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ABSTRACT

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Report *1982*

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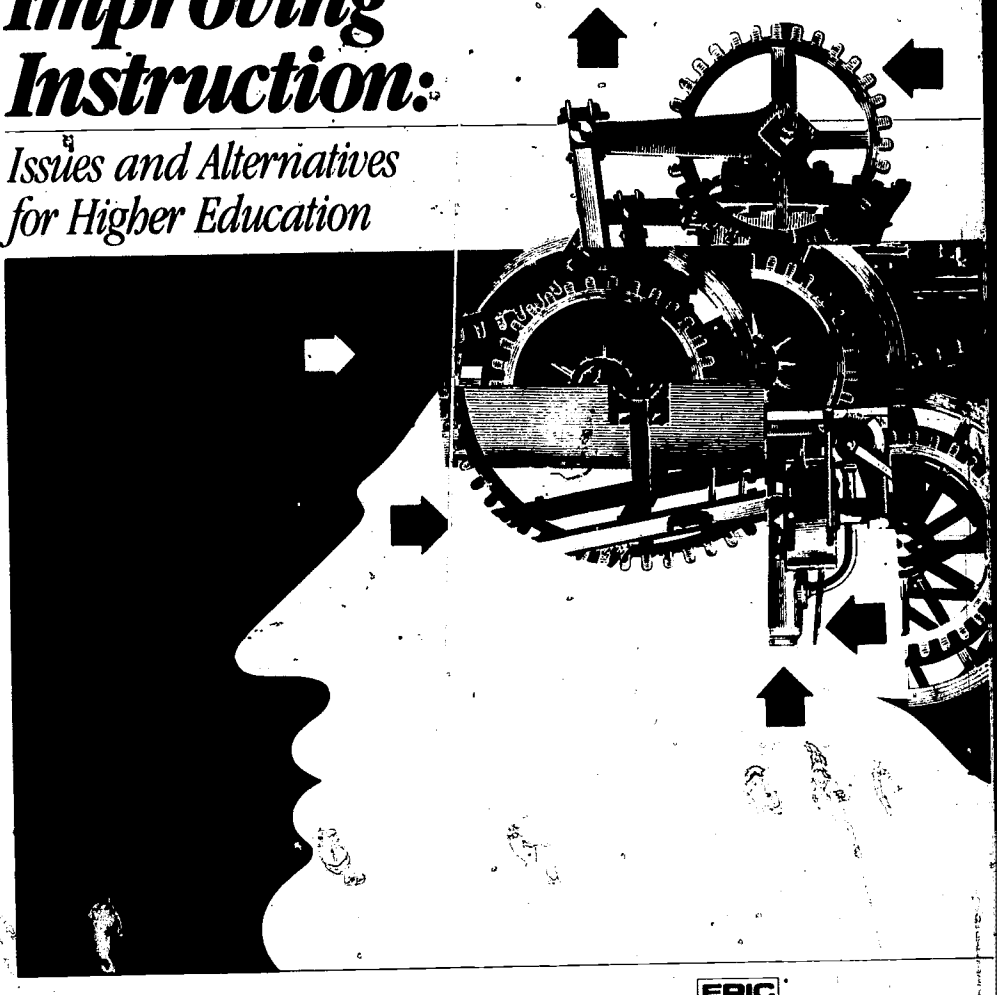
Charles C. Cole, Jr.



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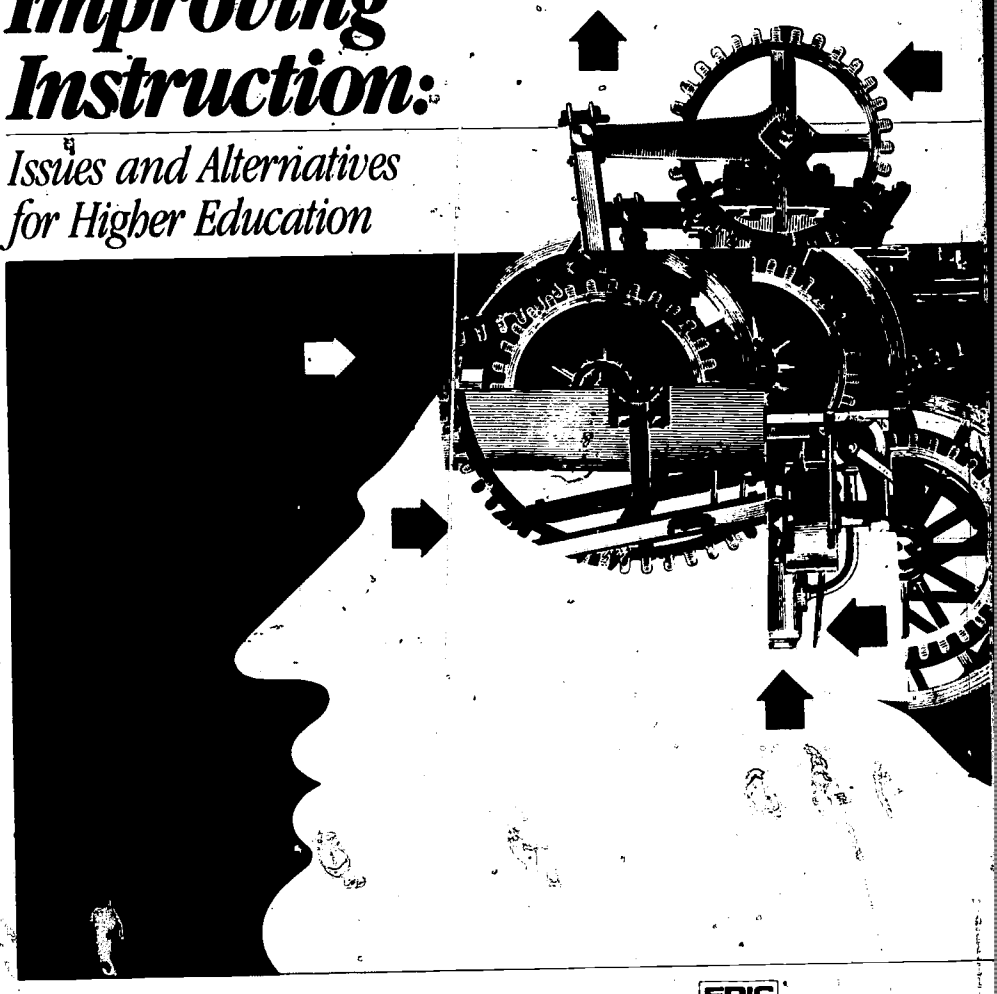

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Contents

Foreword

Although the problems of the 1980s were clearly forecast by Charles C. Cole, Jr., executive director for the Ohio Program in the Humanities, in his first AAHE-ERIC Higher Education Research Report *To Improve Instruction* (Research Report No. 2, 1978), the conditions described still seemed far away and only probable. Today these conditions are all too real. Declining or steady-state enrollments, decreased public support for higher education and subsequent pressures on revenues, coupled with dramatic changes in the students (more adults, part-time students, women), and an increase in career and vocational interests have had a considerable impact on the institution and its curriculum.

There is a consensus that for an institution to survive and prosper in these highly competitive times, it must demonstrate academic excellence. The higher the quality, the greater the chance that students will select that institution over another. There are two types of "higher quality" institutions—one is perceived and one is real. The first type hires a number of faculty with national reputations, gives them plenty of opportunity to publish and speak at conferences while having little or no teaching load. The rest of the faculty are then judged in relation to the publishing/speaking activity of these "stars." This gives national visibility to the institution but does little to improve the quality of education. The second type achieves quality by first emphasizing teaching and then seeking a balance with research and professional activities.

For the perceived high quality institution there is little support from the academic leadership and administration for improving instruction. However, even institutions that emphasize teaching face many barriers to improved instruction. The first is that faculty as a whole have never been trained to teach. Their graduate work almost always is focused on the discipline with little emphasis on how to transfer that knowledge to another. Consequently, faculty learn to teach by trial and error and by imitating the teaching styles of their professors. This lack of formal training in various teaching methods leads to a sense of traditionalism—"It has always been taught this way, therefore . . ." that leads to rigidity.

A second barrier is the decrease in institutional revenue, which has resulted in more pressure for greater faculty productivity and a cutting of "frills." Increased productivity usually means more classes to teach, more students per class, and more committee assignments. Cutting frills has lead to reducing support services from faculty development centers to department secretaries. Consequently, there are fewer resources and less time available to the faculty to reflect on and develop new teaching methods. In addition, institutions with fewer resources cannot always take advantage of or even keep up with the new technologies. Computers, television, and telecommunications are only the most obvious of the new technologies available.

While these and other barriers exist, they are by no means insurmountable. Faculty can be made more aware of learning theory and other concepts that lead to softening of rigid attitudes toward instructional techniques. Administrators can be made more sensitive to the long term

importance of encouraging the development of a variety of instructional methods.

This second Research Report by Charles Cole is another step in this direction. It carefully analyzes the literature relating to instructional improvement since 1978. Only after reviewing the implications of learning theory—the processes used to support instructional improvement and the consequences of faculty attitudes—does Dr. Cole look at specific data on instructional methods. This framework helps to develop an understanding of not only techniques, but interrelationships that are necessary in establishing and promoting high quality instruction.

Jonathan D. Fife
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Overview

Despite some good teaching, college and university instruction urgently needs improvement. A survey of more than 300 books and articles published from 1977 to 1981 indicates that higher education faces a crisis. The lack of sufficient teaching positions and declining enrollments require increased attention to teaching performance. The faculty reward system places a higher premium on research than on teaching. Students as consumers require more attention to their own interests and needs. Financial pressures on colleges and universities force institutions to encourage improved instruction. The increased emphasis on accountability and public criticism of higher education mean that teaching must improve. At the same time, reductions in government funds make efforts to improve quality more difficult.

The effort to improve the quality of instruction begins with increased attention to theories of learning. Learning cannot be simply defined but is interpreted in conflicting ways. Major theories of learning fall into five major groups: classical mental discipline, unfoldment, apperception, behaviorism, and gestalt-field. The most significant conflict divides behaviorists from antibehaviorists. One model of learning pictures it as consisting of "accretion, restructuring, and tuning." Learning styles differ. Individual personality differences affect methods of teaching. The increased proportion of adults enrolled in colleges and universities affects methods of teaching. Much adult learning is self-directed. Adults prefer to be actively involved in learning. They learn more effectively when they set their own pace, and ability to learn remains constant regardless of age. Adults are interested primarily in subjects related to their immediate concerns.

No single theory of learning appears to meet all needs and situations, but experts agree that learning is enhanced when the student is active rather than passive. It is improved by practice, feedback, and direction toward some goal. It has both an affective and a cognitive aspect. Quantitative and qualitative differences are great in the learning process.

Teaching is a creative process that is considered an art, a science, and a craft. One of the most useful models of instruction divides it into discipline-centered teaching, instructor-centered teaching, student-centered (cognitive) teaching, and student-centered (affective) teaching. Different subjects and circumstances call for different approaches. Good teaching depends upon a clear understanding of goals, knowledge of the subject and of students, and a willingness to change one's practices if they are not adequate to a particular situation.

Characteristics of a good teacher include skills, positive personality traits, enthusiasm, empathy for students, and extensive interaction with students inside and outside the classroom.

Efforts to improve instruction include increasing the professor's knowledge and teaching skills, changing faculty members' attitudes, changing methods of teaching, modifying course content, changing students' attitudes and responses, and modifying the physical setting where instruction occurs. Teaching awards by themselves have minimal effect. Faculty development programs have increased rapidly and are now more widely

accepted. Programs in major centers provide information on teaching skills, diagnose individual teaching, and supply details on student learning. But such centers may be threatened by decreased funds.

Programs for teaching assistants and institutions' cooperation in improving instruction have increased recently. Professional associations and foundations have shown interest in improving instruction. Faculty growth contracts and student ratings of teachers help to encourage quality teaching.

Faculty members' attitudes are important in determining the success of efforts to improve instruction. Improving instruction requires the instructor's willingness to change, but it must be tackled systematically and coherently. Few professors have received training in teaching. They generally resist proposals for changing methods of teaching. The influence of traditionalism is strong. Professors relate more to their discipline than to the institution where they teach.

The current literature is rich in information about a wide variety of teaching methods, which can be conceptualized in several models. One approach divides them in terms of those emphasizing content, those focusing on students, and those characterized by interaction between instructor and student.

Systematic research on improving instruction has become more extensive. Although the research has improved, authorities are critical of its methods and findings. Research reports frequently are limited in scope, and findings cannot be generalized. The most striking research results are those on the impact of the personalized system of instruction. Research on the validity of student ratings of faculty and research on student learning styles have increased. More systematic and interdisciplinary research is needed that covers more institutions over longer periods of time and is more carefully formulated. Much more research will compare teachers' and students' aptitudes and cognitive styles. Research results should be more clearly written to make it more understandable to the majority of educators and the general public.

While encouraging examples of successful teaching exist, deterrents to improving instruction are becoming more formidable. They exist in faculty traditionalism, in monumental problems of finances and enrollment, and in the nature of graduate school education. Pressures will intensify for more experimentation and innovation. Change will be more rapid. The use of microcomputers and videodiscs will increase rapidly.

There is no single method for improving instruction. No teaching technique is superior in all circumstances. The instructor's personality plays a crucial role. Learning is more effective when the student actively participates in the educational experience. Efforts to improve instruction should harmonize with an institution's goals and philosophy. Roles of instructor and student need redefinition. The faculty reward system needs revision. Educational institutions must be humanized. New sources of sufficient, sustained support must be found.

The Imperatives for Improved Instruction

Although much college and university teaching today is stimulating, the general level of instruction must improve. Faculties and institutions are being pressured from inside and outside academe to devote more attention, time, and financial support to improving instruction. Probably at no time since World War II has higher education faced such a need to improve the quality of teaching.

