Close-Up #3

Instructional Reinforcement

May 1988
Kathleen Cotton

INTRODUCTION

The idea that learning can be stimulated and enhanced through the use of rewards goes back at least as far as the educational practices of the ancient Greeks. Learning has always held a high place in Jewish culture, too, and edible rewards were provided to students of the Torah as far back as the twelfth century. Numerous other accounts make clear that instructional reinforcement practices have been in use throughout history.

DEFINITIONS

Before discussing the uses and effectiveness of instructional reinforcement in the modern classroom, it may be well to specify just what we mean by "reinforcement." Suppose we ask, "Does reinforcement increase the behaviors which lead to learning and thus improve learning outcomes?" This seems, at first, to be a sensible question and a worthwhile one. It turns out, however, to be something of a trick question, since psychologists define "reinforcer" as any consequence that increases the frequency of a behavior. By this definition, once we have identified something as "reinforcement," there is no longer any question as to whether it will increase a given behavior; we have already said that it will.

Clearly, this differs from the ways the terms "reinforcer" and "reinforcement" are used in most educational settings. Psychology's classical definition would not permit us to identify gold stars, candy treats, or anything else as reinforcement until we tried providing these and found that they do, in fact, increase the incidence of the desired behaviors. In educational settings, however, we frequently speak of reinforcing a behavior (such as giving correct answers) with something we imagine will be desirable (such as gold stars) before determining whether the stars are a true reinforcer of the behavior. This represents a far less rigorous use of the term reinforcement than that used by psychologists.

For present purposes, we shall define INSTRUCTIONAL REINFORCEMENT as: THE PROVISION OF VERBAL, SYMBOLIC, **TANGIBLE OR OTHER REWARDS FOR DESIRABLE ACADEMIC** PERFORMANCE OR EFFORT AT THE CLASSROOM LEVEL. This definition includes such things as:

- PRAISE (AND OTHER VERBAL REINFORCEMENT) - for correct responses during class discussions, accurate homework, improved test scores, etc.
- SYMBOLIC REWARDS - such as gold stars, having one's picture on a bulletin board or

name in a newsletter, etc.
- TOKEN REWARDS - such as points or chips, which are valueless in themselves, but which can be redeemed for things of value
- TANGIBLE REWARDS - such as edibles, toys, or schoolrelated items (pencils, notebooks, etc.)
- ACTIVITY REWARDS - such as free time, being leader of an activity, going on a field trip

The selection of research studies to be analyzed for this report was guided by the above definition of instructional reinforcement. Thus, the report is not concerned with other types of reinforcement often used in educational settings. There is a very large research base, for example, on the use of rewards to manage student's BEHAVIOR and improve classroom discipline. Researchers have also looked at the effects of reinforcing students' achievement and improvement at the SCHOOLWIDE or DISTRICTWIDE levels. Worthy as these investigations are, they have been excluded from the present analysis, so as to concentrate attention on instructional reinforcement in classrooms -- usually as provided by the teacher, but also by aides, peer tutors, or even computers.

THE RESEARCH ON INSTRUCTIONAL REINFORCEMENT

CHARACTERISTICS OF THE RESEARCH

The findings reported here emerged from an analysis of 37 documents on different kinds of instructional reinforcement and their effects. Twenty-five are reports of research studies, and twelve are review/synthesis documents. Twenty documents are concerned with elementary level students, five with secondary students, and twelve with the entire elementary-secondary range. Most subjects were regular education students. Both sexes, all ability levels, and various racial and ethnic backgrounds were represented among subject groups.

The outcome areas examined were general achievement (16 reports); language arts achievement (8 reports); mathematics (9 reports); affective outcomes, such as attitude and behavior (5 reports); IQ scores (3 reports); intrinsic motivation (3 reports); and social studies achievement (1 report). Several reports were concerned with more than one outcome area.

BACKGROUND: CHANGING VIEWS OF REINFORCEMENT

The modern history of instructional reinforcement began with the proliferation of theories and experimental work in the area of behavior modification in the 1950s and 1960s. While it is beyond the scope of this report to provide a detailed account of the various behavioral theories of learning introduced or refined during this time, it is worth noting that this was a very active period for behavioral psychology. A great many studies were undertaken and many theories were advanced regarding the use of reinforcement to manage animal and human behavior.

While enthusiasm ran high regarding the proposed applications of behavior modification techniques, most educators and psychologists now believe that the potential applications of behavior modification were oversold. For one thing, behavior modification theorists showed little restraint in generalizing findings from animal studies to human behavior. In addition, the use of many behavior modification techniques was determined to be unfeasible in educational settings.

The late 1960s and early 1970s saw something of a backlash. Many educators began to express strong criticisms of the use of reinforcement techniques in educational settings. Some argued that providing social and particularly material reinforcements gives students the wrong message about learning; that these extrinsic payoffs communicate that the learning activities are not worthwhile in

themselves. Others claim that providing reinforcements undermines intrinsic motivation and that whatever achievement gains result from using them are lost once reinforcement is withdrawn.

The classroom management and effective schooling research of the 1970s and 1980s has helped to clarify the uses and effects of instructional reinforcement and to resolve some of the issues raised by its critics.

RESEARCH FINDINGS

Does instructional reinforcement raise student achievement? Are some types of reinforcements more effective than others in promoting achievement gains? Is reinforcement which is CONTINGENT on academic performance superior to NONCONTINGENT reinforcement (i.e., reinforcement provided for merely showing up or for participating in a classroom activity)? Are the learning gains achieved through the use of reinforcement techniques likely to be maintained? What effects are produced by criticism? Findings concerning these and other questions are listed below by the major subject areas investigated in the research.

