning than some professors would like to admit.

Another hurdle that must be cleared on the way to the improvement of instruction is the academic distrust of experimentation and innovation. It is hard to explain why college professors, who are so curious and experimental in the pursuit of improvements and better answers within their own disciplines, should be so conservative in the practice of their profession. I was talking with a college dean recently who stated emphatically that the first priority of colleges should be the improvement of traditional instruction, and only when that was perfected should colleges spend money to support innovation and experimentation. In the midst of being grateful for his support of the idea that traditional instruction could be improved, I asked myself where General Electric would be if they had decided to perfect the ice box before starting work on the refrigerator.

Happily some people have started work on the instructional equivalents of refrigerators. I predict that consumers who have experienced even primitive versions of the refrigerator may come to demand it over some pretty high quality ice boxes.

Many of the consumers of the new teaching-learning strategies are coming out of the community colleges. A really good community college today offers a sweeping array of teaching-learning alternatives -- open date enrollment in self-paced courses, hands-on learning experiences in laboratories equipped with a variety of media, the latest in computer-assisted and computer-managed instruction, learning laboratories open round the clock and staffed by skilled and dedicated learning specialists, and teachers who want to be teachers rather than researchers. When these consumers, used to the joys and conveniences of the refrigerator, graduate to rough it in a four-year institution offering a good ice box for a lot more money, we may see a student rebellion that will surpass that of the 1960s in its impact on education.

The last rebellion took us by surprise, although many people said in retrospect that we should have known it was coming. I think my prediction of students protesting in the 1980s against the quality of their learning experiences can and will be avoided if the leading edge of teaching innovators can blaze a trail that looks promising enough for the dragging middle to follow. And I think that is happening. Let me give some examples.

First, we are beginning to apply what we know about the teaching-learning process to college teaching. One of the pioneers of the instructional revolution is Fred Keller, a psychologist who simply applied what he had been teaching about learning to the design of his own classes. The Keller Plan, which is also known as the Personalized System of Instruction or PSI, has spread rapidly throughout the social and physical sciences. The learning

principles incorporated into PSI are simple: 1) the learning tasks must be clearly defined; 2) students must respond actively; 3) immediate rewards must be granted for appropriate responses; and 4) foundation units must be learned well before advanced units are attempted.

The research evaluations that have been part of the PSI movement from the beginning indicate that it does what it purports to do very well. PSI students retain their learning longer, they do better in subsequent courses, and an impressive majority of students give their PSI courses higher ratings than lecture courses in the same subjects (Kulik and Kulik, 1975). PSI is not a panacea -- it does not work for all students in all subjects -- but it is testimony to the power of the instructional revolution that a simple application of what we know about learning should result in such dramatic improvements.

A second step into the instructional revolution is made upon the recognition of the strengths and weaknesses of teaching alternatives. A teaching method need not be new or innovative to be effective, but it must be used for what it can accomplish. Lectures are poorly used to present information that is easily available through the more carefully worded, self-paced medium of a good textbook. Lectures are well used when they are carefully planned to present new ideas, to inspire, or to illustrate the process of a scholarly mind at work. Since few classroom lectures are prepared with such care, we might do better to videotape outstanding lectures with all of the quality control that technology offers. Take another example. Discussions are a waste of everyone's

time when they consist of instructor questions and student recitations of content that might better be handled through computer-assisted instruction which permits the student maximum feedback in minimum time without wasting the time of other students. The discussion method can be a rich learning experience when students are actively cultivating the intellectual skills of listening, analyzing, synthesizing, and solving problems. But how often are class discussions used to stimulate active thinking, and how rigorous are they in demanding clear articulation?

Examples of the appropriate uses of alternative teaching strategies could be extended. For the laboratory sciences, the audio-tutorial methods of Sam Postlethwait at Purdue University are carefully planned learning systems. With the use of an audio cassette, the instructor can arrange laboratory experiences so they occur in the most meaningful sequence. Students no longer need to read the text, hear the lecture, and then do the experiment. They may read a portion of the text while handling physical specimens in their laboratory carrel. They may view a filmed demonstration while they are conducting their own experiment, and they may test their understanding in quiz sessions with other students.

Although the humanities seem to be having some trouble launching their instructional revolution in this behavioristically-oriented era of instructional improvement, television, film and

other methods for utilizing a wider range of se ry channels in learning are having an impact on the culture. evision programs, such as The Ascent of Man and the Adams Chronicles, a The Age of Uncertainty represent an important cutting edge of instructional change. ~~On a regional level, I can cite the exciting Tent Chautauqua that toured Nebraska~~ towns last summer. Putting together a traveling cast of 84 artists plus tents to accommodate 2000 people, the University of Nebraska took the humanities to the people. Two days of music and theater and speakers and community discussions revived the golden age of ~~Chautauqua for Nebraskans of all ages from all walks of life.~~

There is a good deal of creative work going on at the leading edge of the instructional revolution. Learning can be much more than information-saturated lectures followed by student recitations, euphemistically known as discussion sessions.