The reasons for the increased interest in and concern for the quality and effectiveness of instruction include those related to faculty members and their disciplines and professions, those attributable to students, those connected with institutions, and those related to society at large.

The Faculty

In the current crisis facing higher education, faculty members have been described as discouraged, pessimistic, demoralized, and, in some cases, cynical (Stadtman 1980). Frederick Rudolph calls professors "entrenched, nervous, protective of their turf" (Koerner 1981, p. 64). Faculty members face revolutionary dislocations in that their lives and careers seem increasingly to be out of tune with the world around them (Furniss 1981).

Because of the glut of doctorates and the leveling off of undergraduate enrollments, few jobs are available and less chance of tenure for those lacking it. As one observer puts it, "There is no longer anywhere to go" (Showalter 1978, p. 168). The National Center for Education Statistics estimates that between 15 and 30 percent of all junior faculty members, depending on rank, move from one position to another each year. In 1980, only about 7,000 college teaching positions were open; that year, approximately 31,000 persons received a Ph.D. degree. William G. Bowen has predicted that there will be some 450,000 new Ph.D. holders in the next 15 years and only about 100,000 academic openings for them. He expects a decrease of 53,000 in the number of college teachers by 1988 (*New York Times*, January 10, 1982). Thus, an increasing number of well qualified persons are competing for a decreasing number of positions (Eble 1980). To maintain one's position in such a competitive market means increased attention to one's teaching performance.

One fundamental problem is that most faculty members have not been adequately prepared for teaching. Few graduate schools give attention to the subject in any practical way (Heermann, Enders, and Wine 1980), never training students for the job (Schwartz 1980). People who acquire a doctorate and specialized knowledge in a discipline are expected to know how to teach.

To make matters worse, the faculty reward system places a low premium on teaching and creates a conflict between the demands of research and teaching. A number of experts believe that the emphasis on scholarly publication, especially in universities, has intensified the problem (Altbach and Slaughter 1980; Lewis and Becker 1979). Monetary and career incentives are available for increasing research productivity, few for improving teaching. The ability to teach is not as highly regarded or as well rewarded as the ability to conduct research and evidence of publication.

The relatively large proportion of teaching done by graduate students and part-time faculty is another reason for the urgent need to improve instruction. According to several recent surveys at major universities, between 40 and 50 percent of the total credit hours earned in lower-division courses are taught by graduate assistants (Mayo and Gilliland 1979). In 1978, over 57 percent of those teaching in two-year colleges were part-time (Parsons 1980). Part-time faculty tend to be less experienced and to have less education than full-time faculty members. Although the use of part-time faculty may hold some advantages, the disadvantages may result in inferior teaching (Leslie 1978a).

Joseph Axelrod, who has written extensively about teaching styles, cites another reason for concern about quality instruction in the 1980s. He believes that a counter-revolution has occurred in teaching and learning in American universities and that many of the teaching reforms of the 1960s have quickly and quietly disappeared (Eble 1980). Although others disagree, his views about a trend toward the return to more traditional methods of teaching are worthy of consideration.

The Students

Several considerations related to students underscore the need for increased attention to improving the quality of instruction. The student body is increasingly heterogeneous. Students differ widely in their backgrounds, abilities, preparation for college, interests, and motivations. One of the most dramatic changes in the student body has been the increased number of adults attending colleges and universities. According to one estimate, about 5 million adults are enrolled in degree programs, and another 10 million are attending courses or other programs provided by colleges and universities (Bowen 1980). At present, about one-third of all college students are 25 years of age or older (Peltason and Massengale 1978). According to Cross, adult learners constitute "the most rapidly growing segment of American education" (R. Peterson 1979, p. 75).

Experts also report that students are oriented more toward vocational training in the 1980s. Although academics have long complained about students' vocationalism, the economy and financial pressures on families are intensifying that interest in the 1980s. A dramatic shift is occurring at the undergraduate level away from traditional liberal arts programs, and the number of graduate students studying the arts and sciences is decreasing (*New York Times*, March 7, 1982). An irreverence for a college education is growing. Although they have been called more passive than in the 1960s, students also seem more skeptical of traditional academic ways. Student consumerism appears to be rising; it has been called "one of the most interesting responses to massiveness in colleges and universities" (Smith and Bernstein 1979, p. 73).

The implications for instruction are obvious. Faculty members cannot automatically assume ready acceptance of their teaching methods by their subjects. Students must be helped to see the value in what they are asked to learn.

The Institutions

A number of authorities (Eble 1980; Mayhew 1979; Berquist and Phillips 1981) have identified institutional reasons why instruction must be improved. "Bombarded with a never-ending series of management crises, campuses . . . have become mired in talk of demographics and enrollment projections, budgeting and cost accounting, collective bargaining and litigation" (Bover and Levine 1981, p. vii).

The declining enrollment predicted for higher education poses serious problems for those programs designed to improve instruction. Enrollments are expected to decrease through the 1980s. The 14-to-17 age group will decrease by 2.5 million between 1974 and 1985. The decrease in those age 18 to 21 between 1980 and 1990 will be over 15 percent. The majority of experts predict annual enrollment contractions as high as 9 percent (Ashworth 1979; Centra 1980).

Because of declining enrollments, inflation, reduced government support, and other factors, higher education faces monumental financial problems in the 1980s. Financial crises will place new demands on faculty members. "Often one of the first things to be eliminated when the budget tightens is provision for faculty enlightenment, revitalization, and renewal" (Gleazer 1980, p. 167). One such casualty in 1981 was the demise of *Insight to Teaching Excellence*, a periodical published by the Faculty Development Resource Center at the University of Texas at Arlington.

Another trend having implications for instruction is the increased use of sites besides the traditional classroom. Much of higher education now takes place "in public libraries, over television, in ancillary programs of large corporations, through the military, and through many other channels of civic and cultural life" (Grant and Riesman 1978, p. 15).

The nature of governance and the way decisions are made can also affect the efforts to improve instruction. "Academic institutions are peculiarly anarchic entities, seldom able to agree on a particular course of action. The lack of internal consensus on proper goals makes universities especially vulnerable to pressures from without" (Altbach 1977, p. 4264).

The bigness, impersonality, and traditionalism characterizing many campuses have led to criticisms of college teaching. In the surveys he conducted on a number of campuses, Jack Lindquist encountered students who called teaching "too uniformly didactic" and learning "too passive." Although students identified faculty members whose instruction was invigorating, many were quick to speak of those who were "soporific" (Lindquist 1978).

The Society

Society at large calls for renewed efforts to improve instruction for several reasons. The increased emphasis on accountability requires increased attention to improving instruction (Nielsen 1979). Parents, trustees, legislators, and the general public believe that they should have more of a stake in what happens in the educational enterprise. Especially as tuitions rise, the general public expects to know what it is paying for and why

achievement seems to fall short of expectations. In this environment, universities have become "targets of pressure for change by numerous external groups" (Blake, Mouton, and Williams 1981, p. 303).

Included in the criticisms leveled at higher education is the charge that today's graduates are not as prepared for the 1980s as they should be. The public "is discovering more and more evidence that many college graduates lack basic skills in their specific fields of study" (Ashworth 1979, p. 21). In the face of criticism, inflation, and rapid change, the need to give attention to survival overshadows the need to maintain quality teaching. Yet that very survival may ultimately depend in large measure on success in improving instruction.

The increase in student consumerism, litigation, and court rulings provides another imperative for improving instruction. Students and others are increasing their use of legal means to express their complaints about courses and teaching. Institutions are more vulnerable to charges against them. For example, a Tennessee court ruled that Vanderbilt University's doctoral program in management was not adequate. As one authority observed, "The classroom is no longer the sole domain of the teacher" (Centra 1979, p. 3).

Although it is too early to find evidence in the literature, it seems likely that some of the policies of the Reagan administration will have a bearing on the question of instructional improvement. Reduced budgets have already resulted in decreased support for higher education. Some federal programs and agencies, such as the Fund for the Improvement of Postsecondary Education (FIPSE), the National Science Foundation, the Department of Education, and the National Endowment for the Humanities, that have been instrumental in the past in supporting institutional efforts to improve instruction and curriculum have experienced particularly severe budget cuts. Therefore, in the face of reduced financial support from the federal government, colleges and universities have an additional burden that will make future efforts to improve the quality of instruction that much more difficult.

Implications of Recent Learning Theories

One striking characteristic of the educational literature of the last five years has been the increased attention to theories of learning and to their effect on instruction and efforts to improve it. Bower and Hilgard (1981), Bugelski (1979), Gagné (1977), Howe (1977), McKeachie (1980), and Messick and Associates (1976) have contributed greatly to current understanding of the learning process. It is frequently asserted that attention to instruction without reference to learning theory is fruitless. Yet controversies abound among those who profess an expertise on the subject. "The field of learning has expanded beyond anyone's attempt at mastery, and a great number of specialties have attracted different investigators" (Bugelski 1979, p. vii).

This statement serves both as a summary of the published works on learning theory and as a caution to anyone who seeks to find order in a chaotic field. The subject is chaotic because so many of the specialists, whether they are psychologists, linguists, educators, or experts in another discipline, apparently do not examine what has been written on learning from the perspective of other specialties.

Definitions of Learning

No simple definition of learning exists; the different definitions result from conflicting assumptions and interpretations. To call it knowledge acquired by study serves only to substitute one analogy for another. The problem with most definitions is that they describe the results of the process rather than the process itself, the product rather than a special kind of experience. For instance, learning has been described as "a change in knowledge, behavior, attitudes, values, priorities, or creativity that can result when learners interact with information" (McLagan 1978, p. 1). Psychologists define learning most frequently as a modification of behavior, a change in the way a person thinks, feels, and acts (Bower and Hilgard 1981), philosophers refer to it as a reordering of beliefs (Soltis 1981). Gilbert Highet described learning as "a natural pleasure . . . and one of the essential pleasures of the human race" (1976, p. 3). Many writers focus more on what learning is not than on what it is. Many emphasize the fact that as a result of learning, the individual acts or performs differently from the way he or she previously did.

Most definitions include a reference to developing the mind or to accumulating knowledge. Others link it with personal development. One of the clearest definitions calls it "a relatively permanent change in our potential for performance as a result of our past interaction with the environment" (Lovell 1980, p. 30). It is helpful to view it as what happens when one discovers a capability for doing or knowing something that was not possible earlier (Knapper et al. 1977). For some, learning involves acquiring or adding to what one already knows. For others, it is "adapting, changing, or reinterpreting a matter or experience"; for still others, it is a "creating or drawing out" (Chamberlin 1981, p. 15). To Fodor, learning is rather a matter of inductive inference, a process of forming and confirming hypotheses (Piatelli-Palmarini 1980).

The section on learning in *The Encyclopedia of Education* refers to two basic methods of learning: first, the process by which an individual gradually builds up a skill or collection of knowledge; second, the process by which an individual discovers that he or she can organize the information acquired into something meaningful. Anyone who seeks more than a superficial notion of the subject must acknowledge the distinction between these two concepts of learning (Hill 1971).

It may be more productive to conceive of learning as a series of steps as one moves from the simplest of experiences to the most complex. According to Gagné (1977), eight kinds of learning can be distinguished: signal learning, stimulus-response learning, chaining, verbal association, discrimination learning, concept learning, rule learning, and problem solving. The most complicated is the last, which involves discerning a new rule that combines ones previously learned. Each learning step rests on the previous activity, and the experience of each ends with a different capacity for performance. The phases in a learning sequence are apprehension, acquisition, storage, and retrieval. According to Gagné, five different learning outcomes are possible: intellectual skills, verbal information, motor skills, cognitive strategies, and attitudes.

One widely accepted approach to systematization of the learning process is seen in the construction of a taxonomy of educational objectives (Bloom 1977). This thesis divides educational goals into three categories: cognitive, affective, and psychomotor. The classification system in the cognitive area is divided into knowledge, intellectual abilities and skills, application, analysis, synthesis, and evaluation. A comparable taxonomy for the affective domain organizes the subject by terms such as receiving, responding, and valuing (Krathwohl et al. 1969).

Given these varied assumptions about and interpretations of learning, it is undesirable, if not impossible to settle upon a single satisfactory definition of the word because undoubtedly there is more than one kind of learning. While the physiological changes may be well documented, experts disagree widely with respect to what those changes mean. As learning is partly a private act, we may never be able to describe it fully or understand it to our complete satisfaction.

What writers seem to agree upon is that learning is basic to human existence, not a single activity but a continuing process. Some theorists view it as the way by which we prepare to deal with new situations (Botkin et al. 1979). Gagné's major contributions have been his hierarchical conception of learning types and, more recently, his emphasis on information processing as one aspect of learning. What is important to remember, insofar as instruction is concerned, is that learning is an active, not a passive, process and that it is an individual matter.

The major learning theories that have been advanced might be classified in five broad groups: classical mental discipline, unfoldment, apperception, behaviorism, and gestalt-field. Most authorities consider the first three archaic. According to the theory of classical mental discipline, learning is viewed as a training of the mind and a gathering of knowledge.

The theory of unfoldment pictures it as a process of individual development. Apperception theory views the mind as a blank slate and learning a means of relating new ideas to old ones. Behaviorism describes the process in a mechanistic way. To the gestalt-field theorists, learning is a development of insights resulting from an interaction with one's environment (Apps 1979).