THE EFFECTS OF REINFORCEMENT ON ACADEMIC ACHIEVEMENT

What does research say about the effects of reinforcement in general on students' academic achievement? Findings include:

- Contingent reinforcement is positively related to achievement.
- Noncontingent reinforcement is unrelated to achievement in most cases; however, there is evidence that low-ability and younger (primary) children receive some academic benefit from noncontingent, socially motivated praise.
- Acknowledging correct responses as such is positively related to achievement.
- Reinforcements are most effective when clearly linked to students' progress toward goals.
- Achievement benefits accrue at the same rate whether students only receive rewards for correct answers, or both receive rewards for correct answers and lose them for incorrect answers ("response cost").
- Instructional reinforcement alone produces achievement benefits equal to those produced by a combination of instructional and behavioral reinforcement.

PRAISE AND OTHER VERBAL REINFORCEMENT

Praise is the type of reinforcement most commonly used by teachers. Until fairly recently, it was assumed that praise has reinforcing effects on students' academic performance. More recent research, however, indicates that praise may be helpful, neutral, or detrimental, depending on the kind of praise it is and the context in which it is delivered. Findings include:

- Teacher praise does not necessarily reinforce learning, nor is it always intended to do so. Various other reasons, such as a desire to fill students' emotional needs or manage their behavior, frequently motivate praise.
- Praise can enhance learning if it is contingent, specific, sincere, and credible.
- Teachers whose students achieve most are sparing rather than effusive in praising correct answers.
- Greater achievement gains are noted when praise is delivered privately than when it is given in public.
- Greater achievement gains occur when the interactions in which praise is given are initiated by teachers rather than by students.

- When students are praised for their present progress relative to past performance, greater achievement gains result than when they are praised relative to the performance of their classmates.
- Noncontingent praise is negatively related to achievement for high-ability students.
- Praising students who answer correctly in class discussions is often intrusive and distracting, and may even embarrass the recipient.
- When correct responses are acknowledged as such ("Yes," "Correct," "That's right") achievement benefits result.
- BASIC FEEDBACK involves telling students if their response is correct and, if incorrect, supplying the correct answer. Elaborated corrective feedback involves providing students who have answered incorrectly with a series of rules or prompts that will enable them to arrive at the correct answer. Both kinds of feedback produce greater achievement gains than no feedback, and elaborated corrective feedback produces greater gains than basic feedback.

RELATIVE EFFECTIVENESS OF REINFORCEMENT METHODS

Research is inconclusive about the relative effectiveness of different reinforcement methods. Well-designed studies can be cited which indicate the superiority of each major reinforcement technique (verbal, token, symbolic, activity, and tangible) over the others. The annotations accompanying the Key Studies and Reviews at the end of this report indicate which studies support the use of which techniques. In addition to the studies which favor a particular reinforcement technique, there are also quite a number of studies which compared two or more reinforcement methods and found no difference. Several reviewers of the research on reinforcement also concluded that no one technique is best in all situations. Looking at the research as a whole, therefore, little can be said about the relative effectiveness of different methods. Conclusions are limited to:

- Contingent, verbal reinforcement is more effective than other methods for older students.
- Whether immediate or delayed reinforcement is more effective is mainly a matter of the developmental level of the recipient. Young children respond best to immediate reinforcement, while older students respond equally well to immediate and delayed reinforcement.

DIFFERENTIAL EFFECTS OF REINFORCEMENT WITH DIFFERENT KINDS OF STUDENTS

Do student characteristics influence the effectiveness of different kinds of reinforcement? Findings include:

- Noncontingent social reinforcement and praise are positively related to achievement for primary-age students, low-ability students, and many students from low SES backgrounds.
- Students with an external locus of control (those who believe that their actions are determined more by outside events and other people than by themselves) perform better with tangible reinforcement than with verbal reinforcement or with no reinforcement.
- Internal locus of control students perform equally well with different kinds of reinforcers.

COOPERATIVE REWARDS

Some studies investigated the effects of group reward structures on achievement. Researchers have found:

- When students are reinforced and rewarded for group academic performance, their

achievement is equal to that of students reinforced for their individual academic performance.
- In addition to the achievement benefits of cooperative reward structures, students have also demonstrated increases on measures of mutual concern and positive race relations.

OTHER EFFECTS OF REINFORCEMENT

Researchers who study the effects of academic reinforcement are usually most interested in measuring effects on achievement. Some, however, are also concerned with other outcome areas. Findings from this research include:

- When students are reinforced (by any means) for learning achievement, their on-task behavior increases and disruptions are minimized.
- A combination of reinforcement and corrective feedback is positively related to positive attitudes toward learning, toward particular subject areas, and toward teachers.
- Contingent reinforcement is positively associated with increases on measures of self-efficacy (internal locus of control).
- The behavioral improvements noted in response to reinforcing students for learning achievements tend to persist after the removal of the reinforcers.

CRITICISM, RESPONSE COST, AND OTHER NEGATIVE INCENTIVES

Researchers interested in the effects of reinforcing learning achievements have sometimes also investigated the effects of "punishing" learning failures. One such "punishment" is criticism. Another is "response cost" structures, in which students lose points, tokens, or other valuables for incorrect responses in class discussions or on tests. Findings include:

- The incidence of criticism in classrooms, as noted by researchers in observational studies, is quite low.
- Criticism can be positively related to achievement for high-ability students if it is contingent, specific, and relatively infrequent.
- For students generally, criticism is unrelated to achievement.
- Response cost structures alone are unrelated to achievement; a combination of reinforcement and response cost is positively related to achievement.

