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AUTHOR Brophy, Jere E.
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ABSTRACT

This paper reviews educational theory and research on student learning gains (especially in basic skills in elementary grades) and on motivating students to value and engage willingly in academic tasks. Research on the link between teacher behavior and student learning and attitudes is addressed in the first section, followed by a section discussing resulting policy implications for providing basic skills instruction and an effective learning environment. Research topics discussed include: (1) teacher expectations and role definitions (2) importance of student time on task; (3) value of active instruction from a teacher; (4) need for flexible teacher behavior; and (5) feasibility of teacher-student matching. Limitations on applying this reseach are noted, particularly the use of approaches derived from classical learning theory and its basis in nonclassroom settings. The relevance and potential applications of recent research on student motivation is examined in the next section. Research topics considered are: need theory, reinforcement theory, relevance of education to the needs of students, attribution theory, and building intrinsic and continuing motivation in students. Recommendations which are made for teacher education in the final section would affect entry standards and accountability and preservice and inservice education programs. A list of references is appended. (FG)

Occasional Paper No. 51

FOSTERING STUDENT LEARNING AND MOTIVATION IN THE ELEMENTARY SCHOOL CLASSROOM

Jere E. Brophy

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This paper was prepared for an invitational conference on classroom learning and motivation, for which the author was asked to prepare a general position paper reviewing relevant research and drawing implications. Consequently, the paper is a wide-ranging review of theory and especially research on what is known about producing student learning gains (especially in basic skills in the elementary grades) and about motivating students to value and engage willingly in academic tasks. In addition, the author speculates at length about apparent implications of this material for teacher education and teaching practice.

FOSTERING STUDENT LEARNING AND MOTIVATION IN THE ELEMENTARY SCHOOL CLASSROOM[1]

Jere Brophy[2]

I have been asked to comment on the policy implications of recent educational research, and will do so, although this means going considerably beyond the actual findings of even the most relevant studies. My conclusions may differ from others' conclusions based on the same data in at least two ways.

First, I will make few if any one-to-one linkages between specific findings from individual studies and specific policy recommendations. Instead, I will base policy conclusions on what I see as commonalities cutting across large bodies of educational theory and research and constituting what I believe to be well-established facts.

Second, my personal biases and value systems become involved when inferences are drawn about the implications of information for educational policy. Science can *inform* policy decisions, but scientific findings do not translate into such decisions directly. We know, for example, that teaching practices that maximize student learning progress are often different from teaching practices

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[1]This paper was presented at the Summer Institute on Learning and Motivation in the Classroom, June 8 - 26, 1981, University of Michigan, and is included in a subsequent volume containing the major presentations made during the Institute. Parts of the paper were included in Recent Research on Teaching (Occasional Paper No. 40) Institute for Research on Teaching, 1980. The author wishes to thank Linda Anderson, Sharon Feiman-Nemser, Tom Good, Susan Melnick and Mary Rohrkemper for their comments on earlier drafts, and June Smith for her assistance in manuscript preparation.

[2]Jere Brophy is co-director of the Institute for Research on Teaching, coordinator of the Classroom Strategy Study, and professor of Teacher Education and of Counseling, Educational Psychology, and Special Education.

that maximize positive student attitudes toward the teacher. Consideration of other possible objectives, such as promoting moral development or good group relationships, introduces further complexities. Educational policy decisions involve accepting trade-offs in order to make the most progress toward the goals that policy makers identify as most important; making maximal progress toward all relevant goals is out of the question.

In view of this role of personal biases, beliefs, and values in influencing attempts to discuss educational policy, I will begin by identifying some factors that influence my stance (undoubtedly, there are additional factors of which I am unaware). First, I am trained as a developmental and clinical psychologist. I am interested primarily in how individual teachers or students construe and cope with their roles in the classroom. This orients me toward the classroom rather than the school or larger units of analysis, and toward the teacher's interactions with the class, especially with individual students. I am concerned primarily about elementary school, especially the early grades. Most children in the early grades are still in what Piaget calls the pre-operational period of cognitive development. Their knowledge about themselves and about the physical world remains poorly integrated and riddled with misconceptions, and their developing concrete operations are not yet functioning efficiently. I believe that these and other characteristics of primary-grade students make them qualitatively different from older students who have become operational in their thinking, and call for qualitatively different content and methods of instruction. In general, I believe that essentially the

same principles for effective teaching and learning apply across levels of schooling ranging from third or fourth grade through graduate school, but that many of these principles are inappropriate at the early grades. Many of my criticisms of existing educational practices do not so much involve outright rejection of these practices, as the acknowledgement that they are successful in some contexts but unsuccessful when generalized inappropriately to other contexts (particularly other grade levels).

Although I am interested in how *context* influences what constitutes appropriate teacher behavior, I will concentrate on the traditional public school setting in which individual teachers work with classes of 20-40 students at a given grade level. This arrangement works better than it is given credit for, although it, clearly, is neither necessary nor ideal. However, economic realities make tutoring or drastically smaller class sizes unfeasible. Furthermore, although educational practices continue to evolve, there is no reason to believe that traditional practices will change drastically in the foreseeable future. Recent experiences with various innovations, fads, and "improvements" indicate that teachers are not going to be replaced by computers, audiovisual gadgets, or individualized materials, and only relatively minor variations on the pattern of age-graded classes of 20-40 students are likely to endure. It is unrealistic to develop educational policy recommendations that involve eliminating the existing system and replacing it with an entirely new one. To be feasible, any such recommendations must be confined to modest tinkering with the existing system. No doubt, many readers will find this notion depressing, but I do not. In fact, I believe that relatively modest tinkering

with the existing system can produce noteworthy improvements.

Finally, I am concerned about the average teacher working in a typical school with typical students during everyday activities. I find it discouraging that so many schemes for improving schooling involve either unfeasible changes in school organization, finance, or governance, or prohibitively expensive materials and equipment. Furthermore, most of the rest seem to concentrate on the unusual: field trips, visits from outside resource people, pull-out programs for the gifted or learning disabled, special this, special that. I think we need much more attention to what is still the bread and butter of schooling: instruction in academic content and supervised practice of basic skills.

Teacher Behavior and Student Learning

In recent years, a great deal of educational research has been conducted that links teaching processes to their outcomes (student learning and attitudes). Several recent reviews of the major findings of this work are available elsewhere (Brophy, 1979a, Note 1; Good, Note 2; Medley, 197 ; Peterson & Walberg, 1979; Rosenshine, 1979), as are methodological commentaries (Berliner, 1977; Brophy, 1979b; Doyle, 1977). Consequently, I will discuss the major findings of these studies only briefly and concentrate on their potential policy implications.

The 1970's were a decade of great excitement and progress in research on teaching. For the first time, researchers concentrated on the individual teacher as the unit of analysis (rather than masking individual teacher effects by aggregating data from all teachers working at a given school or using a given curriculum). More specifically, they collected data based on sustained observation of teacher behavior (rather than pencil and paper measurement of teachers' status characteristics,

attitudes, or personalities). They also began to focus more on inservice rather than preservice teachers, which allowed them to study teaching under more naturalistic conditions, and to compare groups who had established contrasting "track records" of effectiveness as defined by relative success in producing student learning gains on standardized tests. Comparability of data from different teachers was enhanced by exercising control over the contexts within which instruction was to be observed (grade level, subject matter, student status characteristics, time of year) and/or by observing teachers often and long enough to build up a reliable sample of their teaching behavior. Sophisticated, multivariate classroom observation systems were introduced that combined high inference ratings with low inference coding of specific behaviors, allowed for separate coding and analysis of behavior that occurred in separate contexts, and expressed classroom process measures not merely as frequencies per unit of time but as percentages of the total number of times that the behavior in question might have been observed or expected. These and other methodological improvements (c.f. Brophy, 1979b), used initially in several correlational studies (Brophy & Evertson, 1976; Evertson, Anderson, Anderson, & Brophy, 1980; Good & Grouws, 1977; McDonald & Elias, 1976; Soar & Soar, 1972; Stallings & Kaskowitz, Note 3; Tikunoff, Berliner, & Rist, Note 4) and later in experimental studies (Anderson, Evertson, & Brophy, 1979; Good & Grouws, Note 5; Program on Teaching Effectiveness, Note 6; Stallings, Cory, Fairweather, & Needels, Note 7; Stallings, Needels, & Stayrook, Note 8) have yielded a reasonably coherent body of data linking specific teacher characteristics and behaviors to students' learning of basic skills. Let us consider a few of the major conclusions from this work.

Teachers Make a Difference

Common sense suggests that some teachers will teach more, or teach more effectively, than others, so that their students will learn more. Yet, in the late 1960's, writers like Stephens (1967) asserted that learning depended almost entirely on events occurring spontaneously within students, so that the identity and behavior of the teacher were almost irrelevant. Data from the Coleman report (Coleman, Campbell, Hobson, McPartland, Mood, Weinfield, & York, 1966) seemed to support this. However, 1970's research focusing on the teacher as the unit of analysis established that teachers differ in effectiveness in producing student learning gains. Correlations of class mean residual gain scores from one year to the next are not high, usually averaging about .30 (Acland, 1976; Veldman & Brophy, 1974). This indicates the need for more research on changes in class size and composition, cohort effects unique to specific classes, and teacher health and welfare factors that affect stability in teacher behavior and teacher effects. In any case, despite these factors, it is clear that some teachers are reliably more effective than others.