The Behaviorist View

The most significant conflict among learning theorists divides behaviorists from antibehaviorists. This controversy is all the more crucial for education because it involves two contrasting images of human beings. The behaviorist pictures a person as an organism acting as a result of stimuli originating in the external environment. The antibehaviorist, or someone with a phenomenological orientation, views the person as the source of his or her actions, one who is free to make choices in every learning situation. The antibehaviorist believes that decisions on behavior are made within the context of a human consciousness and therefore are not basically governed by outside stimuli. Although it is an oversimplification, one might say that the behaviorist has a scientific orientation, the antibehaviorist a humanistic one. The roots of both approaches to learning theory lie deep in the shifting philosophical sands of western civilization (Milhollan and Florisha 1972).

The most influential of the behaviorists is undoubtedly B. F. Skinner, whose writings constitute the most systematic account of the behaviorist point of view. According to Skinner (1968), there are two types of learning —respondent conditioning and operant conditioning. The first type is elicited by changed stumuli in the environment. The second type occurs when the human operates on the outside world and his or her behavior is controlled by its consequences, those stimuli that follow the response. Events following a response that tend to strengthen behavior are called reinforcers. Our learning occurs as our subsequent behavior is influenced by positive and negative reinforcers. Behavior strengthened in one situation is likely to occur in other situations. Through a series of processes known as discrimination, differentiation, and chaining, our learning is shaped and we respond to future experiences as a result of our earlier modes of learning. Thus, the emphasis in behaviorist theory is on the role of reinforcement. To the behaviorists, thinking is a form of behavior that is learned and motivated much the same as other human activities.

The educational implications of Skinner's ideas are extensive. According to him, teaching is an arranging of contingencies of reinforcement under which students learn. He believes that what is missing from the traditional classroom setting is positive reinforcement. Because teachers are not the most efficient instruments for controlling students, Skinner advocates the use of teaching machines and programmed learning. The development of the personalized system of instruction (PSI) is an example of the behavior modification approach. Recent literature, however, indicates that behaviorism is under increased attack (Glaser 1978).

Antibehaviorists

Many antibehaviorists are called cognitive theorists because they prefer to concentrate on knowledge and the way it is acquired and used. The cognitive theorists reject the notion that the individual merely responds to stimuli. They prefer to view the human as reacting to and organizing the data assimilated. The cognitive approach emphasizes learning as a process of problem solving. Cognitivists are interested in how the individual goes beyond the information gained rather than viewing him or her as being shaped by it.

One of the best known critics of Skinner is Jerome Bruner. His cognitive-construct instructional theory attributes a greater degree of autonomy and initiative to the learner. According to Bruner (1966), much of our behavior depends upon how we structure knowledge about ourselves and our world. To the cognitive theorists, individual insight is important, and learning is primarily a process of discovering and understanding relationships.

Carl Rogers has emerged as the most persuasive of the humanistic psychologists. In some of his writings (1969; 1977), he is as critical of the cognitive theorists as he is of the behaviorists. He believes that the only true learning totally involves the student as a person. Rogers, who devoted many years to clinical therapy, has advanced a set of principles regarding human behavior. The most fundamental of them places the individual at the center of his or her constantly changing world, where the individual reacts to the environment as he or she perceives it. Behavior is viewed as the individual's attempt to satisfy his or her needs and to develop a sense of self. The individual interacts with the surrounding world and cultivates values that are either part of his or her self-structure or are taken from others.

Rogers emphasizes the facilitation of learning in his concept of instruction. The teacher's attitude is more crucial, in his opinion, than the teacher's scholarly knowledge or specialized skills. The teacher as facilitator must discard the traditional role and become a "real" person with his or her students. The teacher must take a person-centered approach and prize the student as a worthy, valuable individual. There must be close communication between the two. The kind of learning resulting from this relationship will be self-initiated and will involve the student extensively in the learning process. Rogers' favorite teaching method is the encounter group, sometimes called the "T" group or sensitivity training (Hanson 1981).

Accretion, Restructuring, and Tuning

Rumelhart and Norman (1978) advance a different approach, asserting that many different kinds of learning exist. One simple type is merely the accumulation of new information into memory. A more complex learning seems to involve a modification of memory's structure. They have developed a model that pictures learning as consisting of "accretion, restructuring, and tuning." Learning through accretion is the usual kind. Learning

through tuning is more significant, involving actual changes in the categories used for interpreting information. Restructuring is even more significant in that it involves the construction of a new organization and interpretation of the knowledge one has gained.

Learning Styles

The term "learning styles" refers to a person's consistent way of responding in learning situations. According to those who have written about learning styles, individual personality differences influence how and what one learns best; these differences have significant implications for teachers. The most useful research on this subject has been on what are called "cognitive styles." This term refers to how we go about perceiving, thinking, remembering, and solving problems in a consistent, identifiable way.

Researchers have identified at least 11 models of cognitive styles. One of the best known is "field-dependence/field-independence," which refers to the extent to which one perceives items without being influenced by background factors. Field-independent personality types appear to be attracted to scientific disciplines and to have a more impersonal orientation. Field-dependent students are drawn to people, are better at learning materials in a social context, and appear to be attracted to the social sciences and humanities. "Impulsivity/reflectiveness" divides persons in terms of whether they respond quickly or slowly. "Leveling/sharpening" refers to individual variations in assimilation in memory. The leveler tends to put new information into previous categories, while the sharpener tends to differentiate new from old data. "Cognitive complexity/simplicity" refers to differences in how we view the world in a multidimensional way (Messick and Associates 1976; Witkin et al. 1977).

Cognitive styles serve as useful devices to distinguish student attitudes, temperaments, and motivations in a variety of situations. It has been said that cognitive styles serve as "tracer elements" and provide clues to how different individuals acquire and store information, how they tackle an educational task, what they prefer to study, and what teaching method they like most (Wilson 1981). Witkin et al. (1977) summarize well research findings about cognitive styles and their relevance for teaching techniques.

Research in cognitive styles has been useful in correcting some of the myths about the supposed sexual differences in ability and learning. Females score better on memory tests. Males score better in tests of mathematical skills. On the average, males seem to do better than females on tasks involving visual-spatial skills. In terms of cognitive styles, males are more field-independent and females more field-dependent. Therefore, it is reasonable to conclude that women tend to prefer activities that involve dealing with people and are more likely than men to be attracted to the humanities. None of these differences mean that one sex is intellectually superior to the other (J. Sherman 1978).

The recent popularity of cognitive theorists has led to the assertion that learning is more effective when the educational method and the learner's ability and cognitive style are congruent (Wittrock and Lumsdaine

1977). Thus, the realization that students differ in learning styles as well as in personality is gaining acceptance. They have different needs, motivations, and interests—as well as different cognitive styles. Therefore, to make instruction count, teachers must know more about these characteristics in their students (O'Neil and Spielberger 1979). "The effectiveness of student learning depends to some extent upon the strategy used by the student" (McKeachie 1980, p. 89).

Acceptance of this notion has led to an increased popularity for the theory of aptitude-treatment interactions, advanced most systematically by Cronbach and Snow (1977), which studies the differences in students' aptitudes for learning under different types of instructional methods. It means that individual differences in personality will help to predict learning outcomes. One implication focuses on instructional situations in terms of student results. Another supports "a systematic approach to the individualization of instruction" (Pervin and Lewis 1978, p. 237.)

Adult Learning Theory

Because an increasing proportion of students in colleges and universities are older adults, recent developments in adult learning theory are relevant to the question of improving instruction. Major contributions to our understanding of how adults learn have been made in recent years, especially by Malcolm Knowles and Allen Tough. Knowles is notable for having popularized the word "andragogy," the art of teaching adults (1978).

Andragogical theory is based on four assumptions that are different from those of pedagogy: (1) as a person matures, his or her concept of self changes from dependency to increasing self-directedness; (2) as a person matures, he or she accumulates a reservoir of experience that provides a broadening base to which he or she can relate new learning; (3) as a person matures, his or her readiness to learn is decreasingly the product of biological development and increasingly the product of tasks required for his or her social roles; (4) an adult tends to have a problem-centered orientation to learning. According to this theory, in a learning situation in which an adult is not allowed to be self-directing, his or her reaction is likely to be one of resentment and resistence. Techniques such as discussions, field experiences, simulation, and team projects are more appropriate to adult learning, according to principles of andragogy, than lectures and other passive pedagogical methods. Furthermore, topics that are problem-centered and that contain more direct applicability to the learner are more attractive to adults than those related to the traditional academic disciplines (Knowles 1978).

The main theme of andragogy is to incorporate the learner as an active participant in planning, designing, and carrying out the educational experience. According to this viewpoint, the teacher is not the authority figure, and the transmission of a given body of information is not supposed to be the chief activity in the learning process.

The theory of andragogy has its critics (Elias 1979). However, the approach has some value in refuting the behaviorists and in asserting that

men and women are free to choose both their experiences and their learning environments and can indeed shape their destinies.

The major contribution of Allen Tough's writings is the emphasis on how much of adult learning is self-directed. Tough reports that most independent self-learning strategies are effective and result in significant accomplishment. As a result of his studies, he asserts that the typical adult spends some 500 hours a year on major learning efforts and that more than 70 percent of adult learning projects are self-planned (Tough 1979).

The literature on adult learning theory contains several major points. Adults have more experience than children or young people and therefore bring to the learning situation a greater body of attitudes and a more pronounced set of values, interests, motivations, and personalities. The aging process does not result in a drastic decrease in learning. Learning ability seems to remain constant in many people from age 20 to 60. It may decline through disuse, however. Learning appears to be more effective when the individual is actively participating in the educational experience. Adults seem to learn most effectively when they set their own pace. Educational programs for adults need to be brought to where the people are. Almost anyone can learn almost anything if he or she really wants to (Apps 1981; Howe 1977; Knox 1977).

Authorities cite several fundamental principles in their assertions that adult learning strategies should be different from those employed in the classroom. First, most adults are capable of self-direction. They do not need to be passive learners. Their motivation for learning increases when they are treated as equals rather than as less than expert. Second, the experience accumulated by adults can be a rich resource that they can bring to bear in any educational situation. Third, adults prefer to make their own educational decisions (Knox 1980b). Unlike the traditional relationship where the instructor decides the content and technique, an informal method creates a community of learners and teachers in which all have a hand in helping to determine the direction to be taken. Fourth, if a subject is immediately relevant to an adult's life, he or she will show more interest than if it is something abstract. Most adults are interested primarily in what they perceive to be related to their immediate concerns—working, living, their environment. Most adults place a low priority on traditional academic subjects (Cross 1978a). While they are found principally in the literature about adult education, these generalizations appear to be as applicable to 18-year-olds as they are to older members of society.

The Piaget-Chomsky Debate

One of the current unresolved issues related to learning theory is dramatically illustrated in the 1975 debate between Jean Piaget and Noam Chomsky (Piatelli-Palmarini 1980).

On the surface, their views appear to be diametrically opposed. Piaget considers the mind of the human child (and ultimately the resulting adult) as an active agent who constructs an understanding of the universe by

slowly pulling himself or herself forward, mostly by individual effort. Chomsky, on the other hand, views the mind as a programmed unit, innately equipped from the outset to realize its potential and needing only marginal outside sparks to display its productive qualities. To Chomsky, knowledge is largely innate; to Piaget, knowledge can be constructed only through the interaction of the individual and his or her environment. Chomsky doubts that there is any point in looking for a general theory of learning. He challenges all learning theories that depend only on induction. To him, learning involves taking in the right information at the right time and using it to confirm what is already built into the mind.

Common Principles of Learning Theories

Although learning theorists differ among themselves, they appear to agree that the subject of learning is exceedingly complex and that no single theory seems to meet all needs and situations. There is little agreement on how the connection between learning and instruction should be conceptualized; theorists envisage many styles, many formats to meet the diverse learning requirements of all students. But theorists agree generally on these principles: (1) learning is enhanced when the student is active rather than passive; (2) learning is improved by practice and feedback; (3) learning is improved when directed toward some goal; (4) learning has both an affective and a cognitive aspect; (5) the quantitative and qualitative differences in the learning process are great (Knapper 1980; Milton and Associates 1978).

Could there ever be a single theory of learning, a single model to explain the process by which the lively wonder called learning takes place? It seems doubtful. As Gross explains, "No particular way of learning is in itself superior to another. How you learn depends on your temperament, circumstances, stage of life, as well as your need, taste, or ambition" (1977, p. 17).

If no single theory can accommodate the process of learning, no single theory of instruction applies to all circumstances. Most people agree that any attempt to find a technique that will work for every student, instructor, and situation is bound to fail (Kozma, Belle, and Williams 1978). Several concepts and philosophical questions, however, are frequently addressed in the literature dealing with improvement of instruction.

People differ in their definition of instruction itself. To some it is an art, to others a science, to still others a craft. According to Paul Lacey, the faculty member practices two crafts, that of a discipline and that of teaching. It requires "the right balance between head and heart" (Noonan 1980). Teaching has been defined as "any activity on the part of one person intended to facilitate learning on the part of another" (Gage 1978, p. 14). Schwartz prefers to extend the teaching function to include "the aftermath of discovery . . . the elaboration, the testing of the data, the struggle with authority, the agreeing and disagreeing" (1980, p. 242). Axelrod describes its dynamic function as a relationship involving the one who is teaching, the one who is being taught, and the subject matter (Eble 1980, p. 11). A more poetic approach defines teaching as a "lighting of sparks, this setting aflame" (Epstein 1981, p. xviii). It is a creative process that brings about illumination and in which the minds of both professor and learner glow and grow.

Models of Teaching

The recent literature contains models of teaching in terms of its structure, its content, and its objectives. One popular model divides instructors into those who are content-centered, instructor-centered, intellect-centered, and person-centered. This method of classification, associated with Axelrod's writings, focuses on how the instructor approaches the challenge of teaching. The content-centered faculty member is concerned about covering subject matter systematically, is discipline oriented, and poses as an authority figure. The instructor-centered teacher stands as a model for the student to emulate. The intellect-centered professor emphasizes the training of the mind and the development of problem-solving skills. The person-centered instructor is primarily interested in all aspects of the student's development—emotional, personal, and intellectual (Kozma, Belle, and Williams 1978).