ALLEGED NEGATIVE EFFECTS OF REINFORCEMENT

Some researchers and reviewers have undertaken investigations of the charges made against the use of instructional reinforcement, e.g., the allegation that intrinsic motivation will be undermined, or that changes brought about through the use of reinforcement disappear when the reinforcement is withdrawn.

The research on these issues is inconclusive. Studies have found that reinforcement under mines intrinsic motivation and that it does not do so. Studies have found that the learning benefits conferred by reinforcement techniques persist when the reinforcement is taken away and that they do not persist. The effects produced seem to depend on the way that reinforcement is delivered. Findings include:

- Reinforcers of all kinds can contribute to intrinsic motivation if they are salient to the task at hand.
- Reinforcement does not undermine intrinsic motivation when the recipient perceives it as a symbol of success rather than an attempt to control his or her behavior.

- Intrinsic motivation can be undermined if students are rewarded for participation only.
- Decreases in performance quality and in intrinsic motivation following the withdrawal of reinforcement are most likely when the reinforcement has the following characteristics:
    - High salience (large or highly attractive rewards, or rewards presented in ways that call attention to them)
    - Noncontingency
    - Unnatural or unusual qualities, such as being artificially tied to behaviors rather than being natural outcomes of the behaviors

TRAINING IN REINFORCEMENT

If certain reinforcement techniques are positively related to achievement, then can achievement be raised by providing training in reinforcement techniques to teachers and tutors? While not an extensively researched question, this was addressed by some investigators. Findings are:

- Teachers trained in the provision of verbal feedback which acknowledges correct responses and helps students answering incorrectly to arrive at correct responses have higher achieving students than those who do not receive such training.
- Providing training to student tutors in how to deliver specific, contingent verbal reinforcement is positively related to student achievement.

NONINSTRUCTIONAL REINFORCEMENT

While the focus of this investigation is the effects of ACADEMIC reinforcement, some studies involved reinforcing achievement and one or more other variables. Findings include:

- When achievement is reinforced, achievement and behavior (on-task, nondisruptive) both improve; when appropriate behavior is reinforced, behavior improves, but achievement is unaffected.
- Students rewarded for simply participating achieve less than those reinforced for accurate responses and no better than those who are not rewarded at all. Guidelines for Effective Instructional Reinforcement

---

GUIDELINES FOR EFFECTIVE PRAISE (Excerpted from: J.E. Brophy, "Teacher Praise: A Functional Analysis." REVIEW OF EDUCATIONAL RESEARCH 51 (1981), p. 26.)

EFFECTIVE PRAISE

1. Is delivered contingently
2. Specifies the particulars of the accomplishment
3. Shows spontaneity, and other signs of credibility; suggests clear attention to the student's accomplishment
4. Rewards attainment of specified performance criteria (which can include effort criteria, however)
5. Provides information to students about their competence or the value of their accomplishments
6. Orients students towards better appreciation of their own task-related behavior and thinking about problem-solving
7. Uses students' own prior accomplishments as the context for describing present accomplishments

8. Is given in recognition of noteworthy effort or success at difficult (for this student) tasks
9. Attributes success to effort and ability, implying that similar successes can be expected in the future
10. Fosters endogenous attributes (students believe that they expend effort on the task because they enjoy the task and/or want to develop task-relevant skills)
11. Focuses students' attention on their own taskrelevant behavior
12. Fosters appreciation of and desirable attributions about task relevant behavior after the process is completed

INEFFECTIVE PRAISE

1. Is delivered randomly or unsystematically
2. Is restricted to global positive reactions
3. Shows a bland uniformity, which suggests a conditioned response made with minimal attention
4. Rewards mere participation, without consideration of performance processes or outcomes
5. Provides no information at all or gives students information about their status
6. Orients students toward comparing themselves with others and thinking about competing
7. Uses the accomplishments of peers as the context for describing students' present accomplishments
8. Is given without regard to the effort expended or the meaning of the accomplishment (to this student)
9. Attributes success to ability alone or to external factors such as luck or easy task
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 the teacher as an external authority figure who is manipulating them
12. Intrudes into the ongoing process, distracting attention from task-relevant behavior ---

GUIDELINES FOR EFFECTIVE INSTRUCTIONAL REINFORCEMENT

Dr. Jere Brophy, professor at Michigan State University's Institute for Research on Teaching, has conducted an extensive investigation of the various kinds of teacher praise and their effects. Dr. Brophy has prepared the following guidelines for classroom use. He notes that these guidelines are also applicable to other kinds of instructional reinforcement.

In his recently published book, EDUCATIONAL PSYCHOLOGY: THEORY INTO PRACTICE, Dr. Robert E. Slavin of the Center for Social Organization of Schools at Johns Hopkins University, offers additional ideas for providing reinforcement. Intermingled with textual information, Dr. Slavin has included sections called "Teachers on Teaching," in which classroom teachers offer information from their experience on various topics. The following excerpt pertains to teachers' use of reinforcement.

Strategies for Reinforcement (Excerpted from: R.E. Slaving, Educational Psychology: Theory into Practice. Englewood Cliffs, NJ: Prentice-Hall, 1986, p. 111.)

