THE DEVELOPMENT OF A TECHNIQUE FOR THE CATEGORIZATION AND ANALYSIS OF TEACHER REINFORCEMENT BEHAVIORS

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ABSTRACT

THE DEVELOPMENT OF A TECHNIQUE
FOR THE
CATEGORIZATION AND ANALYSIS
OF
TEACHER REINFORCEMENT BEHAVIORS

By

Patricia Ramsdell Widmayer

The purpose of this investigation was to develop an observation schedule to categorize and analyze teacher reinforcement behavior. The study was designed to provide instrumentation to facilitate the adoption of the precision teaching model in the classroom by providing a technique for (1) describing the teacher's reinforcement repertoire, (2) presenting alternatives for selecting those reinforcers that should be used more frequently, used less frequently or eliminated from the teacher's repertoire (given her behavioral objectives) and (3) recording the teacher's revised behavior for control and analysis. An observation schedule was written for classroom use with multiple, behaviorally defined items in three major categories: rewards, feedback and deterrents. Potential items for inclusion were derived from three sources: interaction analysis, applied behavior analysis and reinforcement literature, review of video-taped classroom episodes from a study in the Lansing, Michigan, Public Schools and classroom observations by the author. The instrument includes twenty-eight categories plus subcategories and examples to illustrate each item.

Four experienced teachers were trained to use the instrument. Tests for observer agreement at the conclusion of the training session derived percentages of .84, .75, .87, .67 and .76. The percentage of observer agreement on recording during the study averaged .82.

The testing of the reinforcement observation schedule was limited to suburban elementary school teachers identified as "competent" by the building principals. Ten teachers in five Royal Oak, Michigan, elementary schools were observed for ten randomly-selected half-hour periods over three weeks in April, 1970, and their reinforcement behaviors systematically recorded. The data provided the basis for determining the reliability and validity of the instrument and, simultaneously, describing the reinforcement behavior of "competent" teachers as a criterion for practitioner performance and further instrument utilization.

Analysis of the distributions of the recorded teacher reinforcement behaviors was performed through Gerig's Multivariate Extension of the Friedman Test, Kendall's Coefficient of Concordance and percentage comparisons. The findings indicate that teacher behavior was stable over time and that the teachers had a high level of agreement on category rankings by frequency. The frequency distributions for the ten teachers suggest certain directions for teacher education, but additional comparative data must be obtained using this instrument to describe teacher behavior in other socio-economic settings, grade levels, teaching styles and levels of competence before conclusive statements can be made. The findings do, however, support the conclusion that a teacher reinforcement behavior observation schedule was developed with sufficient reliability and validity to justify further use in teacher

education, both pre-service and in-service. Also, optimal procedures are indicated by this study for future instrument development.

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To Larry, Carole and Jacquey, whose assistance and encouragement made this research a possibility and whose constant harrassment made its completion a necessity.

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TABLE OF CONTENTS

LIST OF TABLES

TABLE PAGE

CHAPTER I

INTRODUCTION OF THE PROBLEM

THEORETICAL FRAMEWORK OF THE PROBLEM

Educational research has finally reached a stage where it can offer substantial assistance to teachers as they attempt to bring about intended learning in students, i.e. learning defined as a relatively permanent change in a behavioral tendency resulting from reinforced practice (Kimble and Garmezy, 1963, 133).

This has not been a sudden occurrence, but rather a possibility built upon learning research, group dynamics research and philosophical investigation during the last half century. However, although the principles are tested and available, instrumentation must be designed before the practitioner can use these principles in the classroom.

During the past fifty years, many experimental programs were instituted and hundreds of instructional innovations initiated in the schools to increase student learning. Yet there was little evidence that a theoretical grounding for educational research might be emerging. Rather, these experimental attempts were executed and evaluated as short-term, univariate programs involving small numbers of students and teachers. In 1963 Elliot and Foshay (233) reached the conclusion that: "Perhaps the most common complaint is that research knowledge in education does not cumulate in the manner found in such fields as medicine and engineering." But during the 1960's a new area of inquiry emerged which offered greater potential for cumlative

knowledge and theoretical frameworks in education: interdisciplinary studies. This marriage was not entered into voluntarily, but was an expedient brought about by increasing demands for reform. Paul Goodman (1962), Edgar Friedenberg (1963), John Holt (1965), George Leonard (1968), Father James Kavanaugh (1967), Herbert Kohl (1967) and others attacked the educational institution as irrelevant to contemporary needs and they gained credence in a time of turmoil. It became apparent that total educational reform was necessary, not just adding new subjects or altering certain teacher strategies. But little research evidence existed to provide substance for such a total change. Thus specialists began to cooperate in compiling the research results in their disciplines to hasten payoff research; they began jointly formulating, investigating and stating solutions in a problem area. For example, practitioners, curriculum specialists, evaluation specialists and area experts have combined their expertise in proposing new approaches to classroom instruction (Saunders and Tanck, 1970). As a result of these investigations it is feasible for specialists in combination to purposefully create and reveal synergisms. It is the investigation and manipulation of these interactive effects in the classroom which have made the massive facilitation of learning a possibility (Bandura, 1969). This cumulative research has resulted in an educational model most accurately called precision teaching (also referred to as applied behavior analysis, behavioral counseling and behavior therapy from its clinical background).