Another approach to classifying instruction divides it into that which is goal-oriented, activity-oriented, and learning-oriented (Solmon and Gordon 1981). The difficulty with this classification is that it fails to clarify the role of the instructor in teaching and learning.

Edward Glassman suggests a somewhat different model, dividing teaching styles into those that are "directive," "participative," and "nondirective." In the directive style, the teacher dispenses knowledge through telling, asserting, and modeling. Students are passive and the instructor dominates the situation. In the participative style, both teacher and student express creative thoughts in the classroom. The teacher is not an authority figure. In the nondirective style, the teacher is a facilitator, and

knowledge comes from the students. This approach is definitely student-centered; the faculty member's expertise is not overtly used (Eble 1980).

Paul Dressel offers one of the most comprehensive models for relating instruction to structure, content, and objective (1980). Modifying Axelrod's terms and giving more attention to the teacher's social orientation, he suggests a fourfold division: discipline-centered, instructor-centered, student-centered (cognitive), and student-centered (affective). Discipline-centered teaching emphasizes the content and structure of a field of study. This approach insists on no modification to meet the needs or special conditions of the student or teacher. It stresses objectivity, the preferred methods are formal, and the professor is an authority figure. In instructor-centered teaching, the professor is the focal point in the classroom and plays a major role in selecting and advancing ideas to students. The student-centered (cognitive) approach focuses on the intellectual development of the student. The aim is to encourage students to think by using discussions, demonstrations, exhibits, and other means to achieve high standards of performance. The approach is concerned less with coverage of content and more with encouraging students' understanding. The student-centered (affective) teaching approach considers the personal and social development of the student as important as the intellectual. Content is secondary. The classroom atmosphere is informal, and students, who are viewed as individuals, are expected to achieve self-realization.

Although these models are useful in analyzing the differences that occur in teaching styles, methodologies, objectives, and classroom settings, they have their limitations. All faculty members do not fall neatly into one or another classification. And, as Dressel himself points out, "There will never be unanimity in definition of teaching types, and hence the imposition of any typology designations will confuse and mislead rather than help" (1980, p. 120). Furthermore, different subjects and different circumstances may call for different approaches. The best instructor in advanced chemical engineering may be a content-centered, field-independent lecturer. The best one to teach attitudes in the humanities may be a person-centered, field-dependent instructor who uses a variety of teaching techniques (Kozma, Belle, and Williams 1978).

The important point is that good teaching does not just happen. It depends upon the faculty member's clearly understanding goals and developing a well conceived strategy for achieving them. It also depends upon a teacher's knowing well both subject and student and building upon his or her strengths. Expressed another way, "Those who desire to increase their teaching effectiveness . . . should understand teaching concepts and practice in relation to teaching objectives, and learner and teacher characteristics" (Knox 1980b, p. vii). One must also understand the rationales for different teaching approaches and be willing to change one's own practices if they are not adequate to a particular situation.

Characteristics of Good Teaching

Much has been written about the characteristics of a good teacher. Steven

Cahn observes that "one cannot be an outstanding teacher without thorough knowledge of subject matter, but to possess that knowledge does not guarantee the ability to communicate it to a student" (1978, p. ix). He also asserts that because teaching is a creative process, there is no sure guide to success. Superior instruction, however, requires "motivation, organization, clarification, and generalization" (1979, p. 25).

Some authorities stress the possession of particular skills in their evaluations of outstanding teaching: comprehensive knowledge of one's specialization and of teaching methods, preparation for class, clear expression, a capacity for motivating students to do their best, and the ability to interact with groups (Seldin 1980). But, as many point out, "there is no magical and fixed set of faculty skills that automatically guarantees superior teaching" (Eble 1980, p. 81).

Some writers identify more subtle traits. Teaching calls for "intuition, creativity, improvisation, and expressiveness" (Gage 1978, p. 15). Flexibility, adaptability, and the ability to learn new skills are often mentioned (Brown and Copeland 1979). Good instructors understand their students well and are oriented more to people than to things (Davies 1981). Effective teachers of adults possess a certain empathy and awareness of the circumstances of more mature students (Knox 1980b; Brown and Copeland 1979).

A larger number of writers focus on particular personality traits that accompany effective teaching. For instance, a good teacher is frequently described as someone who is friendly and patient, has a good sense of humor, respects the characteristics of all his or her students, and is open to new ways of teaching. Outstanding teachers love people and relate easily to them. They are responsive, self-confident, warm, informal in their contacts with others. The most frequently mentioned personality trait is enthusiasm. Its positive effect on student learning has been well documented (Clinic 1977). According to one view, enthusiasm in a teacher encourages students to put more effort into learning a subject and to enjoy it more, while a threatening, distant, or hostile environment "creates anxiety and students learn nothing." Humility creates a more supportive atmosphere for learning than does arrogance (Ramsden 1979, p. 426).

Another favorable trait is "likability." This trait is equated with warmth, friendliness, openness, flexibility, sincere interest in others, expressing praise. According to some researchers, considerable evidence supports the assertion that people change their attitudes toward those they like. Therefore, "personal likability may be a more important factor in teaching than many of us would have supposed" (Uranowitz and Doyle 1978, p. 32). But to one observer, sensitivity is "the ultimate characteristic of great teachers" (Gross 1980, p. 37). To others, the key word is "caring" (Rouche and Snow 1977, p. 121).

Effective teaching involves more than what takes place in the classroom. Several researchers conclude that one main difference between faculty members who are effective teachers and those who are not is the amount of interaction with students inside and outside the classroom

(Milton et al. 1978). Outside the classroom, the contacts professors have with students that most positively influence their learning are those that "reinforce and extend the intellectual goals and purposes of the academic program" (Pascarella and Terenzini 1977, p. 551).

The best scholarly judgment on the subject is perhaps the following: "The good teacher, like the good parent combines technical skills with human sensibilities so that both science and art contribute to success. . . . [The best teachers] seem capable of change, curious about innovations, quite ready to criticize themselves and join the search for better procedures and more satisfying outcomes" (Martin 1981, pp. 151–52). One student's observation sums up the traits: When asked what students want in a teacher he replied, "a human being who's not afraid" (Schwartz 1980, p. 252).

Ways to Improve Instruction

Efforts to improve instruction can take different forms: (1) increasing the instructor's knowledge and strengthening his or her skills; (2) changing faculty members' attitudes; (3) changing teaching methods; (4) modifying course content; (5) changing students' attitudes, motivations, and responses; (6) modifying the physical setting where instruction occurs. Changing one without the others, however, is likely to have only marginal results. Trying to change teaching methods without altering faculty members' skills and attitudes is probably futile. Focusing solely on the instructor's role without considering students' responses is equally fruitless. To be effective, efforts to improve instruction must take into consideration all the factors involved.

Improvement must start somewhere, however, and most authorities focus first on the individual instructor and on what is needed to enhance his or her skills and knowledge. An individual faculty member can begin to improve his or her method of instruction without reference to formal programs. Many helpful guides have been published to assist the neophyte teacher (McKeachie 1978; Eble 1976; Milton et al. 1978). As most departments are accustomed to conventional teaching, however, the attempt by one individual to radically change teaching methods may have negative results (Blake, Mouton, and Williams 1981). Haphazard, unsystematic efforts to improve instruction are not likely to be productive. Most faculty are not prepared for a sustained, self-initiated program of improvement. Furthermore, several studies have revealed that many faculty members have a higher opinion of their teaching performance than others do and do not believe that they need to improve. A study at the University of Nebraska, for example, revealed that 68 percent of the faculty rated themselves in the top quarter on teaching performance and 94 percent rated themselves above average (Stordahl 1981).

Using a colleague's critique in the improvement of one's instruction is another device that can be readily employed, but the role of colleagues in helping to improve one's teaching has not been adequately defined. A distinction must be drawn between evaluation by colleagues for the pur-

pose of improving instruction and for the purpose of making decisions about salary and tenure. Faculty colleagues are best qualified to evaluate such things as one's mastery of course content, course organization, appropriateness of teaching method, commitment to teaching, and support of departmental policies (Cohen and McKeachie 1980).

An interesting device for involving colleagues in evaluating instruction was undertaken at Evergreen State College, where each quarter a faculty member was freed from teaching to spend each week visiting classes of other faculty members who had volunteered to be observed. The visitor then suggested improvements. This procedure requires the participation of committed individuals "who care about teaching and about each other and who are willing to look closely at what they see and to report accurately how they respond" (Noonan 1980, p. 39).

Most writers agree that to be most successful, efforts to improve instruction must have the support of the institution: "the institution has a stake in the faculty's performance" (Furniss 1981, p. 131). Indeed, some assert that improvement is unlikely without the support and involvement of high-ranking administrators. According this view, "Change can be successfully accomplished only if those at the top of the administrative ladder understand why change is needed, and give their efforts and energy to bring it about" (Blake, Mouton, and Williams 1981, pp. 284–85.).

Teaching awards. One popular device for encouraging improved instruction is the use of "outstanding teacher" awards. While more than half of all institutions make such awards, only about 13 percent of community colleges, 26 percent of teachers colleges, and 30 percent of liberal arts colleges do (Wilson 1979). The use of such awards has been criticized by those who feel that their impact is minimal unless the basic reward system for faculty is changed. As long as faculty are rewarded more for research and publications than for outstanding teaching, an occasional prize or plaque will not have much overall effect. Furthermore, detractors claim that unless faculty perceive teaching as a source of profound satisfaction, they will rarely develop the commitment needed to achieve sustained excellence in teaching (Bess 1977). McKeachie takes a similar position, stating that methods to enhance intrinsic rewards are more likely to be successful than encouraging good teaching with extrinsic rewards (Lewis and Becker 1979).

Faculty development programs. Faculty development programs were established at a rapid rate during the 1970s. John Centra's 1975 and 1976 studies revealed that approximately 50 percent of all colleges and universities had some type of faculty development program, including brief orientation sessions, leaves of absence, financial assistance to attend professional meetings, and more elaborate improvement programs. Centra found that 68 percent of the institutions responding to his survey circulated articles on improving instruction, 44 percent set aside time in the academic calendar for faculty development, 58 percent provided summer

grants for professional improvement, and 61 percent allowed temporary reduction of the normal teaching load for the purpose of improving instruction (Centra 1978a, p. 198).

More recent studies indicate that the number of formal centers has increased in the last five years. Watson estimates that more than 400 colleges and universities have faculty and instructional development programs (Knox 1980b). Another estimate suggests that 15–25 percent of institutions have formal centers or committees with programs designed to help improve teaching, with another 30–50 percent having less formalized activities designed for the same purpose (Erickson and Erickson 1979, p. 670). Authorities declare that "the field of faculty development reached maturity in the late 1970s" (Berquist and Phillips 1981, p. 3).

Faculty development programs or centers are called by different names. The most frequently used terms are educational development, faculty development, instructional development, and learning resource. Faculty development experts tend to emphasize instructional skills, techniques, and technologies in their programs. Classroom teachers, on the other hand, appear to be more interested in new developments in their own disciplines (Chait and Gueths 1981). Those who study these programs assert that they must be faculty-centered and involve the teaching staff actively in their operation (Lawrason and Hedberg 1977). Experts also insist that faculty development programs should stress the development of teaching competence in relation to personality and character as well as to techniques and skills (Eble 1980). Others point out that these programs should serve not only those whose skills and attitudes need improving but also those who are successful teachers (Apps 1981).

Some well established programs have developed a record of success working on the development of skills. Some newer programs focus on issues related to values and attitudes to interest faculty in change (Davis 1979). Although faculty development programs are modeled differently, they are similar in their focus on attitudes, processes, and structures and their emphasis on organizational development (Berquist and Phillips 1977). Major centers provide information about higher education, teaching skills, the instructors' own teaching, affective development, awareness of other disciplines, and how students learn (Gaff 1979).

In 1976, a Professional and Organizational Development Network in Higher Education was organized, consisting of individuals committed to working on behalf of professional and instructional development and institutional change. As a result of the efforts of its members, faculty development programs have received a greater degree of acceptance (O'Connell 1979), but the current financial crisis at colleges and universities may threaten the existence of some faculty development centers.

Some institutions systematically collect books, articles, journals, and reports on the subject of teaching and related topics for faculty use. The Center for Research on Learning and Teaching at the University of Michigan publishes *Memo to the Faculty*, which contains articles on improving teaching. The *Journal of Personalized Instruction*, begun in 1976, features

articles on a variety of research studies. The periodical *Improving College and University Instruction* contains brief articles on a variety of subjects of interest to those concerned with teaching. One of the Jossey-Bass monograph series, *New Directions for Teaching and Learning*, presents ideas and techniques for improving teaching. Many faculty development centers publish newsletters.

The Center for Individualized Education at Empire State College is one of five centers funded by the Danforth Foundation. It focuses on faculty-student relationships, individual learning objectives, evaluation, faculty load, and faculty development. The faculty member's role as mentor is especially emphasized at Empire State. According to one observer, "There is no other institution that has attempted to develop individualized education on so large a scale and with so much responsibility for faculty" (Bradley 1978, p. 34).

Strong faculty development programs are also found at New College, University of Alabama; Metropolitan State University, St. Paul; and University College, University of Minnesota. The programs at the University of Massachusetts and University of Texas at Arlington are also widely recognized for their effectiveness.

Leading authorities in faculty development programs make the following conclusions about improving instruction: (1) a systematic design for courses leads to improved teaching in many subjects; (2) closer coordination of objectives, instruction, and measurement would be constructive; (3) faculty should use a wider variety of instructional methods; (4) instruction that actively involves students is preferable to methods in which students remain passive; (5) greater attention to learners' characteristics seems desirable (Mayo and Gilliland 1979).

