

Beyond Education for All--Toward Education for Each

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Within the past five years, there has been a flurry of attention given to the improvement of instruction at all levels of education. At latest count there were more than 1000 institutions of higher education in the United States that said they had either a program or a set of activities designed to help faculty members improve their teaching (Centra, 1976). Some are sophisticated programs, encompassing the broad range of personal, instructional, and organizational matters associated with the improvement of teaching, whereas others may be fairly simple approaches such as the creation of a media center or the provision of funds for instructional innovation. Attention to the improvement of teaching is a rather recent phenomenon at the college level. Most faculty development programs or offices of instructional improvement have been instituted since 1970.

At the elementary and high school levels, the national clamor for attention to teaching and learning has also been picking up speed. More than a dozen states have already passed legislation calling for minimum competency standards for graduation from high school. And there is now serious talk about the federal government devising a national competency test in order to assure that all high school graduates

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will be able to cope with a world that requires basic competencies in the communications skills. (Education Summary, September 1, 1977)

Elementary and secondary school teachers have always been somewhat more sympathetic and amenable than college professors to experimentation with teaching approaches. Unfortunately, many college professors have considered the subject of teaching methods to be beneath their dignity and have treated the subject with disdain and sometimes outright hostility. Clark Kerr (1976) aptly observes that there have been no changes in college teaching methods for hundreds of years. "You could go back to the University of Bologna in the 12th century," he says, "and feel more or less at home." While incredible changes have taken place in the way in which the world stores, retrieves, and disseminates information; lecture and recitation remain the bulwarks of the educational system. If the revolutionary invention of the printing press failed to change the basic role of teachers and students in classrooms throughout the world, what chance have new technologies such as television and computers?

Eternal optimist that I am, I believe that the processes of teaching and learning are in for some fundamental changes before the end of this century. My optimism is based on the observation that the recipe for change in instructional methods appears to have three basic ingredients--the recognition of a need for change, improved knowledge of the teaching-learning process, and the availability of technology at reasonable cost. I think there is a good chance that these three ingredients will come together to create an instructional revolution within the next 25 years (Cross, 1976).

There are a number of reasons for thinking that the recent attention to the improvement of teaching is more than a passing fad. In the first place, there is a genuine concern on the part of the public that children and young people of this generation can neither read nor write as well as their predecessors. Although the declining scores of college admission tests are due to multiple factors, newspapers and the general public have tended to sensationalize the score declines as a commentary on educational quality. Accountability (used in the sense that educational institutions should be held responsible for student learning) is a word that is used with great seriousness these days. The New York Times has observed that there is a good chance that the slogan of accountability will become more than mere rhetoric in the years ahead (Maeroff, 1976).

Thus one major reason for the new attention to teaching methods at all levels of education is that the public is concerned about the learning accomplishments of young people.

A second reason for the recent attention to the quality of instruction especially at the college level, is related to world-wide efforts to expand educational opportunity. These efforts have brought two new kinds of students into colleges and universities. On the one hand, there is a group of new students who need good teaching, and on the other hand, there is a group of new clientele who demand good teaching.

The students who need good teaching are the low achievers that I have called "New Students" to higher education (Cross, 1971). These are students of any age, sex, or color who have not done well in school

tasks in the past. Many lack the basic skills of education and are severely handicapped in future learning. They began flooding into open-admission community colleges in the 1950's and 1960's, and they now constitute a significant mass of college students. I would credit them with making college faculty members aware that the traditional lecture-discussion approach to college teaching was not working. There is, I think, a noticeable new interest on the part of community college faculties, especially in experimenting and in learning more about new teaching methods and instructional technologies.

The impact of the second group of new clientele on postsecondary education has not yet been clearly felt, but it soon will be. The second wave of new clientele into colleges and universities have been labeled "non-traditional" learners--adult part-time learners who are combining their college educations with jobs, family, and other adult responsibilities. I say this group will demand good teaching because they represent the vanguard of the consumer movement in higher education. So far these adult learners tend to be highly motivated, serious students giving their own valuable time and money for classes that they will insist be worthwhile. While there is no evidence that this group needs as much attention to pedagogy as the New Students that I described earlier, we can expect them to stay away from classes, teachers and instructional materials that are not directly relevant to their needs.

These two groups of new clientele into higher education have already done a great deal to sensitize college professors to the need for better teaching. I predict that the pressure from students who

need good teaching combined with those who demand good teaching will continue, and that this pressure will bring about teaching changes of significant magnitude.