Teacher Expectations And Role Definitions Are Important

Students tend to learn more when their teachers believe that instructing students in the curriculum is basic to the teaching role, expect their students to learn, and act accordingly. These teachers make it their business to see that students master key objectives of the curriculum, reteaching or finding another way to teach if the first approach is not successful. They run business-like, task-oriented classrooms (Brophy & Evertson, 1976; Rosenshine, 1979).

Effective Teachers Keep Students Engaged at Meaningful Tasks

Effective teachers are successful in part because they not only allocate a lot of time for instruction but actually spend most of that time actively instructing the students or supervising their work on assignments. They minimize the time devoted to transitions and other purely procedural matters, and especially the time devoted to dealing with classroom disruptions. In part, they accomplish this by displaying signal continuity, with-itness, overlappingness, challenge and variety in assignments, and other principles of effective group organization and management defined by Kounin (1970). Much of this boils down to minimizing disruption and off-task behavior through prevention. Students are likely to remain attentive and engaged when their teacher presents an appropriate activity for them to focus on, keeps it moving at a good pace, and monitors their responsiveness.

Recent work by Evertson and Anderson (1979) shows that organizing the classroom to maximize student engagement in meaningful tasks involves a great deal of instruction in classroom procedures and routines, especially in the early grades. It may be necessary for the teacher to begin the year by giving detailed instructions (often supplemented by opportunities for practice and feedback) to teach students when and how to make smooth transitions between activities, sharpen pencils, obtain needed equipment, get help with an assignment, or check their work. Classrooms that seem to run automatically usually result from careful planning, preparation, and direct instruction in these procedures and routines at the beginning of the year, with periodic review as needed.

Task engagement is not enough by itself. Students must be engaged in *meaningful* tasks if they are going to learn efficiently. Although variety and a degree of challenge are important, the key variable seems

to be pacing: Students learn the most when they proceed rapidly but in very small steps. If they are consistently given work that is too difficult for them, they can be expected to give up, and eventually to become "motivation problems."

This is well known to educators as a general principle, of course, but recent research on teaching makes a contribution by showing that students require a *very* high success rate in order to progress efficiently. Theoretical sources vary on this point. The achievement motivation literature suggests that a 50% success rate is optimal for maximizing achievement motivation, at least for individuals who do not fear failure (Crawford, 1978), and this finding has sometimes been inappropriately generalized and transformed into the notion that classroom questions and assignments should be geared to a 50% success rate. Similarly, writers who stress the value of higher level or "thought" questions often imply that learning that is "too easy" is likely to be repetitive, boring, or pointless. On the other hand, mastery learning advocates usually demand at least 80% success on assignments and tasks, and programmed learning advocates expect to approach 100%. Classroom data support the latter position, indicating that teachers who program for 90-100% success rates on student assignments produce more learning than teachers who tolerate higher failure rates (Fisher, Berliner, Filby, Marliave, Cohen & Dishaw, 1980).

The key concept here probably is mastery to the point of overlearning. Basic skills are taught in hierarchically organized and sequenced strands, so that success at any given level usually requires application of concepts and skills mastered at earlier levels. Typically, students are not able to retain and apply concepts and skills unless they have been mastered to the point of overlearning, so it is vital to teach

to this level of mastery consistently if consistent success is to be reasonably expected. The high success rates seen in the classrooms of effective teachers exist not only because the teachers avoid challenging students with material that is too difficult, but also because they see that students practice new knowledge and skills sufficiently to attain the level of overlearning. Even so, they move through the curriculum at a brisk pace, because they keep students profitably engaged in academic activities most of the time.

Students Need Active Instruction from the Teacher

In general, students taught with structured curricula do better than those taught with more individualized or discovery learning approaches, and those who receive much of their instruction directly from the teacher do better than those expected to learn on their own or from one another (Bennett, 1976; Gage, 1978; Good, 1979; Rosenshine, 1976; Wright, 1975; Zimmerman & Jaffe, 1977; McDonald & Elias, 1976; Brophy & Evertson, 1976; Good & Grouws, 1977; Stallings, Cory, Fairweather, & Needels, Note 7; Stallings & Kaskowitz, Note 3). It is difficult to imagine how it could be otherwise, despite the appeal and occasional elegance of humanistic and discovery learning theories.

To learn independently, students must be able to read, understand, and follow directions, identify key concepts, and correct their own errors. Furthermore, they must be willing and able to sustain sufficient levels of concentration and effort. This combination of ability and motivation does not exist at all among students in the early elementary grades, and probably exists in only a minority of older students. In any case, students apparently learn basic skills most efficiently when systematically taught, monitored, and given feedback by a teacher.

Students in the early grades require a lot of one-to-one dyadic interaction with the teacher, who provides them opportunities for practice and feedback. For efficiency reasons, most of this dyadic interaction occurs within the small group setting, but it is dyadic interaction nevertheless. At these early grade levels, teachers who call on students to recite in a predetermined, patterned order during small group instruction tend to be more successful than teachers who call on students "randomly" (Brophy & Evertson, 1976; Anderson, Evertson, & Brophy, 1979). In part, this is because the pattern method provides structure to students who may need it and cuts down on distractions caused by students attempting to coax the teacher to call on them. Perhaps more importantly, this method automatically insures that all students participate regularly and roughly equally. Earlier research on the communication of teacher expectations to students (reviewed by Brophy and Good, 1974) showed that most teachers who use the "random" method do not actually call on students randomly. Instead, they tend to call on high achieving students more often than low achieving students (and to provide longer and higher quality response opportunities when they do call on them). Also, the more assertive students create more response opportunities for themselves than the shy or withdrawn students do. Calling on students in a predetermined, patterned order automatically reduces these discrepancies.

At higher grade levels, the need for dyadic interactions between the teacher and each individual student gives way to the need for more briskly paced lessons and activities in which the majority of the teachers' communications are directed to the group or class as a whole. Whole class presentations become the usual setting for introduction of new material, with small group activities being used more for remedial and

extra work with students who have difficulty keeping up. By about fourth grade, and increasingly thereafter, students typically do not need much individual interaction with the teacher. They are able to learn by paying attention to the teacher's presentations to the group as a whole (typically supplemented by interactions with a few individuals). In fact, at the higher grade levels, it may be counterproductive for teachers to interrupt large group activities for any length of time in order to deal with concerns specific to an individual student, because this may lead to loss of lesson momentum and problems of student inattention and disruption.

At any grade level, then, teachers must optimize their instruction so that they neither present too much too fast nor move too slowly with too much redundancy. The teacher effectiveness research of the 1970's makes it clear that teachers who accomplish this task successfully will produce more learning in their students, but it does not yield much information about how the task can be accomplished. How much new information should be presented in today's lesson? How much and what kind of practice or application opportunities will the class need? Who will need extra help, and what form should this help take? When will the class be ready to move on, and how will the teacher recognize when this point has been reached? These are among the questions that need to be addressed in the research of the 1980's, particularly in studies of teachers' planning, thinking, judgment, and decision making (c.f. Clark & Yinger, 1977; Shavelson, 1976; Brophy, Note 9).

Different Contexts Call for Different Teacher Behavior

A major contribution of the research of the 1970's was its attention to context factors that influence the appropriateness of particular

teacher behavior. "Context factors" subsume a broad range of variables that would include student individual differences and status characteristics (age, sex, race/ethnicity, social class, intelligence, cognitive style) subject matter, group structure (individual vs. small group vs. whole class) task structure (lecture, discussion, recitation, drill, seatwork assignment), instruction goals (introduce new material vs. apply new material vs. review vs. generalize to new situations; promote mastery of basic skills vs. promote interest), and even time of year (more attention to procedures and mechanics are required early in the year). Few of these context factors have been studied yet, and none has been investigated systematically. When investigators do study such context factors, however, they almost invariably report significant differences in what constitutes effective teaching in the different contexts studied (Brophy & Evertson, 1978).

Some of these context differences combine to form larger patterns, as in the relationship between student age/intelligence/achievement level and the degree to which the student is directly dependent on the teacher for learning. In general, to the extent that students are younger, less intelligent and/or less far along in mastering the key objectives of a given curriculum, teachers will need to: structure their learning experiences, give more detailed and redundant instructions and explanations; interact more individually and often with each student; elicit overt responses to questions and performance demands; provide individualized feedback; divide seatwork assignments into smaller segments or devise ways to provide more frequent monitoring and corrective feedback; and, in general, continually direct and supervise learning activities.