Although these centers are frequently viewed as remedial, it is important to see them as supplying a helpful service to all faculty members. Their utility in the future may lie in assisting professors to take advantage of new technologies in instruction. Staffs of learning centers can assist faculty in determining course objectives, diagnosing teaching-learning problems, and developing materials. They can also be instrumental in encouraging innovation (Lenning and Nayman 1980).

Although some claim that faculty development centers are effective, no one has attempted a systematic evaluation of them. Many of the faculty interviewed for the Project on Faculty Development, conducted by the Association of American Colleges, expressed feelings of "revitalization, indicating that their lives had actually changed as a result of faculty development activities" (Nelsen and Siegel 1980, p. 3). Others have criticized them, however, and assert that evidence of their success is scanty (Lindquist 1979; Knapper 1979). Gaff, while admitting that the programs are fragile, believes that faculty development has been put to the test and that it does work (1979).

Programs for teaching assistants. Efforts have increased recently to improve the training of graduate students who are teaching assistants. Tra-

ditionally their training in teaching methods has been neglected, but the demand for more rigorous instruction, coupled with support from foundations, has led to more programs in universities for teaching assistants. About 1,000 language and literature departments had some sort of apprentice teaching activities in 1979. A few universities, such as the University of Massachusetts and Indiana University, have campuswide activities for teaching assistants. East Carolina University, Central Michigan University, and the State University of New York at Binghamton have internship programs specifically for those who teach English in community colleges. Ohio State University used a grant from the National Endowment for the Humanities for its Training in Individual Instruction Program, designed for teaching assistants. The University of Southern California and Queens College received grants from FIPSE for programs for teaching assistants. The Danforth Foundation, Exxon Educational Foundation, and Pew Memorial Trust also have supported training programs for teaching assistants (Gibaldi and Mirollo 1981).

The Harvard-Danforth Center for Teaching and Learning offers a series of lectures and discussions for the benefit of all Harvard teaching fellows. The Center also videotapes fellows in the classroom so they can view their teaching and receive suggestions for improvement. In 1981, about 40 percent of the teaching fellows took advantage of this service. The videotaping of classroom teaching is a major feature of the Campus Teaching Program sponsored by the Big Ten universities and the University of Chicago. Some authorities believe that review of videotapes with consultation is the most effective way to improve teaching assistants' instruction (Levinson-Rose and Menges 1981).

At Stanford University, 10 departments participate in an annual orientation for teaching assistants. The University of California and the University of Michigan also have extensive programs (*Change* Editors 1978). A project at the University of Nevada produced six videotapes on the teaching of chemistry and six manuals to accompany them (Mayhew 1977).

Several university programs have produced useful handbooks for teaching assistants. Two of the best are Kellen and Walker's *Handbook for Teaching Assistants at Stanford* (1977) and *Change* magazine's *How to Succeed as a New Teacher: A Handbook for Teaching Assistants* (1978). It is paradoxical that just when institutions appear to be encouraging more attention to the training of teaching assistants, fewer teaching jobs are available for doctoral candidates.

Cooperation among institutions. A number of institutions have cooperated to improve instruction. Some faculty appear more willing to participate in a service under the direction of a group of colleges than in one operated by their own institution. In some cases, a program sponsored by a consortium is economically feasible when individual institutions cannot afford a center. The Committee on Institutional Cooperation, established in 1959 by the Big Ten universities and the University of Chicago, facilitates the pooling of resources on a variety of matters of mutual concern. Its

series, *Development and Experiment in College Teaching*, contains articles on new developments in the teaching of all academic disciplines.

Interest of professional associations. Some professional associations have shown strong interest in encouraging improving instruction. The American Historical Association sponsors a project on improving teaching, and its quarterly, *AHA Newsletter*, regularly contains articles on the subject. A mimeographed list of innovations in the teaching of history has been made available to the membership. Useful professional journals devoted to encouraging the improvement of instruction include *Teaching Sociology*, *Journal of Research in Mathematics Education*, *Instructional Science*, *Teaching of Psychology*, and *Improving College and University Teaching*.

The grant program of the American Sociological Association's Project on Teaching Undergraduate Sociology, however, was discontinued after three years because it was not cost effective (Levinson-Rose and Menges 1981).

Faculty growth contracts. Faculty growth contracts are another device to raise the performance level of the faculty. A growth contract is a plan drawn up by a faculty member describing his or her timetable for self-improvement, the specific goals for the year, and the intended means for accomplishing goals and evaluating performance. The plan usually is accompanied by a budget. Growth contracts are used at New College, University of Alabama; College of the Mainland (Texas City); Wharton County Junior College; and the College of Education, University of Massachusetts (Gross 1976).

Gordon College has probably used growth contracts more extensively than any other institution. A faculty member entering the program writes a profile containing an assessment of strengths and weaknesses and a description of long-range personal and professional goals. This profile forms the basis of yearly individual development plans. Since 1976 when the program was instituted, all but one of the college's faculty members have written at least one growth contract (Carlberg 1981).

Evaluation of faculty by others. Professionals disagree about the usefulness of students' evaluation in improving instruction. Several authorities (Levinson-Rose and Menges 1981; Rotem and Glasman 1977) think they are valuable, especially in providing feedback to instructors on their styles and methods. A few seriously question whether the information supplied results in changing faculty teaching habits. Some have questioned the validity of students' opinions on teaching, suggesting that they are not as precise as they seem and can be manipulated (Thielens 1977; Centra 1979). Furthermore, those teachers who most need to improve may not realize their weaknesses from the results of students' questionnaires. Students' ratings may provide only part of the picture, and even the most reliable evaluations give primarily a measure of students' impressions of instruction (Knapper 1978).

Others believe, however, that students are able to note the major strengths in their professors without being unduly influenced by external factors (Stumpf, Freedman, and Aquanno 1979). One study of the use of students' evaluations indicates that giving instructors the opportunity to view students' ratings at mid-semester led to improved ratings over the usual end-of-term evaluations (Price and Goldman 1981). Another study points to the increased usefulness of students' evaluations when the information is accompanied by consultation with a more experienced teacher who is able to supply encouragement and suggestions for improvement. Furthermore, the utility of students' evaluations may vary depending upon the instructor's ability and experience. For those who are poor teachers, "improvement involves diagnosis and elimination of serious weaknesses," while for good or excellent teachers, "improvement may involve developing clearer conceptualizations of teaching . . . or refining existing skills" (McKeachie et al. 1980, p. 122).

A variation of the usual type of evaluation by students has been developed at the University of Washington. Small Group Instructional Diagnosis was created to combine consultation with students' ratings. At mid-term, students address a number of questions raised by a facilitator, who later provides feedback to the instructor of the course. Scheduling the informal evaluation sessions in the middle of the term provides time for improving teaching skills before the course is concluded. It is believed that allowing sufficient time for change to occur increases students' commitment to the process of improving instruction (Redmond and Clark 1982).

Most experts agree that when faculty use students' ratings for self-improvement, a sufficient number of students should be involved, ratings should be free of bias, and an overall assessment rather than specific items should be emphasized (Centra 1979).

The evaluation of a faculty member's performance by peers can encourage better teaching. Some colleges use an evaluation system service, such as the Kansas State University Center for Faculty Evaluation and Development (Perlberg 1979). No one faculty evaluation system is best. For any evaluation scheme to work, there must be strong administrative support, extensive faculty involvement, experts in the institution to help develop or revise the system, and a general acceptance of the need for improvement (O'Connell and Smart 1979).

The Relationship between Teaching and Research

Authorities disagree about the relationship between research and teaching, the relative weight given each in decisions about promotion and tenure, and whether scholarly experts are the best teachers. One study of department heads shows that while the research universities emphasize research and scholarship, the comprehensive colleges and universities and those that grant doctoral degrees rank teaching first, followed by research. Some doubt exists, however, as to department heads' conviction about the importance of teaching (Centra 1977a).

One extreme point of view is that it is not possible for an outstanding teacher to be an outstanding researcher (Apps 1981). A more moderate position is that research and teaching are not necessarily complementary (Seldin 1980) or necessarily in conflict (McKeachie 1978). The results of research on this question are ambiguous. One problem in looking for a relationship is that effective teaching is broadly distributed, while research productivity appears to be more narrowly distributed (Altbach and Slaughter 1980). A recent study at Franklin and Marshall College corroborates other studies at larger institutions, indicating only a slight relationship between research and teaching performance. While the study reveals that faculty members who are active researchers tend to be somewhat better teachers, the relationship is not a strong one (Michalak and Friedrich 1981).

Sherman (1977) poses a different approach to the question, attacking the traditional assumption that students must be taught by experts, the more expert the better. He believes that the successful employment of student proctors, especially in PSI courses, indicates that qualities other than extensive knowledge of a particular subject are more important in ensuring high quality teaching. This argument reinforces the views of others who maintain that instructors should be viewed more as facilitators than as authoritative experts who know all the answers: According to this view, less direction and structure are needed in a course the older and more mature the students; what the profession requires is a philosophical shift in the attitudes of teachers in general (Weathersby and Tarule 1980).

Especially in universities, research is accorded a much higher status than is teaching. Many faculty members and administrators, and to some extent the public, value scholarship more highly than teaching. Research scholars are viewed as creative explorers, discovering new information, developing new interpretations, opening new frontiers. Teachers, on the other hand, are considered by some as retailers of information, standing on a lower rung of the academic status ladder. Experts point out that the more faculty and administrators divide the two activities, the more difficult it is to make clear their interdependence. According to Lorman Ratner, "A good teacher must continually test ideas on peers as well as on students. . . .Research is important to teaching for a number of reasons, but perhaps the most important is to keep reminding the faculty that the teacher must remain always one who also learns" (Guskin 1981, p. 9).

Other Considerations

Some authorities emphasize the fact that just thinking about improving teaching is not enough. A significant number of excellent ideas fail because their proposers are not practical in pursuing their implementation. Educational innovation thus becomes a political problem in that the innovator must get others involved early in planning (Licklider 1981).

Frequently progress is made by slow and steady steps with support provided to "the individual professionals in whose hands the quality of higher learning ultimately lies." Instructional improvement cannot be

forced "by formal policy and personnel review" but must result from the willing commitment and involvement of instructors (Lindquist 1979, pp. vi, 22).

With disagreement among experts on how to improve instruction, it is understandable that there would be little consensus on the prospects for raising the quality of teaching. At one extreme are the views that "a number of currently popular theories of instruction do not appear to have much relevance for most professors" and that "new and innovative styles of teaching have not established themselves" (Mayhew 1979, pp. 213, 221). As one critic states, "Silence and passivity drift like fog through the classrooms and hallways of colleges" (Kraft 1978, p. 41).

At the other extreme are the optimistic notions that the real concern should be not with instruction but with learning and that the challenge that faculty members can meet is to create the environment and facilitate those experiences that enable learning to take place (Davies 1981, p. v). According to this view, the success of teaching is ultimately determined "by what the student learns, not by what the teacher does or insists that the students do" (Dressel 1980, p. 113).

Between the extremes of optimism and pessimism is the point of view that there is no best way to improve instruction, and no one best decision to be made about faculty development, responding to students' evaluations, or rewarding good teaching. "At the heart of the matter is the question of whether the traditional roles of the classroom teacher and the campus will change in response to an emerging generation of learners and learning needs which are neither sequential, predictable, nor orderly in the manner to which educators have become accustomed" (Heermann, Enders, and Wine 1980, p. 9).

Those desiring to improve teaching should develop sound goals with respect to their students and themselves, determine the teaching methods that will best help meet those goals, determine the skills and behaviors that are consistent with those teaching methods, decide how those skills can be developed, and attend appropriate workshops and seminars to improve those skills (Eble 1980). The advantage of this approach is that an individual can improve instruction in the most appropriate way for him or her.

To be really effective, therefore, a program to improve instruction must be tackled systematically and coherently. Once the administration shows strong support, the faculty accept their need to improve, and the process of reform begins, instruction can be upgraded throughout the institution. Improving instruction should not be an isolated activity left to a few committed individuals. It must be a central concern of a sizable segment of a college or university community, receive sufficient, sustained support, and be accorded high priority by faculty members.

The Relevance of Faculty Attitudes

Faculty members' attitudes are important in determining the prospects for improved instruction. No matter how effective a particular strategy appears to be, the participating faculty must have a positive attitude about it if it is to succeed. Faculty members' attitudes are relevant in terms of several considerations: the attitudes they hold about themselves, about teaching in general, about students, about their institution, about their discipline and the academic profession, and about change in general.

It is difficult to generalize about several hundred thousand faculty members in a wide variety of disciplines, and most writers are careful not to make simplistic statements. Nevertheless, authorities cite several generalizations that seem valid in describing the profession at large. Although instructors may be specialists in their field, few have been trained in teaching, and even fewer have been introduced to instructional technology (Hoover 1980).

Many faculty members view their classroom as their own domain. They translate the idea of academic freedom into the right to do what they want in their own courses. They view evaluation of their teaching performance as a threat to their autonomy rather than as a way to improve professional performance. They are more receptive to advice from more experienced professors than from administrators, outsiders, or experts in educational psychology (Cohen and Brawer 1977; Gaff 1978).

Although college and university instructors are generally more liberal than the rest of the population on political, economic, and social issues, they tend to be conservative in matters of educational theory. They generally resist proposals for change in the curriculum, in teaching methods, and in their role in the academic institution (Mayhew 1979). According to one study, approximately 90 percent of the faculty surveyed at 24 colleges and universities judged themselves to be above average or superior teachers (Chait and Gueths 1981). Given such a strong sense of superiority and, perhaps, self-satisfaction, it is understandable why resistance to change should be so great.