Finally, and perhaps most important of all, I think that the recent emphasis on teaching improvement is the result of some breakthroughs in knowledge about the teaching-learning process. We do now have some concrete suggestions to make to teachers about improving the effectiveness and efficiency of learning.

Because I cannot possibly cover all of the teaching innovations taking place in the 1970's, I am going to focus my remarks today on what I consider to be the most promising lever for change--the confluence of the public's concern for basic skill development plus recent breakthroughs in knowledge about teaching and learning, especially as it relates to improved learning for students who have been low-achievers under traditional methods of instruction. It is the combination of these two motivational factors that will stimulate the use of the technology that is increasingly available to us.

Let us talk first about the fairly simple task of creating some educational approaches that recognize individual differences in the rate at which students learn. A great deal of progress has been made in the last few years in breaking the lockstep of education. The new surge of interest in a variety of techniques and methods, known collectively as the individualization of instruction, is a movement of sufficient magnitude that it is not inappropriate to call it the Instructional Revolution (Cross, 1976). The movement is broad in its influence, deep in its demands for change, and relatively sudden in

its acceptance by educators. And breadth, depth, and speed of change are characteristics of educational as well as political revolutions.

Self-paced learning, and its conceptual companion, mastery learning, lie at the heart of the Instructional Revolution. The speed with which these teaching strategies have been introduced into a variety of educational institutions is almost beyond belief. I discovered in my survey of two-year colleges, where egalitarian education has had the most direct impact, that in the short span of three years the use of self-paced learning methods had spread from 31 percent of the colleges in 1971 to 68 percent by 1974 (Cross, 1976). Today it is the unusual college that does not have one or more good examples of self-paced instruction--whether in learning laboratories, off-campus programs, or standard classrooms.

More interesting than speed and breadth of adoption of self-pacing, however, is its revolutionary potential for upsetting conventional ways of thinking about education. The concept behind mastery learning is that the student must learn a unit to a high level of achievement regardless of how long it takes. This is quite the reverse of the traditional concept which insists that all students spend equal amounts of time in the classroom but permits them to learn to varying levels of achievement--A through D, for example. In traditional education we turn out students who are well educated and those who are not, but we certify that all have spent the same amount of time at the task--surely a meaningless measure of learning. The conventional grading system does not solve

the problem; it just acknowledges that some students learned a lot in the time specified and received A's and B's, while others learned little and received D's and F's. If Benjamin Bloom and other scholars are correct in their assertion that 95 percent of the population can learn the standard school curriculum to mastery if given adequate time and appropriate help, then we have a breakthrough that permits us to provide for individual differences through holding achievement constant (mastery for everyone) and letting time and method vary.

Mastery learning has special significance for the education of students with poor records of past academic performance (Cross, 1971). Its advantages to these students are both cognitive and affective. It lays the cognitive foundation for future learning by insisting that one unit must be mastered before the student may proceed to subsequent learning. And it carries an affective message through demonstration to low-achieving students that they too are capable of doing good work. To most New Students, those two critically important experiences are missing from most of traditional education. New Students are perpetually at a cognitive disadvantage in school because they are rushed along to advanced learning without laying the foundation of the more elementary concepts. To the extent that knowledge is cumulative and sequential, efficiency in learning depends upon mastering each step in turn. Research demonstrates that as children proceed through school, the bright get brighter and the dull get duller as the gap between achievers and non-achievers increases (Coleman, et. al., 1966). The

widening gap is probably due to the efficiency factor in learning. Whereas achievers have the tools and the background to make good use of further education, the future learning of non-achievers is perpetually thwarted by their failure to master fundamentals.

Even worse than the cognitive handicaps wrought by traditional education's notion that everyone should move along with the group, is the affective damage done to young people who are offered no alternative to doing poor work. A school lifetime of doing a job half-way because the student never has the time to master the task must surely take its toll in feelings of frustration and, by the time they get to college, in feelings of indifference and loss of self-confidence. Many of the students entering open-door colleges these days, and many entering selective institutions as well, exhibit little pride in academic accomplishment because, I suspect, they have had little opportunity to experience the satisfaction of doing school work as well as they could do it. That state of affairs is as true for the top third of the class as for the bottom third. Under the prevailing equal-time group methods geared to the average rate of learning, the bottom third of the class never reach their potential, while the top third stop short of their full capacity for learning. Neither group achieves the satisfaction of maximum accomplishment.