Older, brighter and more skilled students can assume more of the burden for managing their own learning, especially once they have made

the transition from learning the tool skills as ends in themselves to using the tool skills as means to learn other things. Several aspects of cognitive development associated with movement from Piaget's preoperational period into the period of concrete operations are also important here. In particular, the development of metaknowledge (awareness of, and ability to monitor, one's present knowledge and how it is affected by new input), metamemory (knowledge about memory, especially how to call up relevant information where needed and how to commit new information to memory efficiently), and related skills will enable students to begin to approach learning tasks more systematically and with more continuing awareness of what they are trying to accomplish. Improved memory and concentration lead to the ability to work independently longer and on a greater variety of assignments. Other cognitive developments, combined with mastery of subskills to overlearning, allow students to begin to be able to evaluate their work, to know whether or not they understand the task and how to go about it, and to check their answers and identify errors.

The fact that students *can* assume more responsibility for their own learning as they get older and more knowledgeable does not necessarily mean that they *should*, however. At least with regard to basic skill mastery, the data indicate that, within any particular grade level, students who get more active teaching from their teacher will learn more than students who get less such instruction. Thus, although fourth graders can work more independently than first graders, and eighth graders more so than fourth graders, active teaching by the teacher remains important at each grade. Even skilled adult learners will learn more efficiently when guided externally (Larkin & Reif, 1976; Tennyson, 1980).

A second major cluster of context dependent relationships links

student personality traits such as confidence-inhibition, assertiveness-shyness, and field independence-field dependence to the teaching style dimensions of demandingness-supportiveness and a businesslike, impersonal style versus an emphasis on warmth and personalized interactions. Students who are bright and confident, especially if they also tend toward a field-independent cognitive style, tend to prefer and to achieve more when taught by teachers who are oriented more toward subject matter than individuals, and who are intellectually stimulating but also demanding in their interactions with students (Witkin, Moore, Goodenough, & Cox, 1977). Such teachers challenge their students to stretch themselves intellectually and to put forth the effort required to do the best they can. Often they are sparing in their praise but detailed in their criticism, although both the praise and the criticism tend to be impersonal and concentrated on the quality of academic performance. By demanding the most from students who are capable and desirous of fulfilling these demands, such teachers tend to get the most from such students.

At the same time, however, they tend to terrorize or alienate other students. These include all students who lack (or think they lack) the ability to meet the teachers' high standards, but most especially those who are anxious, insecure, or field dependent in cognitive style. These students are frightened and discouraged by demands and criticism, but they respond well to support and encouragement, especially from teachers who get to know them personally and establish themselves as familiar and concerned helpers rather than distant authority figures. The teachers who are most successful with these students get top performance from them not by demanding it (with implied rejection or punishment for failure to deliver), but by fostering it gradually through praise,

encouragement, expressions of appreciation for effort, and shared pride and happiness for accomplishment, and so on. Such support and encouragement is important for anxious or insecure students of any kind in any setting, but especially so for students whose racial/ethnic group or social class membership makes them part of a minority group attending a school dominated by a majority from which they are (or feel) excluded (Brophy & Evertson, 1976; Kleinfeld, 1975; Peterson, 1977; Solomon & Kendall, 1979; St. John, 1971; Witkin, Moore, Goodenough, & x, 1977).

Teacher-Student Matching

One way to attempt to respond to these interactional relationships would be to match teaching styles to students' preferences. This is often feasible at the college level, where several instructors may teach the same course, and where student preferences have become developed to the point that some students will recognize and be able to act on them. It is seldom feasible at the elementary level, however. Furthermore, both logical considerations and empirical data suggest that such matching might not be in the long run best interests of the students, even where it is feasible (Brophy, 1978).

The logical problem here is that matching that caters to existing learning styles or preferences will reinforce those styles or preferences, and thus make the students even more extreme on those dimensions than they already are. In the case of students who are overly anxious or teacher-dependent, this is clearly not desirable. These students should get the support and encouragement they need, but ideally should be gradually weaned away from their dependence. They probably will be better off in the long run if they gradually learn to become more assertive, to make decisions and accept responsibility for them, and to advance their ideas

even when they may be risking failure or disapproval.

Although it is not as obvious, reinforcement of extremes of traits like assertiveness or field independence can be counterproductive, too. Individuals with little interest in or tolerance for the thoughts or feelings of their peers might become better rounded persons if they learned to pay more attention to social stimuli. In addition to these logical considerations, there are data to indicate that teaching students in the style to which they are accustomed or the style that they prefer does not necessarily lead to better achievement, even though it might lead to better attitudes (Dorsel, 1975; Peterson, 1977; Peterson & Janicki, 1979).

Thus, attempting to match students to teachers probably is neither feasible nor effective as a solution to the problems of optimizing education raised by data on interactions between learner characteristics and teacher behaviors. Instead, students probably will be better served in the long run if teachers are trained to recognize and respond appropriately to individuals' needs and preferences. Ideally, this would include not merely providing students with the treatment they seem to require (or at least respond well to) at the moment, but also weaning them away from narrow, rigid preferences toward a more flexible and differentiated ability to handle a broad variety of situations and people. Thus, students who need a lot of personalized interaction and support would get it, but even while providing it, the teacher would gradually wean them from such dependence and develop assertiveness, frustration tolerance, and self-assessment and reinforcement skills. Similarly, teachers who have been bringing along anxious or alienated students slowly could become more demanding as the students' tolerance for and ability to respond to challenge is improved.

Policy Implications

Policy implications were often implied in the above review of research, but in this section I will state these more formally and expand on them, focusing on successful instruction in basic skills. This is not my only concern: I also favor teacher attempts to promote general mental health in their students, to foster prosocial behavior and cooperative group relationships, to instill a love of learning, and in general, to pursue a variety of worthwhile affective and social objectives in addition to inculcating knowledge and skills. I do believe that instruction is central to the teacher's role, however, or at least should be, and my remarks reflect this belief.

Teaching Effectiveness Is Context Bound

There are few if any generic teaching competencies that apply in any and all teaching situations. (Failure to appreciate this has led to some misguided teacher-accountability schemes at the state level). Aspects of teaching that do seem truly generic tend to be fundamental principles such as "match the level of instruction to the abilities and needs of the learners," rather than specific behavioral prescriptions.

Many skills are important to do well *when* the skill itself is relevant. Clarity in giving explanations is an example. Whenever the teacher must explain something, it will be important to do so clearly (Land & Smith, 1979). However, in many teaching situations the key variables are not explanation abilities but abilities to conduct fast-paced drills or lead discussions. In these situations, clarity of explanation and other skills important for didactic teaching are inappropriate or irrelevant. Specification of what constitutes effective teaching must include attention to context variables such as grade level, subject matter,

instructional objectives, degree of familiarity of the content, and many others. Probably because of my training in developmental psychology, I have emphasized the context variable of student age/grade level (and within grade level, student intelligence/achievement level). As a general rule, older students can learn more efficiently on their own or from one another than can younger students, and within grade level, brighter or more advanced students can learn more efficiently by themselves or from one another than can slower students or students encountering subject matter for the first time. The latter students will need more direct instruction from the teacher, along with closer monitoring and more frequent feedback and structuring when they do begin to work on assignments on their own.

Young Students Should Not Be Expected To Learn Primarily On Their Own

Although I believe that these statements hold up in general, they apply especially to the early grades. Until about the third grade in high socioeconomic status schools and about fourth grade in low SES schools, few children have mastered tool skills to the point that they can apply them efficiently for learning from reading text and for understanding written directions for follow-up assignments. It is for this reason that so-called individualized instruction programs have not worked effectively, and in my view will *never* work effectively, in the early grades.

My objection here is not to the *concept* of individualized instruction, but to its operationalization in practice. In principle, the notion of individualized instruction is quite correct: Learners should be presented with materials, instruction, and assignments appropriate to their levels of skill development. When the learners are functional

readers who have developed learning-to-learn skills, the needed instruction can be built right into the materials in step-by-step fashion, complete with practice exercises, criterion-referenced tests, branching programs that route learners toward needed remediation sequences, and all the rest. This method will not work automatically or perfectly, because even bright and well-motivated students who are getting the right answers will develop incorrect concepts if left on their own too long (Erlwanger, 1975). It will work reasonably well in general, however, and very well when students are both highly motivated and able to get help when they need it.

All of this collapses, however, if learners are unable to learn efficiently by reading and working independently on assignments. They do not get the so-called instruction because they cannot read or understand it, and even the exercises become mostly meaningless because the learners are not aware of what they are doing or what they are supposed to get out of it. In practice, then, so-called "individualized instruction" in the early grades tends to mean little or no instruction at all, and much time is spent groping through bewildering assignments.

The problem is not confined to skills, either. There is also the matter of *learning set*. If we seriously expect children to learn independently by working through programmed materials (or, for that matter, to learn by discovery or through interaction with peers), we must assume not only that they can use tool skills efficiently, but also that they have sufficiently developed metacognitive and self-monitoring skills, mathemagenic or learning-to-learn skills, attention span and concentration skills, interest in learning, and (for most objectives) an orientation toward learning facts and concepts in addition to sensorimotor skills.