1. Teachers write that in their classes, the following have worked as positive reinforcers:
    - a wink, a smile, saying "I'm proud of you"
    - writing "Good job!" on test papers
    - putting brightly colored stickers on papers
    - giving a treat to each well-behaved student at the end of a class

Kaye Cutchen, a seventh-grade teacher in Eufaula, Alabama, gives the following examples of negative reinforcement:

One example of reinforcement that I use involves giving vocabulary tests on Thursdays for five straight weeks. Those who have done satisfactory work those five weeks are then allowed to have the sixth week free of vocabulary assignments.

2. The Premack Principle (or Grandma's Rule) rewards children for doing things they might not want to do with activities they do like. How have you used this in your classroom?

Ann Taylor, a specialist in the Dallas, Texas, Schools writes:

This works well if the reward is to be given almost immediately. Example: "If you get all your assignments done this week, you may play box games for an hour on Friday afternoon." On long-term rewards, however, students often can't sustain the desired behavior. For example: "If you learn good selfcontrol, we will go on a field trip next month."

Nadine Brock, a third-grade teacher in Galloway, Ohio:

I use this often in my classroom. I reward students who get classroom work done and use proper classroom behavior with a special art project, a fun movie, etc. Other teachers mention that in their classes the following activities work as reinforcers:

- games, including computer games
- access to activity centers in the classroom
- "jobs," such as cleaning chalkboards, emptying trash cans, and standing at the head of the line

In the summer of 1986, the U.S. Department of Education published a resource titled EFFECTIVE COMPENSATORY EDUCATION SOURCEBOOK. One volume of the Sourcebook provided brief descriptions of Chapter 1 programs across the country which had been selected for special recognition by panels of experts in the field of compensatory education. Several projects were identified as being especially strong in their provision of regular feedback and reinforcement, one of 13 elements cited by the Secretary of Education as the major attributes of effective schooling. Excerpts from the descriptions of some of these projects appear below: (Excerpted from: P.A. Griswold, et al., **EFFECTIVE COMPENSATORY EDUCATION SOURCEBOOK, VOL. II:** PROJECT PROFILES. Washington, DC: U.S. Department of Education, 1986, pp. 52, 74, 95, 112.)

- Teachers and aides enter check marks on response sheets when students master lessons. Students may accumulate these and exchange them for rewards such as certificates, pictures and free time. When a student attains certain skill levels, staff send home a formal letter informing parents of their child's progress. Unified School District #500, Kansas City, Kansas.
- During instruction tutors provide immediate feedback on students' work, attempting to give feedback which is specific and appropriate to the instructional matter at hand. Tutors provide positive feedback for students' effort and attitude as well as for achievement. Douglas Elementary School, Ellsworth Air Force Base, South Dakota.
- Oral, physical and written feedback on children's skill performance is provided. Teachers scrupulously avoid criticizing children's efforts or punishing them for difficulty or slowness in completing tasks. Parma Elementary School, New Madrid, Missouri.

- The project's structure allows staff to teach and reinforce specific reading and writing skills. Teachers monitor children's responses, so they can reinforce and reteach as needed. Children progress at their own pace, taking tests when they are ready. Detailed records accurately reflect students' progress toward mastering language skills. Close student monitoring and feedback/reinforcement are built-in features on the ECRI mastery learning strategy. SouthWestern City Schools, Grove City, Ohio.

KEY STUDIES AND REVIEWS

Barringer, C., and Gholson, B. "Effects of Type and Combination of Feedback upon Conceptual Learning by Children: Implications for Research in Academic Learning." REVIEW OF EDUCATIONAL RESEARCH 49, (1979): 459-478.

Reviews research that compared the effects of different kinds of feedback (verbal, symbolic, tangible) and feedback combinations on student's learning. Symbolic or verbal feedback had more powerful effects than tangible rewards.

Bear, G. C., and Richards, H. C. "An Interdependent Group-Oriented Contingency System for Improving Academic Performance." SCHOOL PSYCHOLOGY REVIEW 9 (1980): 190-193.

Investigates the effects of group contingencies (extra minutes of recess time) on the English and math achievement of students in grades 5 through 8. Subjects improved their achievement significantly over the baseline period.

Brophy, J. E. "Teacher Behavior and Its Effects." Journal of Educational Psychology 71 (1979): 733-750.

Discusses findings of process-product research conducted during the 1970s; also discusses methodologies used in this research and presents research trends and recommendations for research activities in the future. Includes a section on the effects of teacher praise.

_____ . "Teacher Praise: A Functional Analysis." REVIEW OF EDUCATIONAL RESEARCH 51 (1981): 5-32.

Reviews classroom process research on teachers' verbal praise and its effects. Differentiates among different kinds of praise and offers recommendations to teachers.

_____ , and Evertson, C. M. Learning from Teaching: A Developmental Perspective. Boston, MA: Allyn and Bacon, 1976.

Reports findings from the Texas Teacher Effectiveness Study on the effects of the behavior and expectations of second and third grade teachers on the achievement and attitude of their students. Focuses on teachers' classroom management, questioning patterns and use of motivational techniques in high and low SES classrooms.

_____, and Good, T. L. "Teacher Behavior and Student Achievement." In HANDBOOK OF RESEARCH ON TEACHING, edited by M. C. Wittrock. New York: Macmillan Publishing Company, 1986.

Reviews and summarizes over 200 reports of processproduct research linking teacher

behavior to student achievement. Includes a section on teacher praise and other verbal reinforcement.

Broughton, S. F. EFFECTS AND NONEFFECTS OF REINFORCEMENT FOR ACADEMIC PERFORMANCE. Paper presented at the Meeting of the Midwestern Association of Behavior Analysis, Chicago, IL, May 1978. (ED 186 794)

Investigates the effects on math achievement and ontask behavior of fourth graders when verbal
reinforcement was provided for correct completion of math problems. Reinforced students significantly outperformed controls.