Ironically, we are discovering that mass education is not the inevitable route to the education of the masses. The very diversity of the masses calls for the abandonment of the mass education that seemed to work fairly well in the days of more homogeneous student bodies.

While mastery learning has undeniable merit for individual learners, it also has some unsung advantages for the educational system. Mastery learning is one of the few educational concepts that I know of right now that offers a solution to the concern about the erosion of academic standards. If all students master the subject matter, then the charge of lower academic standards for New Students cannot be leveled at mass higher education.

In the strange logic of higher education, however, the very idea that every student in the class can learn a subject to the same high level of achievement is unacceptable to some standards buffs. If every student studies the learning unit until he masters it, then every student deserves an A--if by an A grade we mean to certify that the student has mastered the learning task and not simply that he is one of the best in a particular class. A grading curve with mostly A's is completely sound educationally, but it is anathema to those accustomed to thinking of educational results measured by the bell-shaped normal curve. The normal curve, after all, is a statistical tool designed to reflect the result of random processes. If there are no factors operating except chance, then the normal curve is the result. To the extent that purposeful, directed influences are operating, the curve should depart from a chance distribution. Education is not a random process; the outcomes of successful education should push the grading curve away from anything resembling a chance distribution. Indeed, one of the impressive findings of the research on mastery

learning is the evidence that instruction presented under mastery learning conditions enables about four-fifths of the students to reach a level of achievement attained by less than one-fifth under non-mastery conditions (Bloom, 1976). Research and logic, however, must do battle against custom which has made us so accepting of the normal grading curve that teachers who give more A's and B's than D's and F's are looked upon as "soft graders" rather than as effective teachers. Many people equate the preservation of the normal grading curve with the preservation of academic standards. Actually, standards are served only when students learn the material. And there is ample research evidence that students do learn the material better under conditions of mastery learning (Cross, 1976).

The phenomenon of grade inflation is something quite different from grading based on mastery. Inflationary grading gives acceptable grades for unacceptable work; mastery grading gives no grade, no credit, no recognition for unacceptable work.

Many people recognize the validity of the arguments in favor of individualized education, but they reject individualization for financial rather than pedagogical reasons. Let us recognize, however, that traditional education especially at the college level 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 faculty is deeply ingrained. While many 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, but I am suggesting that teachers 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 there is no longer any doubt that television and other audio-visual technologies will play an increasingly important role in formal as well as informal education at every age level.

Fortunately, many of the new technological aids are ideally and economically suited to self-paced individualized instruction. While diagnosis and record keeping for a class of students each learning at his or her own pace could easily become a teacher's administrative nightmare, computer managed instruction can now test, diagnose, prescribe, and record with high sensitivity to individual differences in learning. Miami-Dade Community College, for example, operates a sophisticated computer managed system for adult learners unable to attend classes on campus. Consistently, these off-campus learners rate the computer's responsiveness to their learning progress as the most popular feature of the course. In fact it has been so popular,

that the Miami-Dade Learning Laboratory is now adopting the computer management system to help remedial students learning in the laboratory on campus.

Computer assisted instruction is another technological advance that is arriving at the right time to give self-paced learning a helpful boost. There is no question that the new technologies will combine with the new pedagogies to produce an Instructional Revolution. But self-pacing is only one small piece of the Instructional Revolution. Time is not the only variable that needs to be considered on the road to instructional improvement.

Benjamin Bloom, the distinguished father of mastery learning at the University of Chicago, has just written a new and much discussed book in which he maintains that if the quality of the instruction is really good, individual differences in the time needed for mastery are not as great as has been assumed. He writes, "Where conditions for learning in the home and school approach some ideal, we believe that individual differences in learning should approach a vanishing point (Bloom, 1976, p. 16)."

Well, that's pretty strong stuff for a generation of social scientists brought up on the notion of the unchanging lifetime IQ and only recently moved to debating the proportionate roles of genes vs. environment in the determination of learning capacities. If Bloom is right in his assertion that quality education should result not only in equal opportunity but in equal outcomes, then we as educators are in for more trouble over accountability than we thought.

Whether Bloom is ultimately shown right or wrong--and his scholarship is certainly strong enough to command a lot of respect--the point is well taken that the time required to learn any task is in part dependent on the quality and methods of instruction. And a great deal of research and development is now going into the improvement of instruction. One of the most promising avenues of research is based upon the common sense observation that people have different styles of learning. Some people learn best by being shown; some by reading; some through discussion with other people. The things people choose to notice and remember and the way they process information are of increasing interest to psychologists studying cognitive styles.