Few students in the early grades have this combination of traits and skills; this is why (given that one teacher must teach 25 or 30 students) the traditionally-used methods developed through trial and error seem quite appropriate: teacher structuring of learning objectives, active instruction by the teacher, emphasis on rote learning and practice of skills that must be mastered to overlearning, frequent elicitation of overt responses from and provision of feedback to each individual student (small group instruction is merely a mechanism to make this *individualized* instruction more feasible), reading aloud, and the rest. Granted, it is important to stimulate children's curiosity, to provide opportunities for creativity, and to stimulate them to think and speculate about new things, but we should not lose sight of the fact that active instruction and practice of basic skills to overlearning are essential. Knowledge and skills must first be mastered before they can be applied.

Teachers Should Be Active Instructors

Many educational critics and would-be reformers have suggested that teachers talk too much, that they spend too much time lecturing students and not enough time asking them questions and giving them opportunities to make contributions or interact with one another. I disagree with this on principle, because I believe that students usually will get more out of listening to the teacher than to one another. I will grant, however, that many teachers, especially at the high school and college levels, do not make sufficient use of discussion or other non-lecture forms of instruction when these would be appropriate or even preferable to lecture.

Be that as it may, I want to focus here on the notion that teachers spend most of their day lecturing to their students. This may have been

true 20 years ago and may even be true now in high school or college, but it is not generally true in the elementary grades. If anything, the opposite is more typical. My own classroom research in Texas and Michigan, as well as most of the comments I have heard from other classroom investigators, suggest that, along with difficulties in classroom management, the most generally observed failing of elementary school teachers is that they do *not* spend enough time actively instructing their students. By "actively instructing" the students, I meaning presenting information to the whole class or to small groups in the form of lectures, demonstrations, explanations, and the like (c.f. Good, 1979, Note 2, *re* the terms "active instruction" and "direct instruction"). These behaviors are what the average person associates with the term "teaching," but they are surprisingly infrequent in many of today's elementary school classrooms. Too many contemporary teachers spend a lot of time managing the classroom and distributing, monitoring, and correcting individual work assignments, but very little time teaching.

Teachers tell me that this is fallout from the emphasis in the 1960's and early 1970's on teacher-proof curricula and development of programmed and individualized learning packages that changed the teacher's role from instructor to instructional manager. Some have also claimed that the accountability press at the local level was such that one was not considered an effective teacher if he or she spent much time trying to instruct the students instead of administering criterion-referenced tests, using newly purchased instructional materials, and so on. In any case, whatever the reasons, I believe that many elementary teachers have been sidetracked from what traditionally was, and in my view still should be, their primary role as *instructor* to their students. In this regard, I

also believe that teacher education institutions should recognize these realities and return to their former emphasis on preparing teachers to instruct, rather than continuing to make student teachers feel guilty if they spend much time trying to do so.

Stress Individual Growth, Not Group Homogenization

We know that occupation, income, education, measured intelligence, and other factors all intercorrelate, so that *relative* differences between children widen as they develop. Proper concern about this has led to improved prenatal care and nutrition programs for the poor, projects Headstart and Follow-Through, and many other useful, and to some degree, effective programs. However, it also has led to some misguided goal setting, in particular, a tendency to stress reducing relative differences rather than optimizing individuals' development. This is seen most clearly in the writings of Ben Bloom and other master learning advocates, and of people who try to deny the reality of individual differences.

The fact is, however, that individual differences not only are quite real, but function such that they *should* cumulate over time. Part of what makes one person brighter than another is that the brighter person can learn more in a given unit of time (and furthermore, will probably require less repetition and practice to be able to retain this learning). What if these two people are both provided with optimal environments (in particular, optimal nurturance and intellectual stimulation through education)? It seems intuitively obvious to me that this will produce two results: 1) both individuals will develop intellectually to their genetically programmed limits; and 2) over time, the relative differences between the two individual will continue to

increase (because all along, the brighter individual will be learning more in a given unit of time than the other person will).

This implies to me that educators should concentrate on helping each individual develop to his or her intellectual potential, and not on minimizing the differences between individuals or groups. The latter can be done only by deliberately withholding stimulation or educational opportunities from brighter students who have already mastered what other students are still struggling with. Thus, within a mastery learning program (or any learning program) it is sensible to seek a reduction in the variance in scores only in a narrow sense (there should be reduced variance on scores indicating mastery of lower level objectives which everyone is expected to master). There should not, however, be reduced variance in a larger sense; students who master all of the objectives in a program (or a part of the program) should then go on to other things rather than spin their wheels waiting for other students to catch up. The criterion for judging the effectiveness of a teacher or program with a particular individual should be how far along that individual has moved from where he or she started, and not how that individual compares with other individuals.

Formal Operations Should Not Be Assumed

Widespread discussion of Piaget's four stages of intellectual development has left the impression that everyone possesses functioning formal operations by adolescence. This is not true. Formal operations remain undemonstrated in many individuals (and even in certain entire societies where there is no formal schooling). In a great many other individuals, formal operations can be shown to be present only in the most rudimentary and narrowly defined sense. Only a minority of people

develop efficiently functioning formal operations that can be used for conceptualization and problem solving in everyday life. Most of these are people who graduate from college and move into careers that provide continual stimulation and opportunity to exercise formal thought. Even among these people, formal operations tend to be evident primarily only in their areas of expertise. As Piaget himself remarked, he displayed formal operations in his research and writing on epistemology and developmental psychology, but he was strictly sensorimotor when he tried to diagnose or repair car trouble.

I mention this because I think that we in higher education (especially those involved in teacher education and curriculum development for elementary and secondary schooling) have unrealistically high estimates of the average person's (let alone the average child's) capacities for learning and understanding. Many of the math and science concepts that we tend to teach at a given grade level will not be truly mastered by a large proportion of the students, let alone mastered to the point that they can be applied. The same is probably true, although it is harder to see and demonstrate, with regard to abstract concepts in humanities and social studies. Even at the senior-high level, many students in even the best schools will be very concrete thinkers, and most students in other schools will be too. This has implications about what we can realistically teach, and what methods we ought to use in trying to do so.

There Are No Shortcuts to Higher-Level Objectives

Many educators, especially curriculum theorists, criticize teachers for frequently emphasizing low-level objectives and presumably slighting higher-level objectives. Many mathematics educators, for example, believing that calculators have rendered many traditional math skills

obsolete, would like to drop from the curriculum such things as computation of square root or multiplication and division problems that use numbers of greater than two digits. I think this is misguided.

First, the very term "low-level objectives" and its synonyms misleadingly suggest that such objectives are trivial and easily mastered. Neither is true. Data from the National Assessment of Educational Progress, from the Michigan state assessment, and from other such large scale evaluations indicate that vast numbers of individual students, and in many cases, the majority of the students in a given school, have not mastered even fundamental objectives in basic skill areas. I can understand the notion of reducing emphasis on teaching these skills if and when educators begin to teach them successfully, but this has not yet happened.

Furthermore, everything that educators know about learning of complex and hierarchically organized skills tells us that higher-level objectives will not be well comprehended, let alone mastered, until lower-level objectives are not only mastered but mastered to overlearning so that they can be combined and applied to the learning of more complex material. In short, higher-level knowledge assumes and requires lower-level knowledge as prerequisite, and application requires mastery and integration of lower-level facts and skills. This is easy to see in something like math, but the principle holds up everywhere else, too. Except for a very few minor mechanical or copying errors, performance must be perfect on low-level objectives if success on higher level objectives is to be reasonably expected.

Pacing Should Be Brisk But Realistic

A related point is that successful teachers move students along at a rapid pace, but move in very small steps from one objective to the next. Because much of the curriculum in the early years is cumulative, and because of the factors mentioned in the previous section about the need for true mastery of lower-level objectives before high-level objectives can be mastered, it is essential to avoid trying to move students too quickly through material (without sufficient time for practice to over-learning), or trying to move them in steps that are too large for efficient progress.

Most of us in education are familiar with achievement motivation theory and research suggesting that tasks of a 50% difficulty level maximize motivation. This may be true for individuals high in success seeking and low in fear of failure who are operating in play settings. However, school is a work setting where failure has serious social and personal consequences, and where many students are much more concerned about avoiding failure than about seeking success.

Even for students oriented toward success, excessive demands become counterproductive. Recent work by Harter (1978) indicates that in school settings, the key variable affecting student motivation is not the degree of success that can be achieved with sustained maximal effort, but the degree that can be achieved with what the student sees as *reasonable* effort.

Furthermore, school tasks involve cognitive learning, in which a 50% failure rate not only does not promote motivation, but is discouraging to the point of extinguishing further effort for most students. Learning involves cognitive strain, and the level of strain associated

with tasks on which only a 50% success rate can be achieved is such as to make efficient learning impossible for many students and extremely difficult for the rest.

Observational studies of teaching effectiveness suggest that effective teachers ask questions at a level that allows about 75% to be answered correctly (perhaps 70% for high ability students, and 80% or more for low ability students). In seatwork assignments on which students are going to work independently, success rates at 90 or 95% are more appropriate. These considerations indicate that teachers should move students through curricula briskly but in small steps, with emphasis on continual mastery.