_____, and Lahey, B. B. "Direct and Collateral Effects of Positive Reinforcement, Response Cost and Mixed Contingencies for Academic Performance." JOURNAL OF SCHOOL PSYCHOLOGY 16 (1978): 126-136.

Compares the effects on achievement and behavior of three positive reinforcement conditions and a control group. Treatment students outperformed controls but did not differ from one another.

Cannella, G. S. "Praise and Concrete Rewards: Concerns for Childhood Education." CHILDHOOD EDUCATION 62 (1986): 297-301.

Reviews and summarizes findings on the effects of social and concrete rewards on the achievement of elementary students. Guidelines for teachers are offered.

Centra, J. A., and Potter, D. A. "School and Teacher Effects: An International Model." REVIEW OF EDUCATIONAL RESEARCH 50 (1980): 273-291.

Offers a model for investigating school and teacher variables which influence student achievement. Reviews studies of variables and outcomes. Presents findings on reinforcement.

Clingman, J.; Auerbach, S. M.; Bowman, P. C.; and Parrish, J. M. "Differential Effects of Candy, Social and Token Rewards on the IQ Scores of Children of Above Average Intelligence." PSYCHOLOGY IN THE SCHOOLS 14 (1977): 95-98.

Compared the effects on IQ score of rewarding correct responses with a variety of reinforcers. Only token rewards with material back-ups were significantly related to positive IQ change.

Collins, M.; Carnine, D.; and Gersten, R. "Elaborated Corrective Feedback and the Acquisition of Reasoning Skills: A Study of Computer-Assisted Instruction." Exceptional Children (1986), (in press).

Studies the relative effects of basic feedback and elaborated feedback on the development of reasoning skills by special education and Chapter 1 students learning via CAI. Students receiving elaborated feedback outperformed the comparison group.

Conrad, E. E. THE EFFECTS OF TUTOR ACHIEVEMENT LEVEL, REINFORCEMENT TRAINING AND EXPECTANCY ON PEER TUTORING. Tuscon, AZ Center for Educational Research and Development, Arizona University, 1975. (ED 116 807)

Investigates the effects on first graders' achievement of tutors' achievement level, training tutors in reinforcement and corrective feedback procedures, and tutor expectations. Training of tutors was significantly related to achievement; other elements were unrelated.

Dickinson, D. J. "But What Happens When You Take That Reinforcement Away?" PSYCHOLOGY IN THE SCHOOLS 11 (1974): 158-160.

Investigates the effects on junior high students' achievement and behavior when effective, achievementenhancing token rewards (with material and privilege back-ups) were withdrawn. Reinforced students continued to outperform controls two years after the withdrawal of reinforcement.

Gettinger, M. "Student Behaviors, Teacher Reinforcement, Student Ability, and Learning." Contemporary Educational Psychology 8 (1983): 391-402.

The effects of (1) verbal reinforcement of on-task behavior, (2) verbal reinforcement of accurate responses and (3) tangible reinforcers (tokens or edibles) for both on-task behavior and accurate responses were investigated. Verbal reinforcement of accurate responses was positively and significantly related to achievement. Other treatments were unrelated.

Good, T. L., and Brophy, J. E. LOOKING IN CLASSROOMS (3rd ed.). New York: Harper and Row, 1984.

Discusses teacher behaviors and their influence on students. Provides guidelines for implementing effective classroom management practices. Contains section on reinforcement.

_____ Ebmeier, H.; and Beckerman, T. "Teaching Mathematics in High and Low SES Classrooms: An Empirical Comparison." Journal of Teacher Education 29 (1978): 85-90.

Compares the effects of a variety of teacher behaviors on high and low SES classes. Differential effects of praise noted for high and low SES students.

Gregory, M. K. "Effects of Locus of Control and Type of Reinforcement on Programmed Instruction Performance of Adolescent Boys." JOURNAL OF EDUCATIONAL RESEARCH 70 (1979): 45-49.

The effects of three conditions on the achievement of boys determined to have an internal locus of control were compared with the effects of those conditions on boys found to have an external locus of control. The three conditions were no feedback, confirmations of correct response and monetary reward for correct response. Internals performed equally well in all conditions. Externals performed best with tangible reinforcers.

Griswold, P. A., and Arnold, M. R. "Rate and Accuracy of Vowel Recognition as a Function of Spoken Reinforcers and Age." JOURNAL OF SCHOOL PSYCHOLOGY 18 (1980): 256-262.

Examines the effects of praise and corrective reinforcers on the achievement of urban, low SES males in grades 1-3, 6-7 and 11-12. The effectiveness of praise was found to

decrease with grade level, while the effectiveness of corrective reinforcers increased with grade level.

Harrop, A., and McCann, C. "Behavior Modification and Reading Attainment in the Comprehensive School." EDUCATIONAL RESEARCH 25 (1983): 191-195.

Examines the effects on achievement of promising students that a letter of commendation would be sent to their parents if they showed "good" progress in English comprehension. Experimental subjects significantly outperformed controls on standardized tests.

Hundert, J.; Bucher, B.; and Henderson, M. "Increasing Appropriate Classroom Behavior and Academic Performance by Reinforcing Correct Work Alone." PSYCHOLOGY IN THE SCHOOLS 13 (1976): 194-200.