Research on cognitive style has been going on for some 25 years in psychology laboratories but it has rarely been applied in educational settings. That is too bad because Herman Witkin, a pioneer in cognitive style research, asserts that there is now clear research evidence that ". . . cognitive style is a potent variable in students' academic choices and vocational preferences, in students' academic development through their school careers, in how students learn and how teachers teach, and in how students and teachers interact in the classroom (Witkin, 1973, p. 1)."

There are at least a dozen separate cognitive style dimensions that have been the subject of systematic research, and perhaps half a dozen more that have been identified but not extensively studied. I shall limit my discussion, however, to the dimension studied by Herman Witkin and his colleagues at Educational Testing Service. Witkin's dimension of field-dependence vs. Field-independence is far

and away the most extensively studied cognitive style, with more than 2000 studies reported in the literature. Field-dependence-independence was introduced in 1954 as a research measure useful in the psychology of perception. Witkin found in laboratory experiments that some people see things and situations intuitively or in toto without distinguishing the elements that make up the whole, whereas others tend to see discrete elements which are then put together to give the total picture. The reason for the name field-dependence-independence is dramatically illustrated by a laboratory experiment in which the subject is seated in a darkened room with a luminous rod in a luminous picture frame which has been set aslant. The task is to set the rod to the true vertical position. With remarkable consistency, some people align the rod to the slant of the frame--swearing that it is vertical when it may slant as much as 30 degrees. Others ignore the frame, apparently using internal cues to set the rod upright. Those who ignore the surrounding field formed by the luminous frame are called field-independent, whereas those who depend on the slant of the frame to give them their orientation for positioning the rod are termed field-dependent.

According to the research, people who are dependent on the surrounding field to define physical situations are also field-dependent with respect to social situations. Field-dependents tend to be interested and sensitive to what other people are thinking and doing; they tend to be conforming and they like to have people around them. Field-independents, on the other hand, are more internally directed; they are not as sensitive to their surrounding social field, nor are they as

concerned about what others may think. Predictably, the research shows that field-dependents are drawn to fields of study that involve people and human relations--social services, counseling, and teaching; whereas field-independents favor the sciences--mathematics, biology, and engineering. Witkin and his colleagues found that freshmen who entered a field of study not compatible with their cognitive style were significantly more likely than other students to switch majors during their college careers.

Although cognitive style seems not to be related in significant ways to IQ, field-dependents are likely to have trouble with the analytical tasks demanded by school subjects such as mathematics and science. I am beginning to suspect that the school system favors the field-independent learner to the detriment of field-dependent students. Let me give some examples.

Although we know that social situations often present highly effective learning experiences, the traditional classroom is not a very social place. Beginning with their earliest experiences, children are cautioned not to talk to their neighbors, to keep their eyes on their own papers, and to do their own work. Rarely do we permit, let alone encourage, social problem-solving. This throw-back to the years when independence had survival value for pioneers on the rugged frontier is especially self-defeating in today's world where survival may be related more to one's ability to cooperate with others than to

go it alone. More people lose their jobs because of failure in interpersonal relations than because of lack of job skills. Divorce, alienation, and people-related problems are major maladies of our times. Yet the educational system is still geared to the reward of independence, not often balanced by equal rewards for interpersonal cooperation. The independent learner, I suggest, has an advantage over the field-dependent learner in the methods and the attitudes of traditional school systems.

There are other differences between field-dependents and field-independents that have educational significance. Research indicates that the more analytical field-independents seem to structure their own learning material, whereas the more intuitive field-dependents benefit from greater external structure. We need more applied research on the implications of cognitive style for teaching methodologies, but the impact of cognitive style research on the use of technology in education could be considerable. It is entirely possible, for example, that we will have to find ways to socialize televised and computerized courses if they are to be maximally useful to field-dependent learners. Today's technology as well as today's pedagogy seems designed primarily for field-independent learners. The well-known Keller Plan or PSI approach to self-paced learning has already discovered that the personalization of self-paced learning is an essential ingredient for effective learning.

There is much that remains to be done in exploring the full range of instructional approaches. But there are many promising avenues now, and I believe that the 1980's will be a decade of progress in our understanding of the teaching/learning process. We will make progress because we must. Group education that aims for the center but misses most of the target cannot stand up to the diversity of today's student bodies. Postsecondary education will be charged for the foreseeable future with the education of the masses, and we would do well to learn how to provide for the individual differences of the masses.

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