The Need for Thoroughness in Probing the Limits of Learning

Early in the game, most teachers vastly overestimate the degree to which their students understand and remember what they say. In part, this is usually because the teaching has not been as good as it could be. However, even when the teacher does everything well, results are likely to be discouraging with many students (at least until the teacher develops more realistic expectations). This overestimate of student learning is not accidental; it results from systematic student behavior. Out of some combination of a desire to please the teacher and a desire not to look bad in front of their peers, most students learn to give the appearance of paying attention and understanding, to cover their confusion, and to remain quiet when the teacher asks if there are any questions. Students often don't even realize when they need help, and when they do, they may be reluctant to seek out the teacher.

Furthermore, even when students do understand the teacher at the level of receptive learning, they often do not understand well enough

to process the information, make it their own, and be able to explain it in their own words. Thus, they can handle an objective recognition test with items worded almost exactly as the material was presented in the first place, but they will have difficulty with questions or assignments that require them to integrate, generalize, or apply the material.

The lesson here is that in addition to presenting information to students, it is important for teachers to get responses from them, particularly substantive responses that require them to integrate or operate on the material rather than merely regurgitate it. A knowledge of developmental psychology is important here, especially Piagetian insights into the nature of children's thinking. Unfortunately, education majors rarely get enough of the right kind of developmental psychology (c.f. Case, 1975, 1978) to help much in this regard.

Piaget and other developmental psychologists have shown that children's knowledge not only is limited by ignorance (lack of information), but is riddled with misinformation and misconceptions. Some of this is due to the limited or unusual experiences of individual children, but much of it is due to the fact that concrete experience is often misleading. The sun seems to move around a stationary earth. Except when the wind is blowing, air seems to be empty nothingness--a vacuum. When standing still, we feel voluntarily motionless on stationary ground--there is no sense that we are spinning at 1,000 miles per hour and held in place by a balance of powerful physical forces.

These and other shared but misleading experiences predispose us to misconception and confusion when confronted with some of the formal knowledge taught in school. Many "predispositions to misconception" are universal or at least very widely shared, so that familiarity with them

would help teachers to know what questions to ask or what points to stress in their instruction. The examples developed by Piagetian psychologists are mostly in science, but examples exist in all fields and are beginning to draw the attention of scientists concerned with curriculum and instruction in schools.

For example, the Journal of Mathematical Behavior, established in 1971, is devoted to study of the preconceptions and thinking processes used by students in apprehending mathematical problems. Many of the articles illustrate how students' preconceptions are often *misconceptions*, and how their thinking processes are often seemingly logical but misapplied or simply incorrect. Nor are these problems confined to young children. Matz (1980) includes the following in a list of 33 algebra errors commonly made by high school and college students

Evaluating 4X when X = 6 as 46 or 46X.

Evaluating XY when X = -3 and Y = -5 as -8.

Computing 2X divided by 2X to be 0.

Claiming one can't multiply by X because "you don't know what X is."

Other research has shown that such fundamental misconceptions of basic algebra are common even among professors (Lochhead, 1980). Among children in the early grades, certain persistent errors have been identified even in addition and subtraction. For example, Davis and McKnight (1980) found that practically no third or fourth graders solved the following subtraction problem correctly without help the first time they saw it: 7,002 - 25. Furthermore, because of common misconception about the process of "borrowing" during subtraction, one particular incorrect answer was common: 5,087. The misconceptions that led to this incorrect response proved to be persistent and difficult to remove even with tutoring.

Rosnick and Clement (1980) encountered similar problems in trying to get college students to master seemingly simple algebra problems such as the following.

> Write an equation using the variables S and P to represent the following statement: "There are six times as many students as professors at this university." Use S for the number of students and P for the number of professors.

Obviously, we need more information about these predispositions to misconception, and about what can be done to counteract them effectively through improvements in curriculum design and instructional methods. Such information is needed not only in math and science, but in all academic fields. In my opinion, this kind of information will have much more application to education than information about memory storage and retrieval and other topics currently being pursued by psychologists interested in human learning. Be that as it may, existing data on students' predispositions to misconception indicate that it is important for teachers not only to present new information, but to integrate that new information with existing knowledge, using concrete examples and applications, to probe the limits of students' learning in order to identify common misconceptions, and to actively counteract these misconceptions through appropriate preventive or remedial instruction.

Student Motivation to Learn

It is clear from the foregoing that I believe that a growing body of information is available about teaching and learning in the classroom and that this information should inform educational policy decisions. Turning from teaching and learning to student motivation in the classroom, I become much less impressed with the relevance and potential application value of available information. Consequently, I will not so

much review research and infer policy implications, as I will identify what I see as limitations on the applicability to the classroom setting of motivational principles developed from other settings. Then I will describe areas of needed research that might prove more applicable.

As usual, my approach here centers on application by teachers: What can teachers do to build student motivation to learn (tendency to approach tasks with serious intent to do them carefully and get the benefit from them, and not just merely to complete them)? I find approaches developed from animal or human research conducted outside classroom settings to have only limited value for answering this question. The concepts and principles contributed by these approaches seem more useful for describing individual differences in student behavior than for prescribing what teachers can do to motivate their students to learn.

The problem is most obvious with drive concepts from classical learning theory, which were developed from research on (mostly subhuman) organisms motivated by deprivation of tissue needs. This has little application to the classroom, which is concerned with higher cognitive activities in students whose purely biological needs are usually satisfied.

More recently developed concepts involving the operation of need hierarchies, equilibration, or the arousal and satiation of curiosity seem more applicable, but bear in mind that they, like most other concepts of motivation, were developed to describe behavior in free choice situations. Few teachers are teaching students who are in school by choice and who have selected the course on their own initiative because they perceive it as relevant to their own needs or goals. Attendance at school and completion of requirements are compulsory for all

elementary students and most secondary students, and even in college, a large percentage of the courses taken by any particular student is required. Thus, school is a work setting in which individuals cope with compulsory activities under some kind of accountability system, and not a play setting offering free choice according to one's personal preferences. Rather than information about how to predict their students' individual free choice behavior, teachers need to know how to motivate the students to try to get intended benefits from academic activities. There are serious problems with traditionally recommended approaches for accomplishing this.

Need Theory

Information about individuals' need hierarchies is helpful in anticipating their concerns and interests. It also predicts differences in their free choice behaviors, but school is a work setting, and this limits its application value there. Even information about need achievement, which seems directly relevant to schooling, applies mostly to predicting individual differences, although there exist some ideas about developing need achievement in individuals (teaching them to set goals based on internal standards, and to reinforce themselves for success in meeting these goals).

I see development of achievement needs as only a partial solution to motivation problems at best. First, need for achievement can be overemphasized. Too much of it may produce people who are restless or insecure because they are overly competitive with themselves or others. I would de-emphasize building a *need* for achievement, and instead would stress developing a *value* or *appreciation* for achievement. At base here is my belief that people can and should enjoy the *processes* that go into

achievement, and not merely the *outcomes* represented by success or task completion.

Like other needs, and perhaps like motivation generally, need for achievement relates curvilinearly to efficiency, such that increases in need intensity beyond some optimal amount are counterproductive. Another way to think of this besides intensity is flexibility: Concentration on success (in meeting individual standards or winning competitions with others) is appropriate in certain contexts but not others. Ideally, people will strive for success in contexts where this is appropriate, but will not generalize this tendency to other contexts where this is not appropriate. They will be *flexible* in responding to context differences.

A third point about need achievement, especially powerful and rigid need achievement, is that it may detract from potential intrinsic motivation derivable from experiencing the processes of engaging in the task at hand. Attribution theorists have shown that people's tendencies to attribute their own task involvement to factors external to the task itself may interfere with the quality of task performance (Kruglanski, 1978). Inappropriately powerful or success-oriented achievement motivation would constitute such an external factor, even though it comes from within the person (because it acts as a force driving and controlling the person, just as an external force would).

Various needs, in addition to the need for achievement, also provide useful clues to motivating students. Information about need for affiliation, for example, is useful in deciding whether students will work better in a group or alone. In general, however, these other needs are still needs, and thus subject to the same limitations as the need

for achievement where it is used as a basis for motivating the students.

Reinforcement Theory

It is clear that relatively neutral behaviors can be shaped by applying sufficiently powerful reinforcers. I will not argue with this principle, but I will argue that its application to classrooms has been oversold, and also that even to the extent that reinforcement can be used to control student behavior, it has potential side effects that call for limiting and qualifying its use.

Availability. A great many reinforcers are available to teachers, but none of them are very powerful. Unfortunately, the kinds of reinforcers available to the typical teacher are most effective with students who least need external motivation or control and are least effective with students who present the biggest problems (Walker, 1979). Token systems driven by the types of powerful reinforcers used in prisons and mental hospitals cannot be applied in schools (even if this were considered desirable), because schools do not have sufficient control over students' lives to enable them to use really powerful reinforcers when milder ones are insufficient.

Applicability. Reinforcement is much easier to apply to overt behaviors than to internal thoughts, desires, or attributions; easier to apply to quantity than to quality of achievement; and easier to apply to frequency or rate of performance of already acquired skills than to efficient acquisition of these skills. In education, the really difficult problem is usually eliciting a given level of performance in the first place, not reinforcing repetition of this level of performance later. Thus, reinforcement may be useful for motivating persistence in repetitious drill and practice, but it is difficult to apply (and may be

counterproductive) when the goal is to get students to concentrate on and absorb new learning (McGraw, 1978).