Investigates the effects on academic achievement and classroom behavior of providing tokens (which could be redeemed for toys) for appropriate behavior and correct work. Subjects were boys 9-12 in a psychiatric hospital. When rewarded for appropriate behavior, behavior improved but achievement did not change. When rewarded for achievement, both achievement and behavior improved.

Hymel, G. M., and Mathews, G. S. "Effects of a Mastery Approach on Social Studies Achievement and Unit Evaluation." SOUTHERN JOURNAL OF EDUCATIONAL RESEARCH 14 (1980): 191-204.

Examines the relative effects of no feedback, general feedback, and specific feedback on the social studies achievement of secondary students and their evaluation of the units studied. Those receiving specific feedback outperformed those receiving general feedback, who, in turn, outperformed those in the no-feedback condition.

Kennelly, K. J., and Mount, S. A. "Perceived Contingency of Reinforcements, Helplessness, Locus of Control, and Academic Performance." PSYCHOLOGY IN THE SCHOOLS 22 (1985): 465-469.

Studies the relationships among students' perceptions of the contingency of teacher-administered reinforcements, teachers' perceptions of student helplessness or competence, student locus of control measures, and student achievement. Various relationships were noted.

Lysakowski, R. S., and Walberg, H. J. "Classroom Reinforcement in Relation to Learning: A Qualitative Synthesis." JOURNAL OF EDUCATIONAL RESEARCH 75 (1981): 69-77.

Analyzes statistical data from 39 studies involving nearly 5000 students in over 200 classes to determine relationships between reinforcement and achievement. Found that the effects of reinforcement were positive and were constant across grades, races, private and public schools, students, and community types.

Morgan, M. "Reward-Induced Decrements and Increments in Intrinsic Motivation." REVIEW OF EDUCATIONAL RESEARCH 54 (1984): 5-30.

Reviews studies on the relationship between providing rewards and students' subsequent motivation. Many kinds of rewards and situations in which they are

provided are outlined. Some unclear findings, but it appears that intrinsic motivation is not undermined when the recipient perceives the reward as a "symbol of success" rather than an attempt to control his or her behavior.

Saigh, P. A. "The Validity of the WISC-R Examiner Verbal Praise Procedure as a Concurrent Predictor of the Academic Achievement of Intellectually Superior Students." JOURNAL OF CLINICAL PSYCHOLOGY 37 (1981): 647-649.

Investigates the effects of noncontingent praise on the achievement of high-IQ, high-achieving students. Control students were given neutral comments instead of praise. The experimental students' achievement was not enhanced by the noncontingent praise. In fact, their achievement was slightly lower than that of controls.

Rosenfeld, G. W. "Some Effects of Reinforcement on Achievement and Behavior in a Regular Classroom." JOURNAL OF EDUCATIONAL PSYCHOLOGY 63 (1972): 189-193.

Studies the effects of different kinds of reinforcement on the achievement of high-, middle- and low-IQ sixth grade students. Different effects noted for different students. Improvements did not deteriorate when reinforcements were withdrawn.

Schunk, D. H. "Enhancing Self-Efficacy and Achievement through Rewards and Goals: Motivational and Informational Effects." JOURNAL OF EDUCATIONAL RESEARCH 78 (1984): 29-34.

Investigates the effects of performance-contingent rewards and proximal goals on children's task motivation, self-efficacy and task performance. The condition of rewards and proximal goals produced greater achievement than either one alone.

_____ . "Reward Contingencies and the Development of Children's Skills and Self-Efficacy." Journal of Educational Psychology 75(1983): 511-518.

Investigates the effects on elementary students' arithmetic achievement and self-efficacy of three conditions: performance-contingent rewards, rewards for participation, and no rewards. Children in the performance-contingent treatment (points which could be exchanged for prizes such as marking pens, stickers, small notebooks) significantly outperformed other students and had greater self-efficacy perceptions. Rewards-for-participation students performed no better than no-reward students and their sense of selfefficacy was no greater.

Slavin, R. E. EDUCATIONAL PSYCHOLOGY: THEORY INTO PRACTICE. Englewood Cliffs, NJ: Prentice-Hall, 1986.

Presents concepts and practices from the field of educational psychology, accompanied by numerous reallife examples and commentary from teachers.

_____ . Effects of Individual Learning Expectations on Student Achievement, Report No. 288. Baltimore, MD: Center for Social Organization of Schools, Johns Hopkins University, 1979. (ED 189 118)

Compares the performance of students who had the opportunity to earn "plus points" toward having their names published in a weekly newsletter with the performance of control students. Treatment students significantly outperformed controls.

_____. "Students Motivating Students to Excel: Cooperative Incentives, Cooperative Tasks, and Student Achievement." THE ELEMENTARY SCHOOL JOURNAL 85 (1984): 53-63.

Reviews 46 studies on cooperative learning and cooperative rewards. The majority of studies showed cooperative learning to have significantly positive effects on student achievement. The most positive effects were noted when students were in structures with both cooperative tasks and cooperative rewards.

Taffel, S. J., and O'Leary. K. D. "Reinforcing Math with More Math: Choosing Special Academic Activities as a Reward for Academic Performance." JOURNAL OF EDUCATIONAL PSYCHOLOGY 68 (1976): 579-587.

Investigated the effects on math achievement of providing special math activities as a reward for completion of initial math activities. All experimental children performed better than controls, but there were no significant differences among treatment groups.

Taylor, C., and White, K. R. "Effects of Reinforcement and Training on Title I Students" Group Standardized Test Performance." Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, CA: April 1981. (ED 206 655).