A third necessary step in the instructional revolution is to teach students to be more discriminating consumers of education. If life-long learning lies in the futures of our students, then we need to provide them with the consumer skills to make wise choices among various learning alternatives. As the instructional revolution develops, students will be exposed to a wide array of learning experiences and will be able to do some comparative shopping. But students should learn something about their <u>own</u> cognitive styles, as well as something about human learning in general. An excellent lecture course may be a good investment for some students at some

points in their learning, whereas it might be a poor investment for others who may decide that they need more basic skill development or more active involvement in formulating and articulating their own ideas. I believe that in the long run students, as sophisticated consumers of education, will do more to challenge college faculties to their best performance than any other incentive system we could devise. Most of us do our best when we know that we have a discriminating audience. Just as a chef will outdo himself for a table of gourmet diners, so a faculty member is likely to rise to the challenge of discriminating learners. But students are not very critical consumers at the present time. Many are content with the ice box because they do not know that the refrigerator exists. And students are notoriously charitable in rating their instructors. Unlike some of their professors, they seem to feel no obligation to preserve standards by rating on the curve. Some faculty are lulled into a false sense of security by their gratifyingly high student ratings. Faculty at one typical institution, for example, averaged 5.5 on a 7-point scale (Hildebrand, 1971), and the overwhelming majority of teachers at almost any institution are rated above the average point on the scale. ~~Personally, I doubt that there is any cause and effect relationship between inflated student grades and inflated faculty ratings as some observers have charged. Rather, I think that no one, students or teachers, yet knows how satisfying good teaching and learning can be.~~

By and large I think that college faculty are dedicated and conscientious professionals. It is not so much a question of urging professors to work harder as it is to get them to acknowledge

that they are not practicing their profession very skillfully. Most university administrations assume that they will get better teaching if they tie salary and promotion to valid evaluations of teaching effectiveness. Perhaps so, but ~~our preliminary~~ interviews with faculty members at the University of Nebraska indicate that the greatest reward that can be offered for good teaching is the self-satisfaction that comes from doing a good job and seeing students develop into thinking individuals. This is not to say that we can afford to let distinguished teachers play second fiddle to distinguished researchers in matters of promotion and pay, but it is to admit that there are many ways to improve teaching without spending large sums of money on monetary incentive systems.

The fourth step in the instructional revolution lies a few years in the future, but it is as essential to the improvement of learning as anything I have mentioned. I believe that before the end of this century we will see dramatic changes in the structure and organization of instructional programs. Specifically, we will have to take a hard look at the three sacred cows of education -- the semester, the credit hour, and the grading system.

These are our measures of learning -- and woefully inadequate measures they are. The semester represents mass education at its worst. Under the bind of the semester, we batch people of vastly different backgrounds and abilities and do whatever we can for them in the time available. It is as though the Ford assembly line batched cars that were almost completed with cars that were just barely started and did what they could for each in the time available at each station. I picture conscientious workers, comparable

to the faculty, working hard to get the first wheel on some cars and the last wheel on others. At the end of the line, out comes just what one would expect -- cars unable to run because they have only one wheel, cars lurching on three wheels, and cars gliding smoothly on all four wheels. Noting these obvious differences, Ford might compound their original error by grading within batches. The car with three wheels will be rated an A if it appears in a batch lacking four-wheeled cars, but it will receive a B if it passes through the line with some four-wheelers. Quality control may note with some dismay that the average Ford car has only two wheels, but management will point out that after all each car has been through the standard eight stations, and by definition, eight stations equals one car -- much as eight semesters equals one degree.

The assembly line that we have tried to apply to education does not work when the incoming units vary as much as they do in higher education. Education, if it is to be useful to the majority of American citizens, will have to abandon the assembly line in favor of customized or individualized education. The simple fact is that the existence of individual differences in learning rates precludes the efficiency of the assembly line. The semester makes no sense if students are encouraged to learn at a pace convenient and possible for them instead of in a standard unit of time convenient for administrative purposes. Grades make no sense in self-paced or individualized learning because there is no cut-off time such as the end of a semester when a decision can be made about how much the student learned relative to his peers. In individualized

learning, the cut-off point occurs when the student has learned the material to some agreed-upon criterion level. If comparative grades at the end of a standard semester become useless as measures of learning, then the replacement is likely to be variable or modular credit in which students collect educational credits for what they know.

Many people reject the implementation of individualized education for financial rather than pedagogical reasons. But let us recognize that traditional education is extravagantly individualized for teachers rather than for students. Each teacher is permitted to design a unique course that capitalizes on his or her knowledge, abilities, and interests. Students then are expected to adjust their learning pace and abilities to whatever their particular teacher can do or chooses to do. The tradition of individualization for the faculty is deeply ingrained, however. While people question the financial feasibility of the individualization of student instruction, few seem to question the enormous expense of the individualization of course design. What kind of economy is it that supports the design of literally thousands of separate courses on roughly the same subject while questioning the expense of helping students learn what has been so extravagantly prepared? I am not advocating a national curriculum -- far from it. But I am suggesting that teachers at the undergraduate level -- especially the first two years -- can get as much satisfaction from the challenge of helping individuals learn as they can from course design in the image of their graduate training.

British Open University has demonstrated the feasibility of high quality centrally produced courses, and Empire State College and other non-traditional institutions in this country have demonstrated the effectiveness of individualized learning contracts. Keller Plan courses have demonstrated the effectiveness of self-paced methods. A judicious use of combinations and alternatives appears to make good fiscal and pedagogical sense.

In summary I believe the challenge that lies ahead for higher education is to provide optimal education for individual learners. Colleges & Univs ~~We~~ were pushed into this instructional revolution by such external factors as the steady state, consumer demands for accountability, and the egalitarian challenge of open admissions. In response to the push that turned to shove, there has developed a leading edge of instructional reform that is blazing promising new paths. The new pedagogies of individualized instruction are making great strides both in their acceptability to professors and in their accountability in research evaluations. Staff development programs are making some progress in helping college teachers to recognize the strengths and limitations of a broader array of teaching strategies than have existed in the past. As the instructional revolution opens new experiences and new choices, students will become increasingly sophisticated consumers of their own education. By the turn of the century, I believe the instructional revolution will lead to fundamental reform of the structures and measures of higher education.

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