Feasibility. Traditional forms of reinforcement call for rewarding each successive approximation to a goal and maintaining desired rates of behavior using reinforcement schedules determined to be effective for the individual and the behavior in question. This simply cannot be done in the classroom. One teacher cannot even keep track of, let alone consistently reinforce, all of the relevant behaviors of all of the students in the class (Emery & Marholin, 1977). At best, the teacher can concentrate on a few behaviors for most of the class and deal with a few individual students more intensively. Therefore, so long as teachers must deal with classes of 20 to 40 students, attempts to maintain all relevant behaviors at desirable levels through efficient reinforcement will remain practically unfeasible, even if theoretically possible.

Side effects. Attribution theorists have shown that extrinsic rewards (or in fact any extrinsic reason for doing a task--competition, time dealines, etc.) will decrease intrinsic task motivation (at least where such motivation has existed previously). Once you start paying people for doing a task or offering them rewards for doing it, they will be less likely to do it voluntarily in the future (Lepper & Greene, 1978). What is more, introduction of these extrinsic considerations tends to reduce the quality of task engagement--people become more concerned about rewards they are expecting than about the content of the task they are doing to get the rewards, and more concerned about completing the task (at minimal levels of acceptability) than about doing the task well or thoroughly (Condry & Chambers, 1978). They develop a piecework mentality rather than a pride in craftsmanship.

Many of these problems with traditional reinforcement applications to the classroom are reduced with newer techniques often called cognitive behavior modification (Meichenbaum, 1977). Here there is an emphasis on goal setting, self-monitoring of behavior, self-recording of behavior, self-reinforcement for meeting goals, and the like. Such techniques can be especially effective if combined with modeling of self-talk (the teacher models what students should say to themselves at key points in the task engagement). These techniques are more applicable to internal events occurring during acquisition of knowledge and skills than traditional reinforcement is, and more feasible because they can be used independently by students (thus freeing teachers from having to deliver all reinforcement personally). Side effects can be minimized if the emphasis is placed on noticing and taking pride in accomplishment rather than on extrinsic reinforcement for success.

Tie School Activities to Life Goals

One often recommended approach to classroom motivation, which draws upon both need theory and reinforcement theory, is to attempt to present academic activities as instrumental to success in life. Students are exhorted to work hard and master academic skills because they can use them to meet their own goals in the present or will need them to succeed in the future. This is probably a good idea in theory, but observations in classrooms suggest that it is not done nearly as often as it could be, and when it is done, it is often done in self-defeating ways. Rather than stress the positive by indicating the present or future application value of what is being learned, teachers tend to stress personal embarrassment ("You don't want people to think that you are ignorant") or future educational or occupational disasters ("You'll never get through

sixth grade," "How are you going to get a job if you can't do basic math?"). Other well-meaning motivation attempts cast the student in a more positive light but portray society as a hostile environment (learn to count so storekeepers don't cheat you; learn to read so you don't get taken when signing a contract). Rather than stir up needless fear or anxiety, teachers would do better to help students to recognize and appreciate developing knowledge and skills, and to come to value these for their own sake in addition to whatever application value they may have.

There are other problems in trying to portray present school tasks as applicable to future goals. For one thing, this can work only when students see the future goals as attainable and believe that they are making progress toward them. Students who do not buy into these goals or who believe that the goals that are out of reach will only be discouraged by such attempts to motivate.

Also, unless handled carefully, stress on a present task's instrumental value for future activities can have the effect of devaluing the task itself, by making it seem to be just a hurdle in one's path rather than an intrinsically worthwhile activity. Consider the motivation of inservice teachers in courses they are taking purely to build up credit hours that will qualify them for higher pay.

Application of Attribution Theory

Weiner (1979) and others have shown that people's engagement, persistence, and ultimate success in achievement-related activities are affected by their attributions for success or failure outcomes. Dweck (1975) and others have shown that attribution retraining procedures can alleviate learned helplessness. These and other classroom applications

of attribution theory are discussed in detail in other presentations in this volume, so I will not review them here. I will confine myself to a few brief comments.

First, I believe that attribution theory has made and will continue to make important contributions to the development of a systematic approach to motivating students in the classroom. It focuses attention on the relatively neglected cognitive side of motivation, and it helps us to understand individual differences in response to classroom events. In particular, it complements reinforcement approaches nicely by helping us to understand why ostensible "success experiences" are not always rewarding or motivating, and why ostensible "failures" are not always debilitating. These and the various contributions detailed in other chapters of this volume underscore the value of the attribution theory approach, and it is within this context that I offer the qualifications and criticisms below.

I am impressed with the breadth and consistency of experimental data on attributions, but I believe that attributions occur less frequently and have less predictable effects in everyday settings (including classrooms) than the experimental data seem to imply. First, although one can stimulate people to make attributions by questioning them, there is little evidence that they spontaneously make such attributions with regularity. Much behavior consists of conditioned habits that are responsive to situational contingencies and played out with little or no conscious monitoring, let alone analysis of the reasons for outcomes. This is especially true of young children, who ordinarily do not engage in much self analysis, and when they do, are likely to reach false conclusions due to their egocentrism and immature social cognition. Thus,

people in general and young children in particular probably engage in relatively little attributional thinking.

Furthermore, the attributional thinking that does occur often involves attributing outcomes to causes other than ability, effort, task difficulty, and luck (Frieze & Snyder, 1980). Again, this is especially a problem with young children, whose attributional responses do not always relate to other variables in ways that would be predicted from a rational model of intellect. As I have argued elsewhere (Brophy, 1977) in discussing the limited application of cognitive dissonance theory to young children, cognitively based personality theories developed from research on adults usually assume implicitly that everyone has "become operational" in the Piagetian sense--that the contents of the mind have been organized into an integrated cognitive structure that apprehends not only facts but the relationships between them. This level of cognitive development and organization must be present before cognitive inconsistencies will begin to be recognized regularly and to motivate efforts at resolution. It will also be necessary before we can expect to see systematic linkages among perceptions of success or failure, attributions of these outcomes to causes and effects on self concept, future preferences for or persistence in similar tasks, and so on. Thus, attribution theory may have less systematic application to preoperational children than it does to those who have become operational, even where attributional thinking does occur spontaneously (c.f. Nicholls, 1979; Surber, 1980).

My final concern with attribution theory applications is that they may have overemphasized effort and underemphasized ability, particularly in attribution retraining programs. First, although it is clear that "helpless" students have learned to become frustrated quickly and to

attribute failure to lack of ability, successful or mastery-oriented students do not typically show a parallel tendency to turn their attention from the task to self congratulation. Instead, they concentrate on the processes of the task at hand when they are succeeding smoothly, and on problem solving efforts when they are not. Attributional thinking occurs only at the end of the task, if at all. These data suggest that, with the exception of "helpless" students, students' engagement in academic tasks might be improved more by programs that increased their enjoyment of the actual processes of task engagement and their abilities to tolerate frustration and cope with failure than by programs directed at their attributional thinking. Cognitive behavior modification approaches involving modeling with verbalized self-instruction seems especially applicable here.

Also, when successful or mastery-oriented children do make attributions concerning their task outcomes, they stress ability at least as much as effort, especially when talking about success. I believe that attribution retaining programs should have this same emphasis, at least in programming success attributions. Recall Harter's (1978) finding that success achieved with what is perceived as reasonable effort is motivating, but success achieved only with sustained maximal effort is discouraging. Consider also Covington and Omelich's (1979) findings that students prefer to be seen as both able and motivated over being seen merely as well motivated. Such data indicate that the motivational value of successes will be maximized when students learn to interpret those successes in part as evidence of ability, not just effort.

Attributing failures to (low) effort must be handled carefully. First, it is essential that tasks be carefully matched to individual

students so that attribution of failure to effort becomes a credible, factual statement. If the task is such that the student is bound to fail with even sustained maximal effort, attribution of that failure to effort is not only incorrect but insulting and discouraging. Therefore, teachers should be cautioned about the importance of task difficulty and of insuring that attributions of failure to (low) effort are factually accurate when applying attribution retraining procedures, or the approach may backfire.

Even when done correctly, though, there is a limit to what can be gained by systematically attributing failure to (low) effort. Realities of individual differences and limits on the degree to which schooling can be truly individualized make it certain that some students will not be able to do what some of their peers do, even with maximum time and effort. To me, this suggests that a complete attribution training program would include attention to issues surrounding when it is sensible and correct to attribute failure to (limited, but not necessarily low in an absolute sense) ability, and what the implications of such attribution may be. Everyone cannot succeed at everything, and students have to be helped to come to terms with that.

Build Intrinsic Motivation/Continuing Motivation

I believe that this approach is both the most important and the least stressed among those considered here. If we really want students to engage in academic activities seriously, it will be important to develop in such students what traditionally has been called "intrinsic motivation," and what Maehr (1976) calls "continuing motivation" (development of interest in content that generalizes beyond the classroom).