Examines the effects of reinforcement, teacher training in test administration, and student training in test taking procedures on the standardized reading test performance of elementary students.

Walberg, H. J. "Improving the Productivity of America's Schools." EDUCATIONAL LEADERSHIP 41(8) (1984): 19-27.

Synthesizes the findings from approximately 3000 studies to determine the relative effect sizes of over forty factors, including student aptitude levels, instructional practices, and environmental factors. Found that the largest effects were produced by reinforcement.

Walker, H.M., and Hops, H. "Increasing Academic Achievement by Reinforcing Direct Academic Performance and/or Facilitative Nonacademic Responses." JOURNAL OF EDUCATIONAL PSYCHOLOGY 68 (1976): 218-225.

Compares the effects on reading and math achievement of three treatments: reinforcement (specific praise and tokens with material back-ups) of correct responses, of behavior believed to relate to achievement (attending, volunteering, compiling), and of both correct responses and desired behavior. All treatment groups significantly outperformed control students, but there were no significant differences among treatments.

Winefield, H. "Remedial Reading, Effects of Tokens, Material Back-Up Reinforcers, and Response Cost." Perceptual and Motor Skills, 44 (1977): 383-394.

Compares the reading achievement of children 8-10 years old in six situations -- no remedial lessons, remedial lessons without tokens, tokens with and without material backups and with and without response cost. The only significant relationships to achievement were receiving remedial lessons (in any format) as opposed to not receiving

them, and extracting a response cost as opposed to not doing so.

OTHER REFERENCES

Anderson, L.M.; Evertson, C.M.; and Brophy, J.E. "An Experimental Study of Effective Reading Groups." THE ELEMENTARY SCHOOL JOURNAL 79 (1979): 193-223.

Examines the effect on basic skills achievement of acquainting teachers with a group of principles supported by research. Also tests the validity of those principles in fostering achievement gains.

Ayllon, T., and Roberts, M.D. "Eliminating Discipline Problems By Strengthening Academic Performance." JOURNAL OF APPLIED BEHAVIORAL ANALYSIS 7 (1974): 71-76.

Examines the effects on reading achievement and classroom behavior when students are rewarded for achievement.

Bates, J.A. "Extrinsic Reward and Intrinsic Motivation: A Review with Implications for the Classroom." Review of Educational Research 49 (1979): 557-576.

Reviews research on the effects of various reward structures on learning motivation.

Berliner, D.C. THE EXECUTIVE FUNCTIONS OF TEACHING. Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, March 19-23, 1982.

Reviews the research on managerial and instructional behaviors and their relationship to student outcomes.

Dweck, C.S. "Motivational Processes Affecting Learning." AMERICAN PSYCHOLOGIST 41 (1986): 1040-1048.

Reviews research on motivation and presents a research-based model of motivational processes.

Emans, R. TEACHING BEHAVIORS IN READING INSTRUCTION: A REVIEW OF THE RESEARCH AND CRITIQUE. Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education, Detroit, MI, February 1983. (ED 227 093)

Summarizes research findings on teacher behavior and its relationship to student reading achievement.

Evertson, C. RELATIONSHIP OF TEACHER PRAISE AND CRITICISM TO STUDENT OUTCOMES, REPORT NO. 75-7. Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C., 1975.

Examines the effects of praise, criticism, rewards, and punishment on the achievement of high and low SES elementary students.

Forness, S.R. "The Reinforcement Hierarchy." PSYCHOLOGY IN THE SCHOOLS 10 (1973): 168-177.

Discusses various reinforcement strategies and their effectiveness in relation to

children's age, race, socioeconomic status, ability level, etc.

Good, T.L., and Grouws, D.A. "Teaching Effects: A Process-Product Study In Fourth-Grade Mathematics Classrooms." JOURNAL OF TEACHER EDUCATION 28 (1977): 49-54.

Presents the results of a large observational study of teaching effectiveness in fourth grade mathematics instruction.

Griswold, P.A.; Cotton, K.J.; and Hansen, J.B. Effective Compensatory Education Sourcebook. 2 Vols. Washington, D.C.: US Department of Education, 1986. (ED 276 787 and 276 788)

Volume I reviews research on effective schooling practices, with attention to implications for disadvantaged students. Volume II provides descriptions of 116 Chapter I programs selected for special recognition in 1985.

Hayes, L.A. "The Use of Group Contingencies for Behavioral Control: A Review." PSYCHOLOGICAL BULLETIN 83 (1976): 628-648.

Reviews studies on the use of group and individual reward structures with students. While behavior is the main focus, some of the studies reviewed were concerned with the effects of rewarding achievement.

Karraker, R.I. "Increasing Academic Performance Through Home-Managed Contingency Programs." JOURNAL OF SCHOOL PSYCHOLOGY 10 (1972): 173-179.

Examines the effects of contingent praise and rewards from parents on the math achievement of second graders. Achievement improved in response to contingency programs.

Lepper, M.R., and Greene, D. eds. THE HIDDEN COSTS OF REWARD: NEW PERSPECTIVES ON THE PSYCHOLOGY OF HUMAN MOTIVATION. Hillsdale, NJ: Erlbaum, 1978.

A compilation of writings on the detrimental effects of providing extrinsic rewards to reinforce achievement and behavioral outcomes. Most articles are reviews with commentary.

Litow, L., and Pumroy, D.K. "A Brief Review of Classroom Group-Oriented Contingencies." JOURNAL OF APPLIED BEHAVIOR ANALYSIS 8 (1975): 341-347.

Reviews studies on group contingency arrangements and comments on finding about their relative effectiveness.