Meacham and Weisen (1969, 3) describe precision teaching as follows:

> (It) involves a blending of scientific procedures

> with the vast problems of modern education . . . . What is developing, then, is a system of education which carefully evaluates its own methods through the framework of science and makes corrections based on data rather than opinion, on facts rather than fiction. In the classroom this new approach is beginning to manifest itself in what is called precision teaching.

Precision teaching requires that the environment be programmed for successful learning through the measurement of behavior in the classroom, the setting of explicit behavioral goals, the strengthening of desirable behavior through planned positive reinforcement and the provision of cues for learning. Thus, precision teaching stands at the crossroads of three very dominant areas of educational research: behavioral science methodology, Skinnerian reinforcement theory and classroom interaction analysis. The melding of these three concerns into one complex, rational approach to classroom manipulation presents a concrete alternative for enhancing both cognitive and affective learning for all children, a goal long sought but seldom realized. The results of precision teaching in modifying behavior have been significant, as will be indicated further in Chapter II.

Several basic assumptions are present in precision teaching. A first assumption stems from the old adage that, "It's not what you say, it's what you do that counts." Therefore teacher self reports are not used, but rather the basic data for precision teaching is overt behavior. The unit for observation is a response, a single completed statement or interaction between teacher and student, student and student or student and classroom stimuli which has a clearly observable beginning and end (Meacham and Weisen, 1970, 50). A second assumption is that the most appropriate tactic to produce desirable responses is reinforcement. This is based upon the principles of learning that

Kuethe (1968, 57) summarized by stating, "A wealth of experimental data has demonstrated that there is a relationship between the performance of an organism and the reinforcement that is received for performance." A third assumption is that the entire school setting is utilized. Thus, resources for intended learning are not limited to the teacher and the textbook, but any and all stimuli in the environment can be used in the planned changes.

A reinforcement approach to teaching points out a new direction which is contrary to much existing classroom practice. Many plans for learning are now based upon the premise that if a person has a high self-concept, a positive attitude toward his environment, and is aware of the consequences that will result from an unsatisfactory school performance (usually negative) he will be likely to achieve at higher levels. However, precision teaching follows B. F. Skinner's contention (1953, 73-75 & 242-256) that we do not give a man a sense of achievement, but rather we reinforce a particular action and the knowledge and attitudes that accrue are simply a repertoire of reinforced behaviors. To reiterate, then, precision teaching deals directly with overt behavior and reinforcement in the school setting. These factors are deemed crucial in that they facilitate measurement and manipulation in a systematic fashion.

Several advantages accrue from the precision teaching or behavioral method:

1. The student/teacher relationship is modified to a client/change agent relationship. This latter relationship is a more plastic pairing, necessitating mutual planning and definition of goals. Thus, the rigidity of the cognitive-dominant, teacher-

telling strategy is loosened. (Gage & Unruh, 1967, 358) In its place is a prescription for modifying the entire school environment.

Also, because of the redefinition of the student/teacher relationship, all environmental stimuli are incorporated into the change agent/client relationship. This setting is very amenable to both the effective utilization of technology (media and computer) and the programming of higher learning experiences (not necessarily through machinery, but structuring of the conditions of learning and its contingencies in the environment).

2. A systematic description of the entry behaviors of both the student and the teacher are required in the categories of defined concern. Thus, a record of the overt behaviors of both the client and change agent are available for analysis and change. Two advantages are gained from this procedure: (A) This provides the focus for a determination of the appropriateness of present instruction and subsequent learning goals for the student, i.e. if instruction is directed toward the satisfaction of the individual's specific and unique needs. (B) Such an analysis also provides the vehicle for individual planning. This could answer the criticism voiced by Edmund Gordon (1970, 9) regarding compensatory education:

> These demonstrations and evaluation efforts reflect a search for generic treatments, a desire to find the program or practice that works for large numbers of people; this tendency can be seen as a reflection of the generic nature of research on population characteristics, which tends to give the impression that we are dealing with a large, homogeneous group with common problems of development. Very little of this research is directed at carefully designed and controlled experimentation or at qualitative analysis of large sample of naturally occurring programs to identify relationships between differential

> learner characteristics and differential treatment characteristics. Questions as to what works for which children under what specific conditions are not heavily reflected in available research to date.

Data that would shed light on individual learning style would be collected constantly in precision teaching.

3. An explicit statement of behavioral objectives is required, enabling a clear criterion for assessment to be provided for the student and teacher. This specification has two distinct advantages: (A) By concisely stating the objectives, a specific judgment of the worthiness or goodness of the intended changes can be made prior to the inception of learner behavior modification, and (B) a prior statement of objectives provides the criteria for change agent accountability for intended and unintended learning.