This will mean developing students' tendencies to value knowledge

and skills for their own sake, as well as to value the exercise of such knowledge and skill. This should lead to enjoyment of the process of learning, pride in craftsmanship when doing assignments, and recognition of the personal benefit that accrues from doing the assignments. It is not reasonable to expect students to be excited or thrilled about their participation in academic activities (except on rare occasions), but we can expect them to find such activities meaningful and valuable, to take them seriously, and to get something out of them. The following methods should help them to do so.

First, adapt existing approaches with an eye toward communicating desirable expectations and attributions, stressing the intrinsic value of task participation and steady gains in knowledge and skills rather than extrinsic rewards or sanctions. Examples of how this can be done with verbal praise are shown in Table 1, but the same principles apply to delivery of rewards, as well. The key concept is that reinforcement should focus student attention on desired task engagement and problem solving processes, and not on extrinsic factors.

Second, consider task design. Certain tasks are enjoyed by most people, and others are commonly seen as drudgery. We need more attention to the variables of tasks themselves that affect motivation. Some clues have come from analysis of games and recreation. However, as noted previously, school is a work setting. Thus, the most valuable clues to design of effective classroom academic tasks probably will come from industrial psychologists' analyses of job characteristics as they relate to job satisfaction, employee turnover, and the like. Employee satisfaction has been found related to such job characteristics as range of variability in the types of tasks included in a job, degree to which the job

Table 1

Guidelines for Effective Praise

EFFECTIVE PRAISE	INEFFECTIVE PRAISE
1. is delivered contingently	1. is delivered randomly or unsystematically
2. specifies the particulars of the accomplishment	2. is restricted to global positive reactions
3. shows spontaneity, variety, and other signs of credibility; suggests clear attention to the student's accomplishment	3. shows a bland uniformity that suggests a conditioned response made with minimal attention
4. rewards attainment of specified performance criteria (which can include effort crteria, however)	4. rewards mere participation, without consideration of performance processes or outcomes
5. provides information to students about their competence of the value of their accomplishments	5. provides no information at all or gives students information about their status
6. orients students toward better appreciation of their own task-related behavior and thinking about problem solving	6. orients studetns toward comparing themselves with others and thinking about competing
7. uses students' own prior accomplishments as the context for describing present accomplishments	7. uses the accomplishments of peers as the context for describing students' present accomplishments
8. is given recognition of noteworthy effort or success at difficult (for *this* student) tasks	8. is given without regard to the effort expended or the meaning of the accomplishment
9. attributes success to effort and ability, implying that similar successes can be expected in the future.	9. attributes success to ability alone or to external factors such as luck or (essy) task difficulty
10. fosters endogenous attributions (students believe that they expend effort on the task because they enjoy the task and/or want to develop task-relevant skills)	10. fosters exogenous attributions (students believe that they expend effort on the task for external reasons--to please the teacher, win a competition or reward, etc.)
11. focuses students' attention on their own task-relevant behavior	11. focuses students' attention on the teacher as an external authority figure who is manipulating them.
12. fosters appreciation of, and desirable attributions about, task relevant behavior after the process is completed	12. intrudes into the ongoing process, distracting attention from task-relevant behavior

Note: Table 1 is from Brophy, Jere. "Teacher Praise: A Functional Analysis, Review of Educational Research, Spring 1981, pp. 5-32. Copyright 1981, American Educational Research Association, Washington, D. C.

provides feedback about the quality of performance, degree to which the job allows opportunity to complete finished products, and degree to which the job allows opportunity for creativity or decision making. These and other factors that affect worker satisfaction on the job probably have parallels in academic tasks that would affect student satisfaction in school.

Third, look at teacher presentation variables. Teachers probably affect students' reactions to academic activities by the ways that they present these activities and talk about them (Good & Brophy, 1978, 1980). A given task should be received better by the students of a teacher who presents it by articulating positive expectations and stressing the knowledge or skills (or their application) that the task should provide, than by students of a teacher who presents the task with little enthusiasm or even states that the task is unpleasant but must be done anyway.

Pilot work from my own research on student motivation in the classroom suggests that most teachers could be more positive in presenting tasks to their students. Observations were conducted in six elementary (grades 4-6) classes, during which teachers' comments made about tasks as they were being presented to the students were recorded. In 68 instances, teachers simply launched directly into tasks without describing or characterizing them. They did characterize the tasks in some way most of the time, however, producing 249 presentation statements. These were coded into 17 descriptive categories and tentatively typed as likely to produce neutral, positive, or negative student expectations about the task. These data are show in Table 2.

Teachers made no introduction to the task at all 21% of the time, made some kind of neutral statement 29% of the time, described the task in positive terms 25% of the time, and said something likely to provoke

Table 2

Classification of 317 Task Presentation Statements

Observed in Six Elementary School Classrooms

Type	Task Introductory Category	N	%
Neutral	None (teacher launches directly into the task with no introduction)	68	21
Neutral	Cues effort (teacher urges students to work hard)	31	10
Neutral	Continuity (teacher notes relationship between this task and previous work students have done, especially recently)	29	
Neutral	Positive challenge/goal setting (teacher sets some goal or challenges the class to try to attain a certain standard of excellence	18	6
Neutral	Survival value (teacher points out that students will need to learn these skills to get along in life or in our society as it is constructed presently)	13	4
Positive	Recognition (teacher promises that students who do well on the task will be recognized with symbolic rewards, hanging up of good papers in the classroom, etc.)	7	2
Positive	Extrinsic reward (teacher promises reward for good performance)	2	1
Positive	Teacher personalizes (teacher expresses personal beliefs or attitudes directly, or tells the students about personal experiences that illustrate the importance of this task)	3	1
Positive	Teacher enthusiasm (teacher directly expresses his or her own liking for this type of task)	8	3
Positive	Self-actualization value (teacher suggests that students can develop knowledge or skill that will bring pleasure or personal satisfaction)	0	0
Positive	Personal relevance--other (teacher makes some other kind of statement that tries to tie the task to the personal lives or interests of the students)	10	3
Positive	Cues positive expectation (teacher states directly that the students are expected to enjoy the task or to do well on it)	52	16
Negative	Threats/punishment (teacher threatens negative consequences for poor performance	12	4
Negative	Accountability (teacher reminds students that the work will be carefully checked or that they will be tested on the material soon)	18	6
Negative	Time reminder (teacher reminds students that they only have limited time to get the assignment done so they had better concentrate)	19	6
Negative	Embarrassment (teacher tries to show the importance of the task to the students, but does this in a negative way, indicating that they are likely to be embarrassed at some time in the future if they do not learn the skills involved)	1	<1
Negative	Apology (teacher apologizes to the students for foisting this task on them)	1	<1
Negative	Cues negative expectation (teacher indicates directly that the students are not expected to like the task or to do well on the task)	25	3
		317	100%

negative expectations another 25% of the time. Thus, teachers took advantage of their opportunity to engender expectations about tasks only about half of the time, and when they did, they were as likely to engender negative expectations as positive ones. Only one of the six teachers attempted to engender positive expectations with any regularity.

As can be seen in the table, the teachers generated quite a variety of task presentations. Ironically, the only category that was not represented even once was that dealing with the intrinsic or self actualization value of the tasks. More generally, it is clear from the table that these teachers were not doing nearly as much as they could do to foster intrinsic motivation (or continuing motivation) in their students for the knowledge and skills they were learning at school.

Recommendations

I believe that traditional sources of advice to teachers about motivating their students need to be supplemented with new research on teachers' communication of expectations and attitudes through their presentations of tasks to students, and on the nature of tasks themselves and the affective reactions they engender. In the meantime, we can make teachers more aware of their own role in shaping student attitudes toward academic activities, can see that teachers learn about communicating positive expectations and attitudes through their own modeling and their presentations of tasks, and can see that teachers are exposed to recently developed techniques such as cognitive behavior modification and attribution retraining.

Teacher Education

I have outlined several policy implications concerning what I believe teachers ought to be doing in their classrooms. These things are much easier said than done, however, and it seems to me that they imply changes in teacher recruitment, education, and professional status. Unfortunately, most of us are familiar with the refrain, "those who can, do, and those who can't, teach." This is gratuitously insulting to teachers and rightly resented as such, but it gets to the heart of any attempt to discuss educational policy in the United States, in at least two ways.

First, especially at the secondary level, teaching was not the original or primary career choice for many of those who end up in the profession. For one reason or another, many aspiring biologists or mathematicians are not able to get advanced degrees or technical jobs in these fields, and end up teaching instead. The fact that they, and most of society, see this as a step down in status and a less attractive career indicates the relatively low esteem in which the teaching profession is held in our society. There is nothing inherently necessary or correct about this, however, as the relatively higher status of teachers in most other societies indicates.

A second problem implied in the "those who can't teach" notion is that almost any functionally literate and reasonably stable person can at least survive in the teaching role. Incompetence in the job will not have immediate public consequences such as breakdown of industrial equipment, stoppage of an assembly line, ruin of an experiment, or loss of a contract. Teachers' failings may be well known to their students, at least after the first few grade levels, but they are unlikely to come to

public attention unless classroom discipline breaks down altogether. The isolation within which most teachers work, combined with the fact that they are seldom observed by principals or anyone else, makes it possible for them to survive indefinitely with minimal competence.