Lujan, J. HOW TEACHER BEHAVIOR RELATES TO STUDENT EFFORT IN CLASSROOMS FOR LOW AND HIGH STATUS STUDENTS.

Examines the kinds of praise provided by teachers in elementary and secondary classrooms, the relationship of praise to student achievement, and student perceptions of teacher warmth.

Martin, J.; Veldman, D.J.; and Anderson, L.M. "Within Class Relationships Between Student Achievement and Teacher Behaviors." American Educational Research Journal 17 (1980): 479-490.

Investigates the relationship between 25 teacher behaviors and the reading achievement of (1) whole classes, (2) small groups, and (3) individuals in first grade classes.

Medley, D.M. TEACHER COMPETENCE AND TEACHER EFFECTIVENESS: A REVIEW OF PROCESS-PRODUCT RESEARCH. Washington, D.C.: American Association of Colleges for Teacher Education, 1977. (ED 143 629)

Analyzes and synthesizes the results of nearly 300 studies on teacher competence/effectiveness. Over 600 process-product relationships are displayed in a series of tables.

Michaels, J.W. "Classroom Reward Structures and Academic Performance." REVIEW OF EDUCATIONAL RESEARCH 47 (1977): 87-98.

Synthesizes the findings of studies comparing group and individual contingency reward systems and group and individual competition structures.

Rosenshine, B. "Teaching Functions in Instructional Programs." ELEMENTARY SCHOOL JOURNAL 83 (1983): 335- 351.

Reviews research on effective teaching practices, with special attention to the content of inservice programs which were attended by successful teachers.

_____. "Recent Research on Teaching Behaviors and Student Achievement." ELEMENTARY SCHOOL JOURNAL 27 (1976): 61-64.

Reviews research on teacher behavior -- student outcomes relationships. Immediate feedback which incorporates praise is identified as a teaching behavior which promotes achievement.

_____, and Stevens, R. "Teaching Functions." In HANDBOOK OF RESEARCH ON TEACHING, edited by M.C. Wittrock. New York: Macmillan Publishing Company, 1986.

Drawing on research concerning the provision of teacher training in effective instructional techniques, the authors identify major teaching functions and discuss them in detail.

Slavin, R.E. "Cooperative Learning." REVIEW OF EDUCATIONAL RESEARCH 50 (1980): 315-42.

Summarizes the results of 28 studies on the effects of cooperative learning techniques on student achievement and affective outcomes.

_____. "Effects of Student Teams and Peer Tutoring on Academic Achievement and Time on Task." JOURNAL OF EXPERIMENTAL EDUCATION 48 (1980): 253-257.

Studies the effects of different task structures and reward structures and of a focused schedule of instruction on student outcomes.

_____. "Classroom Reward Structure: An Analytical Practical Review." REVIEW OF EDUCATIONAL RESEARCH 47 (1977): 633-650.

Reviews literature on cooperative, competitive, and individual reward structures in terms of their effect on academic achievement.

Stallings, J.A. CHANGING TEACHER BEHAVIOR: A CHALLENGE FOR THE 1980'S. Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, CA, 1981. (ED 200 596)

Teachers were trained in classroom behaviors which research had shown to be positively related to student achievement. Students of trained teachers outperformed control students. Reinforcement through provision of supportive feedback was one strategy shown to be effective.

Stewart, L.G., and White, M.A. "Teacher Comments, Letter Grades, and Student Performance: What Do We Really Know?" JOURNAL OF EDUCATIONAL PSYCHOLOGY 68 (1976): 488-500.

Reviews studies on the relative effects of different combinations of letter grades and types of written comments; then the results of a study conducted by the authors are reported.

Stringer, B.R., and Hurt, H.T. TO PRAISE OR NOT TO PRAISE: FACTORS TO CONSIDER BEFORE UTILIZING PRAISE AS A REINFORCING DEVICE IN THE CLASSROOM COMMUNICATION PROCESS. Paper presented at the Annual Meeting of the Southern Speech Communication Association, Austin, TX, April 1981 (ED 202 054)

Review s research on the effects of teacher praise, criticism, and ignoring on achievement and classroom behavior. Thompson, L.J. A Survey of Reinforcement Preferences. Research Bulletin Number 3. Churchlands, Australia: Churchlands College of Advanced Education, 1978. (ED 164 473)

Examines degree of congruence between preferred reinforcers of students and teachers and between students of different ages. Older students and higherachieving students placed greater emphasis on intangible reinforcers than did younger and lowerachieving students.

Tobin, K.G., and Capie, W. STUDENT ENGAGEMENT IN MIDDLE SCHOOL SCIENCE CLASSROOMS. Paper presented at the Annual Meeting of the Southeastern Association for the Education of Teaching of Science, Orlando, FL, November 1980. (ED 194 522).

Examines the relationship between teacher behaviors in junior high school science classes and student engagement rates. Higher engagement rates occurred in classes where teachers reinforced student efforts and encouraged them to maintain involvement.

Ware, B. "What Rewards Do Students Want?" PHI DELTA KAPPAN 59 (1978):355-356.

Surveys high school student and teacher opinions about the desirability of 15 kinds of rewards. Both teachers and students ranked praise very low.

Winett, R.A., and Roach, A.M. "The Effects of Reinforcing Academic Performance on Social Behavior: A Brief Report." The Psychological Record 23 (1973), 391-396.

Investigates the effect of rewards on students' rate of completing assignments and on their classroom behavior when rewarded for assignment completion only.

This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number 400-86-0006. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

May 1988