Attitudes toward Teaching

Most authorities assert that university professors are generally more oriented toward research and publication than toward teaching. Teaching appears to be less related to the university professor's personal, professional, and intellectual interests. According to this view, "professors attribute little importance to the removal of discrepancies in the teaching domain" (Rotem and Glasman 1977, p. 80). Faculty in two-year colleges, on the other hand, are interested primarily in teaching. That does not mean, however, that they are automatically open to change. "Many instructors still see their own presence as the most important thing they can offer to the students; consequently, they resist automated teaching devices" (Cohen and Brawer 1977, p. 41).

The generally favorable attitude that faculty members express toward research and publication is curious in the light of their activity in this area. In the 1977 Ladd-Lipset survey of faculty members, 58 percent of

the professors had not published a book or monograph, and about 33 percent had never published a scholarly article. The bulk of scholarly publications comes from a small minority of academic professionals. In another Ladd-Lipset survey, approximately 75 percent of those responding expressed more interest in teaching than in research (Seldin 1980).

Attitudes toward innovation can be an inhibiting factor. A faculty member who changes his or her style or method of instruction, may encounter antagonism from colleagues who interpret such actions as an indirect criticism of them. Few instructors are able to successfully adopt teaching practices that are too different from those of their colleagues (Cohen and Brawer 1977).

Faculty members' attitudes toward the improvement of teaching understandably vary. At one extreme is the position that anyone with a doctoral degree can teach well enough for any college student (Mandell 1977) and that excellence in a particular specialization automatically brings with it the ability to teach that subject or else the capacity to learn teaching skills quickly through informal communication with colleagues (Knapper et al. 1977). At the other extreme is the position that instructors know what constitutes good teaching because they have worked hard to achieve it over the years and feel unwilling to consider newer methods or styles. Faculty members' resistance to some newer technological teaching aids, such as the computer, videotape, and audiotape, appears to be based on this premise (Mayhew 1979). Because many faculty members attended graduate school before the widespread use of computers, they prefer to delegate computer work to their assistants rather than to master the new technology themselves (Bailey 1978).

The influence of traditionalism is strong. "There is a reassuring simplicity in the old ways of teaching. They may not work well but they are a solid tradition to fall back on. . . .The irony of this order is not simply the static knowledge it produces, but also the alienation it provokes" (Shor 1980, p. 122). Eble expresses a kinder view, asserting that acceptance of a large role for personality in teaching "comes hard for a university faculty" (1980, p. 2).

Despite this overall resistance to change, however, faculty on some campuses are using recent advances in educational technology and are receptive to new ideas about effective teaching.

Attitudes toward Students

Faculty express ambivalent attitudes toward students. Most professors have formed opinions of students over a period of time, and most students probably fail to live up to their professors' expectations. Despite the many negative reactions faculty express about students, however, the majority appear to view their students as indeed capable of learning and as individuals whose interests deserve respect.

One limitation in faculty members' understanding students, however, is their general lack of extensive knowledge about students' aptitudes and personality traits. Many faculty lack a sophisticated understanding of the

psychological factors that bear on learning or of students' developmental needs (Mayhew 1979).

It is the increased influence of student evaluations that appears to trouble many faculty. Professors often resent student evaluations: "To demand that faculty transcend the fears and pressures which student ratings place upon them, particularly in these days of budgetary constraints and retrenchment, is simply naive. The process should be recognized for what it is: demeaning, arbitrary, and demoralizing" (Raskin and Plante 1979, p. 383).

Attitudes toward their Institutions

Making generalizations about faculty members' attitudes toward their institutions is risky. Some faculty may relate more to their discipline than to the institution where they teach. On the other hand, many are very much involved in their college or university community and identify closely with their own institution. They believe that they should have a major say in determining institutional policy. Many professors doubt that institutions need to expend effort to raise the quality of teaching. Given the necessary support and time, they feel capable of improving on their own (Stordahl 1981). Indeed, formal faculty development programs pose a threat to many faculty members (Hoyt and Howard 1978).

Attitudes toward Change

Faculty members' attitudes toward change are also difficult to categorize. The scholarly approach calls for an open mind and a willingness to alter conclusions and interpretations in the face of new evidence. However, faculty possess that resistance to change that characterizes most humans. Perhaps they are just more articulate in expressing that resistance.

Some writers wonder whether professors are sufficiently aware of the serious problems confronting higher education in the 1980s. "Do they realize the extent to which their professional existence, not to mention the opportunities for high-quality performance, is threatened? Faculty members use the words of scarcity, decline, and reallocation, but their hearts are not in it" (Miller 1979, p. 95). Many factors appear to be responsible for this situation: Earlier warnings of retrenchment were perhaps not realized; faculty members exhibit a certain degree of unworldliness; as a profession, they are said to be not attuned to practicalities.

A number of experts talk about the "increased sense of insecurity among many faculty members" because of intensifying problems with finances and enrollment (Guskin 1981, p. 2). Others maintain that with relatively few young people joining the profession, the average age of faculty is rising and that aging is accompanied by increased resistance to change (Mayhew 1979).

All these considerations are bound to affect college and university teaching and faculty members' attitudes toward the improvement of instruction. On the one hand, professors should feel motivated to improve to strengthen their own position in the academic marketplace. On the

other hand, circumstances are so serious and impending change looms as such a threat that some instructors may give up on efforts to improve because the future appears so bleak.

Recent Data on Methods of Instruction

The current literature is rich in information about the wide variety of instructional methods presently employed in colleges and universities. Cahn (1978), Centra (1977b), Eble (1980), Gaff (1978), Kozma, Belle, and Williams (1978), and Milton et al. (1978) provide useful summaries of methods from lecture to discussion, from seminar to simulation. Although at least 70 percent of undergraduate teaching still relies on the lecture method (Mandell 1977; Berquist and Phillips 1981), educators report an increased interest in new teaching techniques, especially those involving the individualization of instruction and those that respond to the more diverse student body served by higher education in the 1980s. Experts also report an increased interest in the personal aspects of learning, reflecting the extensive attention given to adult development.

Friedlander's report on teaching practices in the sciences reflects the combination of the traditional and the innovative. According to a 1977 national survey of science teachers in community colleges, 94 percent used the lecture method, 81 percent class discussions, 46 percent media, 25 percent students' verbal presentations, 10 percent field trips, and 10 percent simulation/games (Brawer 1980).

The different teaching methods currently used can be conceptualized in several models. One might classify them in terms of the learning or instructional theories on which they are based or on the basis of control by instructor or by student. They might be classified according to whether they focus on the cognitive or affective aspects of learning. The most useful division appears to be one used by Berquist and Phillips (1981), which organizes teaching methods into three major classifications— content-based, student-based, and interaction-based.

Those who focus primarily on subject matter, especially the behaviorist school, use content-based teaching methods. The student-based methods seek to respond to the learner's needs and interests, with the instructor less in control and the student playing a dominant role in identifying outcomes. The interaction-based methods reflect the assumption that learning occurs primarily through the give-and-take between teacher and student, student and student, or student and experience. These methods devote more attention to the instructional setting than to coverage of a particular amount of information (Berquist and Phillips 1981).

Although a modification of this model is employed in the following pages, it is important to bear in mind that many faculty members use a variety of teaching methods, depending upon circumstances. One might combine lecture and discussion on a regular basis or change the pace of a course by using educational technology or simulations where these devices are more effective than traditional methods. Each method reflects a basic assumption about the teaching/learning experience and the nature of human behavior, even though such assumptions may not always be clear to the instructor or student. One important variable in the following discussion is the extent to which the particular method allows for individual variations in students' ability and the extent to which it encourages the student's active involvement in the learning process.

Methods Emphasizing Content

Lecture. The lecture method can vary, depending on whether the lecturer is imparting information, clarifying an interpretation, or focusing on a problem. Although the lecture is the most widely used method of instruction, it is also the most frequently criticized. It is useful when the factual information imparted is not readily accessible or when the subject matter is particularly confusing to the student (Hoover 1980).

Successful lecturing requires certain skills and careful preparation. Lectures can provide a framework for students, motivate them, introduce a new field, simplify complex subjects, and provide a lot of material quickly. They can be modified to meet students' interests and level of ability. Indeed, experts maintain that the effective lecturer is the one "who knows his audience and can accommodate the message to the background and interests of the listeners" (Kozma, Belle, and Williams 1978, p. 154).

The lecture is a means of communication in which the instructor dominates. The student has little opportunity to influence the information presented or its rate of flow. Bostert identifies seven types of lecturers: the scholar immersed in his subject; the flashy, overwhelming personality; the phrase coiner; the brisk, confident, no-nonsense professional; the witty performer; the serious, obviously mature human being; the casual, meandering informal commentator" (Cahn 1978 pp. 16-17).

The heavy reliance on the lecture is probably not justified. Lecture notes can become stale quickly; presentations can become too mechanical. In one study, students tested after one week retained only 24 percent of the material given in lectures and only 17 percent after two weeks (Mayo and Gilliland 1979). The lecture method is criticized for being an inefficient way of transferring knowledge, for providing little feedback to either instructor or student, and for relying exclusively on oral communication (Berquist and Phillips 1981). To one expert, "It is not at all an effective way to teach students to think for themselves" (Lovell 1980 p. 130).

Experts maintain that many lectures are poor; few are outstanding. According to one authority, most faculty members are not capable "of more than fifteen or so lectures that are truly creative in organizing old material in a new way or presenting new material at the edge of the unknown" (Riesman 1980, p. 278). Several educators assert that lectures can be improved by carefully organizing the course material, by getting students to interact during the class hour, and by supplementing the lecture with discussion (Bowman 1979).

Rowe advocates improving lectures by adopting the "pausing principle." She declares that even good students experience mental lapses when a lecturer makes an unobserved shift in context, introduces an idea the student fails to grasp, or stimulates an independent chain of thought. She recommends a two-minute pause several times during a lecture to give students a chance to share notes and make comments (Brawer 1980).

McKeachie has a committee of students who read his lecture notes a week in advance and suggest revisions. He finds this device valuable in increasing the students' sense of participation in the course (1978).

The lesson. The lesson method, sometimes called the question-and-answer recitation, is part way between the lecture and the tutorial and independent study methods. It avoids the passivity of the lecture and requires the presentation of material so as to secure the optimum participation by students. It involves the planned use of questions followed by explanations and demonstrations.

Its advantages include flexibility, adaptability to groups of different sizes, and encouragement of students' active involvement. The lesson method is not useful in handling complex, detailed subject matter. It takes more time than a lecture and is not effective for very small or very large groups, but it has been called "one of the most versatile and useful of all instructional methods" (Davies 1981, p. 49).

Audiovisual instruction. "Audiovisual instruction" refers to the various technological aids designed to improve instruction, including film, slides, transparencies, videotape, television, videodisc, and other techniques. Their introduction was partly to accommodate larger classes than can be served by the traditional lecture, but a more compelling reason for their present use is to reach the nontraditional learner and to serve those who are housebound or handicapped. The primary value of audiovisual instruction is to supplement the traditional classroom techniques and to vary teaching methods. It appeals to students who prefer visual forms of communication.

More has been written about instructional television than any other audiovisual technique. Instructional television has not realized its full potential (Shorenstein 1978). Most educators believe that it is most effective when combined with other instructional techniques (Ackerman and Lipsitz 1977). Its impact is also increased when viewers are inspired to respond in some way to the instruction they are receiving and when the camera records scenes that stimulate learning (Kozma, Belle, and Williams 1978).

To become proficient in using instructional television, one must be sufficiently familiar with one's subject to recognize when production procedures interfere with the authenticity of one's teaching. Television instructors must have personalities strong enough to be comfortable with the medium and flexible enough to work with television technicians (Crow 1977). Television can force a lecturer to organize material better and to improve the clarity of his or her presentation.

Instructional television can free the instructor from repetitive instruction. It can save teaching time. Students can see and hear everything that is on camera. The quality of instruction can be uniform; the best lectures can be preserved and reused. It also has limitations, however—the initial cost, the lack of personal contact, insufficient feedback from and involvement of students in the learning process, and an exaggeration of personal idiosyncrasies (Herold 1976). For some institutions, the cost is a major deterrent to more extensive use (Wood and Wylie 1977).

Some institutions use instructional television on a large scale. The Dallas County Community College District, with four campuses, offers

college credit courses by public television to more than 10,000 students each year. The system at the State University of Nebraska takes advantage of a nine-station statewide public television network. Regional learning centers supply a direct link between the learner and the delivery system. Printed materials, audiotape cassettes, and instructional kits are mailed to students, and a WATS telephone line links the centers with students taking courses by television (Ackerman and Lipsitz 1977). The Miami-Dade Community College award-winning series, "The Art of Being Human," will be aired on public television in late 1982.

Instructional television has stimulated interinstitutional cooperation. The Association for Graduate Education and Research of North Texas (TAGER) is a consortium of 10 colleges and universities that share their resources by instructional television. Each TAGER institution has classrooms or studios from which it can originate programs for the network and classrooms where students can view the programs coming from other institutions (Crow 1977). The University of Quebec is using the HERMES satellite to supply lectures, seminars, and discussions by television with opportunities for students' questions and comments through an audio link. The same satellite has been used to link Carleton University in Ottawa with Stanford University in California (Knapper 1980). The Corporation for Public Broadcasting plans to allocate $5 million for the production of college-level courses and for demonstrations of new ways to use television in higher education. Shortly after its announcement, the Corporation received 227 proposals for consideration (*Chronicle of Higher Education*, December 9, 1981).