Note, however, that to acknowledge that it is possible for incompetents to survive in the teaching role is *not* to acknowledge that teaching is a relatively simple task that merits the relatively low esteem in which it is held in our society. On the contrary, almost everyone who spends time analyzing and observing teaching concludes that it is an extremely complex task which is very difficult to do *well*. Successful teaching requires a combination of intelligence, dedication and energy level, interest in students as individuals, classroom organization and management skills, and subject matter knowledge and instruction skills that does not exist spontaneously in many individuals (despite the notion of "born" teachers), is not systematically developed in our teacher education institutions, and is not systematically or even notably rewarded even where it exists by the general consensus of all concerned. Perhaps that is why this combination seems to be so rare these days.

At one level, the social policy implication here seems straightforward: We should be more selective about who is accepted into teacher education programs in the first place, more serious and systematic in educating and training the individuals who are accepted, more thorough in monitoring their performance on the job, and more prepared to base tenure and salary decisions on merit. None of this is likely to occur, however, so long as the social status and rewards associated with the teaching profession remain too low to consistently attract top quality personnel. I see no signs of improvement in the situation at present, but there is at

least some basis for hope for the future. As the implications of the nearly universal adoption of birth control and family planning practices begins to sink in on the American public (lower birth rate, changes in the age structure of the society, strain on the social security system as the percentages of retirees rises relative to the percentage of contributing employees, etc.), and as these same trends change the outlook of individual parents (emotional investments and concerns concentrated in just one or two children rather than spread over a larger number), we should begin to see clear changes in how children are viewed. In particular, as the continuing oversupply of children to which we have become accustomed evolves into a condition of stability or even undersupply, we should become less willing to write off significant percentages of each generation through "benign neglect." In turn, this should lead to greater concern about school quality. Until such concern emerges, however, the changes suggested below are unlikely to occur on a systematic national basis, although many might be implemented locally.

Entry Standards and Accountability

The entire educational establishment, but especially the teacher education institutions, need more emphasis on quality. I have in mind medical education as a model: Only selected applicants would be admitted to teacher education programs in the first place, and these applicants then would receive extensive, high-powered course work and laboratory experiences while in school, plus several years of supervised apprenticeship on the job. There would be much more skill development through training and supervision, although no less education in the broader sense. Individuals who lack the necessary intelligence, trainability, or

emotional maturity would be weeded out, preferably as early as possible.

Preservice Education

I would divide teacher education into finer segments than the crude elementary versus secondary division in use at present. Ideally, there would be four tracks: early elementary, late elementary, middle school/junior high, and high school. I believe that each of these four segments is qualitatively different from the others in the cognitive and social/emotional characteristics of the students served, the types of content and activities to which the student should be exposed, and the instructional objectives and teaching methods that are likely to be most effective.

I would like to see prospective teachers in each track get a strong grounding in developmental psychology and related disciplines that would help them to understand what the types of students they will be teaching are like, how they got to be that way, and where they are headed (c.f. Case, 1975, 1978). This grounding would include much more than a cursory consideration of developmental stage theories. In particular, it would include extensive exposure (both through direct interviewing and through opportunities to read transcripts or observe videotapes) to the thinking patterns of the kinds of students they will be teaching. This would include not only exposure to students' thinking about conservation and other topics stressed by developmental psychologists, but also their thinking about the subject matter they are studying in school (What are common misconceptions that later elementary-grade students are likely to have about science concepts typically taught in these grades? What aspects of beginning reading instruction are likely to cause problems for some students? Why? What are effective ways of overcoming these

problems?). Exposure to such content would ideally be followed up by opportunities to tutor students or teach concepts to small groups (preferably with observation and feedback).

A great deal of useful knowledge now exists about effective classroom organization and management (Brophy & Putnam, 1979). Future teachers should not only be exposed to this information, but trained to apply it efficiently. This would include a variety of routine but not unimportant skills (using audiovisual equipment, preparing effective illustrations or handouts, planning lessons and units, etc.).

There would be a great deal of emphasis on teaching skills geared to the content and learners that the future teacher will be working with. This would include not merely selecting objectives and appropriate materials, but presenting new information to students through lectures and demonstrations, conducting recitations and drill exercises, conducting discussions, preparing, explaining, and supervising practice exercises and independent work assignments, and the like. There would be emphasis on student comprehension as the criterion for successful activities, and on the need to elicit student performance regularly as a way to get feedback and gauge student comprehension. There would be much emphasis on reteaching students who fail to master something the first time through. In particular, future teachers would learn that simply repeating the same content and strategies probably will not be effective with such students, so that it will be necessary to break down the task into smaller parts, introduce more or different examples, probe for sources of confusion, and so on.

I would take into account readiness and levels of concern in introducing such education and training to future teachers, starting with

basic skills and survival tactics that can be taught and mastered in isolation, and requiring application in simple contexts before moving on to more complex ones. Teaching practice would begin with peers working in pairs or in small teaching groups, then move to teaching students in individual tutoring contexts, then to small group instruction, and only then to whole class instruction. Teaching of unfamiliar material would not be required until there had been a great deal of experience teaching familiar material. Independent planning would not be required until future teachers were familiar with the curricula and students taught in the grade levels in which they would be working. Even then, early emphasis would be on lesson planning, withholding weekly or unit planning until the future teachers were experienced enough to know what were appropriate expectations.

Just as we use counting sticks and Cuisenaire rods as simplification aids ("crutches" if you will), in teaching arithmetic in the early grades, we should be prepared to use simplification aids in the early stages of training future teachers: scripting lessons, allowing use of the teacher's guide or a homemade outline for quick referral during teaching, standardized responses (even algorithms) for dealing with failures to respond to a question or with various classroom management problems, and the like. Early on, this may be the only way for future teachers to cope efficiently with the complexities of their task. Ultimately, of course, we want them to be creative and flexible teachers who can select from a rich repertoire those strategies most suited to the immediate situation. However, it takes time to build up that kind of repertoire and to learn when and how to deviate from pre-established plans. This development is likely to occur most smoothly if student teachers are provided with whatever support and structure they seem to require.

Inservice Education

I believe that we need a much greater investment in inservice teacher education than we have at the moment. This statement flows in part from my desire to see teacher education become (in some ways) more like medical education, particularly with the first few years on the job being treated as an internship with regular supervision by and feedback from master teachers (note that such an internship, while probationary in one sense, would involve much more instruction, supervision, and individualized corrective feedback than occurs during present probationary periods for new teachers).

It is not just new teachers who need inservice education, however. New curricula and methods appear all the time, and now that research on the classroom has become well established, we can expect a modest but steady output of information of direct relevance and use to teachers. Furthermore, the revolution in birth control and family planning mentioned earlier has initiated what will probably be a permanent reduction in annual openings for new teachers. This, along with oth sociological trends (greater percentages of teachers working due to financial necessity and not just preference; higher percentages of female teachers returning to their jobs after childbirth), means that teacher turnover is likely to remain very low indefinitely. Thus, if changes in teacher behavior are desired, they will have to be accomplished mostly by retraining or other inservice activities with existing teachers rather than by infusion of new blood into the system. Much of what I would like to see in this regard has already been implied in the above discussion on preservice education. In addition, however, there are some changes that I believe would be of special value for inservice teachers.

First, I would like to see a breakdown in the isolation that teachers experience in their everyday work so that they can benefit from peer stimulation and corrective feedback. Teachers' classrooms should be visited much more often than they are. Here I mean all teachers, not just probationary teachers, and I mean visitation for purposes of staff development, not just accountability--visits by principals, supervisors, master teachers, and others who might provide feedback and make valuable suggestions. In addition, I believe it is important to see that teachers visit one anothers' classrooms. In the present system, most teachers are exposed to only one or two models (to any extent), typically while they are still in their preservice program. Once on the job, they get few opportunities to observe one another at work. Yet, virtually all teachers agree that this opportunity is one of the most stimulating and valuable inservice education opportunities available. If I were running a school district I would try to find ways to make sure that each teacher visited several other classrooms each year (preferably classrooms in other schools). I would expect such visits to have significant positive effects on teachers even with minimal structuring, although I would expect even greater benefits if the visits were well planned and coordinated (see Good & Brophy, 1978).

In particular, I would expect maximum benefits when teachers working with similar grade levels and types of students formed cooperative pairs or small groups that would not only visit one anothers' classrooms for their own stimulation, but also provide feedback to one another and work together on problems of mutual interest. In ideal situations, this could include audiotaping or videotaping of teachers in action in their classrooms, with later opportunity to review the tapes repeatedly, discussing

strengths and weaknesses of the activities recorded, alternative methods that might have been tried in situations that turned out poorly, and so on. Besides the immediate specific benefits to the teachers involved, such procedures would have the added benefit of allowing teachers to identify and strive to meet their own inservice needs, working cooperatively with their peers in the process and (for a change) acting more as the professionals they are supposed to be.

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