In the near future, videodiscs will compete favorably with other technological aids. They may completely replace motion pictures in college classrooms (Ackerman and Lipsitz 1977). The videodisc, which looks like a phonograph record, is a remarkable development. With some 18,000 tracks per radial inch, the videodisc creates a new dimension in teaching and learning. Its major advantages over television are that the viewer can select the time to watch a lesson and can control the disc by stopping at a single frame, slowing the motion, reversing it, or speeding it up. Groups demonstrating its usefulness in a variety of disciplines include the University of Nebraska videodisc design/production group, the University of Utah/WICAT group, and the Utah State University group. Videodiscs dramatically lower the costs of reproduction compared with film and videocassettes. Experts claim that "the relative cost advantage of videodiscs is very likely to increase during the coming decade. . . . [V]ideodisc may be the only medium we can afford by the end of the decade" (Schneider and Bennion 1981, p. 57).

Properly developed, audiovisual aids can accelerate reform in instruction.

Computer instruction. The computer has many applications for instruction. It is used for testing and scoring, practice and drills, tutorial programs, simulations and games, problem solving, and conferencing. The

computer can supplement and enrich the content of practically every course (Bailey 1978; Kozma, Belle, and Williams 1978). Nearly 30 percent of undergraduate juniors and seniors currently take computer courses (Boyer and Levine 1981).

Computers can be used in teaching in two ways—computer-assisted instruction (CAI) and computer-managed instruction (CMI). In CAI, a student sits at a computer terminal in continuous dialogue with the computer. The student makes entries in response to instructions, and the computer is programmed to vary subsequent instructions in accordance with these inputs. In CMI, the computer can handle up to 200 students at each terminal, because most of the instruction is done away from the computer. The computer gives individualized instructions, and the student completes the work off-line. The computer subsequently evaluates the learning and diagnoses weak areas, prescribing further work if necessary (Mayo and Gilliland 1979). CMI can diagnose and store information about students, assign appropriate study methods, continuously conduct assessments, and supply faculty with a wealth of data on students' performance. Miami-Dade Community College uses CMI extensively in its Response System with Variable Prescriptions (Cross 1976).

The PLATO system (Programmed Logic for Automated Teaching Operation) is the best known of the computer-assisted instructional systems. Housed at the University of Illinois, PLATO is a computer facility simultaneously serving nearly 1,000 remote users of terminals with responses in fractions of a second. PLATO operates through a network with widely distributed terminals linked by telephone lines. The TICCIT system (Time-shared Interactive Computer-Controlled Information Television) combines conventional television, cable technology, and microcomputers. It is designed to operate with terminals in a learning resource center and supports local instructional computing facilities. One TICCIT system serves up to 128 terminals (Gage 1976; Kulik, Kulik, and Cohen 1980).

Evaluations of the PLATO and TICCIT systems yield contradictory results. It is difficult to obtain accurate figures of the acceptance of computer instruction in regular courses. An Educational Testing Service study of both systems revealed that students and faculty reacted favorably to the PLATO system but that its use had no significant impact on student achievement. The evaluation of TICCIT revealed an improvement in student achievement, but students in TICCIT classes were more likely to drop out than those in conventionally taught classes (Murphy and Appel 1977; Kulik, Kulik, and Cohen 1980). Neither system has yet reached its full potential.

Computer instructional systems save substantial amounts of student time. Students learn as much when using computer instructional systems as they do through traditional teaching methods. Institutions spend widely different amounts on computer instruction, ranging from $29 per student at small colleges to $130 per student at large universities (Hamblen and Landis 1980). Computer simulation is especially valuable for students because it allows them to design and run a number of experiments in a

short time. The availability of computers also makes possible independent research projects (Benedict and Butts 1981).

Widespread acceptance of microcomputers, which are complete systems operating in a self-contained unit, is predicted. Microcomputers are already popular in computer science, engineering, and physics courses. According to a 1979 study, at some institutions the amount of instruction by microcomputers had already exceeded that provided to students by centralized computers. It is claimed that microcomputers will have great impact, as a tool for students' learning and on the role of the professor. "The advantage which the professor holds over the student in terms of knowledge and skills . . . will be reduced. Students will access more information directly than has been possible with book formats" (Zinn 1980, p. 122). Between 1978 and 1980, more than 100,000 microcomputers were sold. According to one estimate, in the very near future the number of microcomputers in use will be in the millions, and a large proportion of institutions will be using personal computers in their educational programs (Lewis and Tagg 1980).

For some, computers seem to pose a threat, but to others they open new vistas of potential for extending and improving instruction. According to a view that is becoming more widely accepted, "The increasing technological sophistication of our society requires that people learn more complicated subject material and skills and perform those skills at higher standards of performance" (O'Neil 1981, p. xi).

Audio-tutorial instruction. The audio-tutorial system, founded by S. N. Postlethwait at Purdue University, is a multifaceted, multimedia approach by which the student seeks to meet course objectives by following instructions tape recorded by the professor. Students proceed at their own pace. They follow the instructions on the tape, stopping when necessary to read, view films, conduct experiments, or consult with the instructor. They are able to bypass those portions of the subject they already know. The audio-tutorial system combines tape with printed materials and uses a study-laboratory with a faculty member readily available when needed for consultation. The original audio-tutorial program combined independent study with a general assembly session and a small assembly session (Milton et al. 1978).

The major research done on audio-tutorial instruction reveals that it "has been at least as effective as traditional teaching in stimulating student achievement, and in many cases it can lead to significant increases in student learning" (Kulik and Jaksa 1977, p. 17).

Audio-tutorial instruction is especially popular in the sciences. According to some studies, students learn faster under this system than under the lecture method, and students seem to prefer it to conventional teaching methods. One disadvantage is the expense involved in setting up and maintaining the system. Some faculty members believe it is more challenging to develop an audio-tutorial system than to prepare a more conventional lecture-laboratory sequence. Another disadvantage is that, because

it is self-paced, some students procrastinate in meeting obligations for the course. The major responsibility for learning rests with the student (Russell 1978).

Personalized system of instruction. The personalized system of instruction, or the Keller Plan as it is popularly called, has been described as "the most revolutionary approach to college teaching in the past fifty years" (Hoover 1980, p. 53). It is a system that allows the student to learn material, and to be tested on it, at his or her own speed. PSI has five major characteristics: It emphasizes the written word for the most effective communication between instructor and student. It requires a student's mastery of one unit before going to the next. It permits students to pace themselves, proceeding through a course as quickly or as slowly as they wish. Lectures and demonstrations, which are normally voluntary, are used to increase students' motivation rather than as a means for conveying information. Superior students are used as proctors to assist in the course (Sherman and Ruskin 1978). As J. Gilmour Sherman points out, PSI is a method "for implementing the philosophy of individualized instruction. It shifts the emphasis of education to a goal of teaching for accomplishment from that of merely selecting for achievement" (Bijou and Ruiz 1981, p. 282).

Advantages of PSI include allowing students to progress at their own pace, requiring them to accept responsibility for their own learning, focusing on mastery learning rather than on formal instruction, and providing systematic feedback to students on their progress. A PSI instr can devote his or her attention to those students who need it mos advantages include the fact that the system works less well for unmo vated students and for those who need constant supervision, requires considerable preparation by faculty to initiate, offers a lonely type of educational experience for some learners, and is incompatible with the scheduling and crediting procedures on some campuses (Davies 1981; Berquist and Phillips 1981). Some experts believe the greatest problem for faculty is the adjustment in their traditional role. "They must become course designers and course managers rather than performers. They must forego the immediate gratification of lecturing for the delayed gratification of improved student performance at the end of the course" (Milton et al. 1978, p. 162).

Initially PSI courses were taught in psychology. Now they are found in practically every field. The number of articles on PSI as a teaching method now exceeds 1,000. The overwhelming majority of research studies point to its superiority over traditional teaching methods in terms of student achievements and satisfaction with course content. The most recent analysis of research studies reveals that PSI

> *generally produces superior student achievement, and higher student ratings in college courses, but does not affect course withdrawal or student study time in these courses. . . . PSI's superiority can be demonstrated in*

a variety of course settings with a number of different research designs (Kulik, Kulik, and Cohen 1979a, p. 307).

Mastery learning. Mastery learning is not a particular method of instruction but a concept that has far-reaching implications for all methods. It has been called "a revolutionary concept that lies at the heart of the new teaching strategies" (Cross 1976, p. 11). Mastery learning is based on the premise that all students should be allowed to learn at the same high level, regardless of the time required for them to do so. Mastery learning involves a flexible attitude toward the meaning of aptitudes and an optimistic view of the capacity of all students to learn if given sufficient time. A Mastery Learning Program was initiated at the City Colleges of Chicago to raise students' achievement levels and reduce students' attrition rates. According to research results, "Students in mastery classes scored higher on final examinations, attained higher course grades, and were less likely to withdraw than students taught by more traditional methods" (Guskey and Monsaas 1979, p. 263).

Methods Focusing on Students

Tutorial instruction. The strongest advantage of tutorial instruction is that it can be individualized education at its best. Although the objective of tutorial instruction is to assist a student to acquire specific knowledge and skills, the student must be actively involved in the decisions about the instruction for it to be successful. Tutorial instruction usually requires closely monitoring the student's progress. To be effective, the participating faculty member must modify his or her presentation and course content to meet the needs of the student. Tutorial instruction can be used for students of varying abilities. It appears to be especially helpful to those encountering problems in completing their coursework (Berquist and Phillips 1981).

Independent study. Independent study is best defined as "any academic work conducted on campus under the mentorship of a particular faculty member" (Riesman 1980, p. 72). When engaged in independent study, a student has maximum responsibility for planning and undertaking learning. A student usually selects a problem, solves it, and reports the results. Independent study usually involves the writing of a report or term paper and/or a research project. The faculty member serves as a facilitator and ultimately evaluator but provides little in the way of formal instruction. Independent study is used most frequently by students whose academic records suggest that they are capable of undertaking a project with little or no supervision.

Independent study has maintained its popularity with both faculty and students. It is estimated that 70 percent of educational institutions offer independent study in all academic departments, 90 percent in at least one-half of their departments. One of its strengths is its affirmation of such values as freedom of choice, individualism, and democratic participation (Boyd, Apps, and Associates 1980).

Although research results have not shown independent study to be significantly more effective than traditional methods of teaching, educators support it for its providing a means whereby students can take major responsibility for their own learning. Proponents defend it for giving students "increased capacity for generalization and transfer, a sense of the relevance of learning, and the ability to analyze, synthesize, and apply what is learned" (Kozma, Belle, and Williams 1978, p. 355).

Learning contracts. The learning contract is "an agreement between a faculty member and student to a series of learning objectives, activities, and assessments" (Wald 1978, p. 224). A learning contract can enable a student to learn in a way different from the rest of the class. The contract is fulfilled when a student can demonstrate that he or she has learned what the contract was designed to help the student learn (Esbensen 1978; Milton et al. 1978). Imaginative learning contracts are employed at the Universidad Boricua in New York (Smith and Bernstein 1979).

Experiential learning. Experiential learning takes place outside the classroom in the context of practical experience rather than through study alone. It is based on the assumption that students' understanding the relationship of occupations, work, meaningful activity, and scholarly pursuits is valuable. Experiential learning seeks to provide learners with the opportunity to develop competence in interpersonal skills as well as in classroom performance. It can occur in a variety of settings, allowing students to apply knowledge in actual situations, usually in connection with a well defined working assignment.

Authorities point to an increase in its acceptance. They assert that conducting or supervising experiential learning requires "skill, experience, and an understanding of behavioral dynamics" (Walter and Marks 1981, p. 278). The Cooperative Assessment of Experiential Learning project has been instrumental in encouraging the movement to extend academic credit for experiential learning experiences (Duley and Gordon 1977). This project, sponsored by the Council for the Advancement of Experiential Learning, has enabled more than 300 colleges and universities to review and validate assessment procedures for using and crediting experiential learning (Levine 1978).

Field study, one type of experiential learning, is popular because it supplies students with practical experience to supplement their academic coursework. Usually the student designates what is to be studied. Professors who supervise field study or internships become partners in learning. Students in the field must be more responsible for their own learning that when they are in a traditional classroom. "The learner participates in and is directly in touch with the realities that are studied" (Borzak 1981, p. 9).

The portfolio plan, in operation at Sinclair Community College, in Ohio, is another version of experiential learning. The student develops a portfolio in consultation with one or more faculty members. The document

gives evidence of learning in the form of transcripts, letters, and the student's projects. Portfolio classes begin as group sessions; individual conferences follow. The particular learning plan, which combines study with work experience in the community, is shaped to meet the individual's need. The portfolio plan is especially attractive to older adults (Bradley 1978; Heermann, Enders, and Wine 1980).

Student-generated courses. Student-generated courses include those initiated by students but led by faculty members, those initiated by professors but led by students, and those run exclusively by students. According to one survey of selected colleges and universities, 60 percent allow students to initiate new courses, and 28 percent permit them to conduct their own courses for academic credit (Grant and Riesman 1978).

Those who favor this practice see it as a way in which higher education can be more responsive to students' interests and needs. Those who criticize it express concern for standards and for the further erosion of instructors' roles. In any event, educators suggest that all student-oriented instructional methods require that a faculty member be "a competent juggler who can work simultaneously with individualized time, place, format, modes of instruction, modes of evaluation . . . and have access to a large pool of information about community educational resources" (Berquist and Phillips 1981, p. 96).

Methods Characterized by Interaction

Discussion. Discussion refers to a variety of teaching styles, all of which require a high degree of participation by students. Discussion is a creative, purposeful process through which an instructor engages students in learning by getting them to speak and listen in an orderly sequence so that relevant thinking can occur. In a good discussion, interaction is frequent and one contribution builds on another. Educators divide discussions into three types—leader-centered, leader-guided, and group-centered, in which there is no official leader (Hyman 1980).

Superior discussion requires careful preparation, a great degree of concentration, ability to improvise, and infinite patience. Of its many advantages, one of the most important is that the student becomes actively involved in learning. The information gained becomes more meaningful, because the student frequently must rephrase it in his or her own language. It is easier for a student to have a point clarified during a discussion than during a lecture. A student also has the opportunity to test an interpretation against that of the professor or of fellow students. Many consider group discussions "among the most rewarding of class activities for instructors and students alike" (Milton et al. 1978, p. 62).

An interesting example of a discussion method is guided design, which is a strategy that instructors use to teach the subject matter and develop in their students the decision-making skills needed to apply what has been learned to practical problems. Students work in groups of four to seven on open-ended problems. Each problem is broken into a sequence of de-

cision-making steps, and the instructor moves among groups. This approach has been successful at West Virginia University in reducing attrition and increasing students' learning and satisfaction with courses (Wales and Stager 1978).

Another example of the discussion method is the cooperative learning group, which is a permanent, relatively independent collection of eight to ten students. A faculty member, not a member of the group, sets goals for learning and acts as resource consultant. The students engage in discussion designed to "facilitate creativity, independence, and self-reliance" (Eble 1980, p. 38).

Some criticize the discussion method because less factual information can be conveyed than in more formal methods and because discussions can be unreliable in accomplishing objectives. It is the second most widely used teaching technique in higher education. One educator claims that discussions can be among our richest experiences (Miles 1981).

Seminar. The seminar, an instructional technique similar to discussion, appears to be most successful when the students involved are sufficiently advanced and knowledgeable to contribute substantively and to hold their own with the professor. A seminar provides an environment where faculty and students can discuss problems, ideas, and interpretations that do not easily lend themselves to solution or where an organized body of content does not exist.

Ideally, the seminar requires systematic contributions from students. It can be adapted to a wide variety of situations. It is important for professors leading seminars to avoid lecturing or dominating the deliberations. The ideal seminar teacher is a resource person who helps students learn how to learn (Hoover 1980).

Case study. A case study is the factual account of an experience centered in a problem confronted by a person, group, or organization. It describes a real situation that requires a decision or set of actions and involves the application of general concepts or principles to specific problems. Facts are presented about a particular problem and the issues identified, but the outcome or solution is not recorded. The reader is required to make an independent judgment based on the available facts, considering what decision might be made and what consequences might occur. The learner is involved at three levels: reading and reflecting upon the case itself, analyzing and discussing the case with a group, and subsequently reflecting upon the solutions or issues raised in the discussion. As Fisher points out, the case "appears to provide a dimension of realism so often lacking in the structured learning milieu" (Milton et al. 1978, p. 259).

Although the case study is generally thought of in connection with the study of law, it can be applied to a variety of disciplines. One appraisal of the case study method concludes that it is "in a sense a simulated experience. Rather than experiencing reality as it happens, the learner analyzes reports of reality" (Hoover 1980, p. 204).

Role playing. Role playing is called "a powerful learning strategy, guaranteed to motivate and animate most students and to confuse and make nervous many" (Frederick 1981, p. 113). Unlike the setting created in the case study method, role playing is an artificial situation. It is categorized in two ways: those where students or instructors retain their own personalities and roles but act as if they were in a different situation, and those where players take on the behavior patterns and roles of other people.

The role player attempts to adopt the identity of the person being represented and to understand that person's motivations. Role playing requires considerable empathy and imagination. It can be a motivating experience for students. Students assigned to represent a particular historical figure, for instance, must learn a lot about that person to make a credible representation.

One advantage of role playing is its potential for creating interesting and thought-provoking situations. It also encourages considerable interaction among students. Its greatest disadvantage is its artificiality (Kozma, Belle, and Williams 1978).

One professor who has used this method most successfully is John A. Rassias, professor of Romance languages and literature, whose Dartmouth Intensive Language Instruction Model turns the classroom into theater. The performing arts can be an integral part of teaching language. Rassias believes that going through students' emotions is the best way to reach them. He dramatizes many roles during a class period and stages scenes that captivate his students into learning a foreign language. The Exxon Educational Foundation has provided funds for helping colleges to adopt the Dartmouth method, and 20 institutions, including the College of William and Mary, Immaculata College, and Lenoir-Ryne College, have done so (Meeth 1978a).

Games and simulations. The popularity of games and simulations is rapidly increasing. In simulations, players take on roles representative of those in the world at large and then make decisions in response to the circumstances in which they find themselves. Simulations are structured models that imitate reality and are designed to teach specific concepts or enable learners to see the consequences of certain decisions. Games are not as tightly structured. They create an atmosphere in which everyone involved can be teaching and learning simultaneously. The game format is considered the most participatory method of teaching.

One advantage of simulation is its potential for creating a heightened interest and excitement in learning. Another is its novelty. Some students enjoy the challenge of simulations and games. They can be more entertaining than a lecture or a seminar. The learning occurs in discovering fairly quickly the consequences of one's actions or in being confronted with the costs or limits that are imposed upon some social system. More learning can occur if a critique can be prepared after the exercise is concluded.

The method also has disadvantages: Games can be simplistic and leave

the learner with an incomplete understanding of reality (Kozma, Belle, and Williams 1978). Evaluations of their value are inadequate. Although they have strong proponents, there has been little "systematic validated research study" (Taylor and Walford 1978, p. 72).

Horn and Cleaves' guide (1980) contains over 1,400 entries for simulations and games and 24 essays evaluating and comparing simulations in a variety of subject areas. Most educational simulations are in the social sciences. The success of a simulation depends upon a high degree of student cooperation.

Encounter group. The encounter group, or T-group, is experimental in approach, nonauthoritarian in atmosphere, and very personal in its impact on participants. Many educators view it as a form of therapy or as a radical means of raising consciousness with respect to oneself or others and are therefore suspicious of its effects. Carl Rogers is its most eloquent advocate; he defends its potential for helping society cope with the rapid rate of social change. The encounter group "inevitably generates a wide range of strong feelings and reactions" (Walter and Marks 1981, p. 186).

One of its major goals is the development of a more accurate or perceptive understanding and appreciation of others. Its use requires skilled, experienced leaders. It is not often employed in undergraduate courses, but acceptance of it appears to be growing. Few research studies of this method have been undertaken (Smith 1980).

Research on Improving Instruction

Systematic, definitive research on improving instruction, which lagged during the early 1970s, has become more extensive in the last five years. Researchers have flooded the pages of educational and psychological journals with their findings. Surveys of surveys have been published, and all the titles of research reports on methods of instruction and learning styles of students printed since 1977 would fill a volume.

The State of Current Research

Although it has improved considerably, many authorities are still critical of research on methods of instruction and skeptical of its findings. Some critics assert that many studies are methodologically flawed, fragmentary, uneven in quality, and difficult to interpret. Research reports frequently are isolated—limited to a local situation; they overemphasize quantification, and their applicability cannot be generalized. Many surveys conclude with a call for more research. Relatively few studies have covered more than a semester or a year. Many focus on introductory courses. Sampling is biased, and local circumstances appear to interfere with results (Bowen 1977; Menges and Levinson-Rose 1980; Cohen 1981; McKeachie 1978).

Much of the research has been called "misconceived, misdirected, trivial" (Soltis 1981, p. 255). More serious criticisms are that research studies are "more complex and multivariate, but often without a sound theoretical or research rationale" (Dill and Friedman 1979, p. 432). One evaluation of 500 research reports concludes, "There are so many variables that it is impossible to control all of them. . . .Even when experiments seem to be conducted successfully, the results apply only to certain groups of students" (Beard, Bligh, and Harding 1978, p. 100).

Research is faulted for dehumanizing teaching. As one expert expresses it, "Almost all research into teaching suffers by comparison with the vibrancy of the act itself, and suffers badly from isolating in order to analyze, for systematizing in order to simplify" (Eble 1980, p. 4).

A more devastating criticism points out that little direct connection exists between the research conducted and educational practice. Those who conduct research and those who make decisions about instruction work in different vineyards. It takes time for research results to be conveyed to the classroom teacher. Many consider false the assumption that research can solve educational problems. According to this view, "Educational research does not lead directly to improvement in educational practice" (Kerlinger 1977, p. 5).

Despite these criticisms, some significant research findings deserve to be more widely read (see, for example, Beard, Bligh, and Harding 1978; Gage 1978; Johnson and Ruskin 1977; Kulik and Jaksa 1977; Kulik, Kulik, and Cohen 1979a, 1979b, 1980). The *Journal of Higher Education*, the *Review of Higher Education*, *Research in Higher Education*, the *Journal of Educational Research*, and the *Journal of Personalized Instruction* regularly contain useful articles on current research findings.

The most significant development in the methodology of educational

research is meta-analysis, which applies statistical methods to the results from a large body of individual studies. Meta-analysts "use multivariate techniques to describe findings and relate characteristics of the studies and settings to outcomes (Kulik, Kulik, and Cohen 1979a, p. 308). According to Gene Glass, who proposed the method, meta-analysis is "nothing more than the attitude of data analysis applied to quantitative summaries of individual experiments. . . .It is a perspective that uses many techniques of measurement and statistical analysis (1981, p. 21). The advantage of meta-analysis is that it uses combined results from many studies and seeks to correct for the limitations inherent in individual inadequate research studies.

Examples of Recent Studies

Several studies on faculty teaching styles have yielded significant results. Research confirmed that faculty members with a student-centered orientation were perceived as more effective teachers than those with a subject matter orientation (South, Hill, and Morrison 1979). Another study of teaching styles revealed overwhelming student preference for professors who view themselves as teachers rather than as researchers or administrators (Tennyson, Boutwell, and Frey 1978). Another study, which confirmed the thesis that personality factors are important in superior teaching, reveals that androgynous teachers received higher evaluations from students than did masculine or feminine teachers (Bray and Howard 1980a).

Much of the significant research on the lecture method reveals that "the lecture is open to serious criticism if used as an all-purpose teaching method" (Gage 1976, p. 296). The lecture method fails to pay sufficient regard to individual differences among students. Students' ability to retain information received by lecture is disappointingly meager.

Research on the effectiveness of instructional technology shows mixed results. One survey of 59 evaluations of computer-based undergraduate teaching concludes that this method made small but significant contributions to the achievement of college students and affected positively students' attitudes. Research also reveals that computer-based instruction is efficient, accomplishing a task in about two-thirds the time required by conventional methods of teaching (Kulik, Kulik, and Cohen 1980). However, a survey of 500 published research reports on instructional television reveals that most studies indicate "no significant difference" when compared with other methods of teaching (Crow 1977, p. 328).

The most striking research results are those reported on the impact of the personalized system of instruction. PSI has generated, according to Sherman, "the largest body of coherent, systematic research in the literature of education" (Bijou and Ruiz 1981, p. 285). The majority of studies supply convincing evidence that PSI is more effective than traditional methods in a variety of disciplines when students' performance on examinations is the criterion. Studies also indicate that students' attitudes toward PSI are very favorable (Johnson and Ruskin 1977; Taveggia 1976; Kulik, Kulik, and Cohen 1979a).

Research on the validity of students' ratings of faculty performance has increased markedly. The literature on students' ratings is characterized as extensive, contradictory, and uneven in quality (Dowell and Neal 1982). The most widely accepted view is that "student ratings are highly valid as indices of achievement of attitudinal and motivational goals of education. They are reasonably valid as indices of achievement of cognitive goals" (McKeachie 1979, p. 390). The most extensive appraisal of the validity of students' ratings of instruction has been made by Peter Cohen (1981), who used the technique of meta-analysis to review a large number of individual studies.

Other analyses of students' ratings indicate that the student's major may influence ratings, that social science students are more critical than those in other disciplines, that students prefer teachers with a doctorate, and that the teaching method used influences students' ratings. The highest ratings are given to those who use the discussion method or self-paced materials (Alciatore and Alciatore 1979).

Research on students' learning styles is also on the rise. One study reveals that students do not necessarily possess consistent, individualized styles of learning (Laurillard 1979). Research on the interaction between aptitude and treatment, popular with some psychologists, has been more difficult to undertake than originally expected. The current conclusion is that "simple hypotheses about matching student abilities with appropriate treatments have proven difficult to substantiate" (McLeod and Adams 1980, p. 225).

Nevertheless, several studies confirm Witkin's theory that field-independent students perform better when allowed to work independently and field-dependent students learn more when they receive extra guidance from the instructor (McLeod et al. 1978). Results from another study support the view that the lecture method is probably superior for conforming students while individualized instruction is better for nonconformists (McKeachie 1980). Most studies support the notion that learning is more effective when the student is actively involved in the process (Smith 1977).

Possibilities for Future Research

The future can build on current research progress. Experts say that research should be more systematic, carefully formulated, and more sophisticated, that it should cover more institutions over longer periods of time, and that more interdisciplinary studies should be conducted (Walter and Marks 1981). Much more research will probably compare teachers' and students' aptitudes and cognitive styles. Research similar to that conducted by Andrews (1981) on the interaction of teaching format and students' styles of learning needs to be expanded. Surveys are also needed on the long-range effects of various efforts to individualize instruction and on the influence of instructional technology on students' attitudes and values. Further application and refinement of meta-analysis in research should result in more meaningful interpretations of many individual studies.

All the research results available, however, will be valueless unless those who teach are open to change and are willing to learn how their instruction might be improved. Research results must therefore be translated into language that is understandable by the majority of educators and the general public. Until that is done, research results are not likely to influence traditional teaching habits.

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The ERIC Clearinghouse on Higher Education abstracts and indexes the current literature on higher education for publication in the National Institute of Education's monthly *Resources in Education*. Readers who wish to order ERIC documents cited in the bibliography should write to the ERIC Document Reproduction Service, P.O. Box 190, Arlington, Virginia 22210. When ordering, please specify the ERIC number. Documents are available as noted in microfiche (MF) and paper copy (PC).

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