4. The central precept of precision teaching is positive reinforcement for desirable behavior and the withholding of positive reinforcement when undesirable behavior occurs (as defined by the change agent, often in consultation with the client). One advantage is that the emphasis is on reinforcement to the exclusion of punishment. In other words, the potentially negative consequences of the use of punishment (e.g. negative attitudes toward subject matter, teachers and school in general) are diminished. This is in keeping with Leonard's (1968, 43) description of Skinner's research:

> Skinner has found that, not punishment, but reward -- or, in his terms, positive reinforcement -- is the most effective force for shaping or teaching. Positive reinforcement may turn out to be food, money, praise, a kiss, a smile, a fleeting nod of approval. Best of all, it may consist simply of getting a right answer and knowing it's right, of working out a puzzle, of mastering a skill, of finding new beauty and order in words, music, color.

> . . . Too often, according to Skinner, people have relied on punishment or the threat of punishment to control other people. Or they used gross and insulting positive reinforcement, such as money meted out in a crude piece-work system. Skinner's scientific and humane impulses meet in his desire to substitute reward for punishment, to rely increasingly on the more subtle and "beautiful" forms of positive reinforcement.

In implementing precision teaching, the overt observable behavior of the student is the dependent variable and reinforcement is the independent variable. Once a behavioral objective has been stated, a baserate of the applicable student behavior and the teacher reinforcement of that behavior are obtained. Typically this is done by the teacher or an outside observer tallying the student behavior on a desirable-undesirable dichotomy. The teacher's behavior is tallied, usually, as (1) approving desirable, (2) approving undesirable, (3) disapproving desirable, (4) disapproving undesirable. Second, the teacher determines what is reinforcing for the student. Third, the teacher manipulates her reinforcements, reinforcing appropriate behaviors and withholding reinforcement when inappropriate behaviors occur. Control is exercised over this process by recordkeeping and experimentation with reinforcement techniques until the desirable behavior is exhibited by the student for an extended period of time. Krumboltz and Thoresen (1969, xi) provide evidence that this technique is effective for all age levels in four categories: (1) deficient decision-making skills, (2) ineffective academic skills, (3) inappropriate social skills and (4) self-defeating fears and anxieties.

STATEMENT OF THE PROBLEM AND PURPOSE

A major problem presently prevents adoption of the precision teaching model in the public schools: there is insufficient instrumentation in existence for the classroom teacher to categorize and analyze behavior. Some examples are provided in the literature (see Chapter II), but in most cases the categorizations were designed as situation specific. The greatest need, therefore, appears to be for a comprehensive categorization of the reinforcement techniques that are and can be used by teachers. Given the present constraints (lack of time, training and consultation assistance) of the classroom teacher, it is difficult for her to design the necessary instruments, even after she is cognizant of the viability of the model. If reinforcement is the independent variable to effect behavior change, there should be an instrument available that would provide for (1) the assessment of teacher entry behaviors, (2) the description and refinement of reinforcement and feedback and (3) the evaluation of a teacher's performance. Such an instrument would: (1) describe the teacher's reinforcement repertoire, (2) present alternatives for selecting those reinforcers that should be used more frequently, used less frequently or eliminated from the teacher's repertoire (given her behavioral objectives) and (3) record the teacher's revised behavior for control and analysis.

An attendant problem in the adoption of the precision teaching model is the limited reinforcement alternatives of most teachers. An extensive listing of reinforcement techniques in the instrument (with behavioral definitions and examples) would provide most teachers with a greater number of behavior options than are presently being gleaned

from pre-service training. Evidence from several sources supports this contention. First, a perusal of the education curriculum in any college catalog will reveal that usually only one educational psychology course is required for graduation and certification. This allows only minimal time for exposure to and understanding of the literature. Second, during classroom observation periods, when pre-service teachers go into the schools, they see reinforcement practices that seldom go beyond praise and grades. Finally, this author has found that students enrolled in methods courses and supervised teaching are seldom able to generate a list of greater than five reinforcement options. Thus, a listing of reinforcement behaviors is needed that will move teachers out of the present limited model.

The advantages of precision teaching, an instructional model based upon Skinnerian reinforcement theory, have been discussed. However, no instrumentation exists beyond textbook and research descriptions to assist the practitioner in adopting this teaching strategy. Therefore, classroom observation instruments should be devised for recording overt behaviors to assist the practitioner in describing classroom behavior, formulating a procedure for behavior change, carrying out the program and evaluating its effectiveness in terms of behavioral modification. Because the teacher's major resource in implementing precision teaching is reinforcement, it is this construct that should be dealt with first. Thus, it is the purpose of this study to develop a classroom observation schedule to categorize and analyze teacher reinforcement behavior. For optimal utilization, this instrument should be employable by the classroom teacher.

CHARACTERISTICS OF THE INSTRUMENT

In developing the instrument, behavioral definitions and examples should be devised, since none presently exist. Certain methodological explanations have been written which could serve as a partial guide in this endeavor (Medley and Mitzel, 1963; Simon and Boyer, 1967). However, a revised approach must be taken in the development of the behavior schedule since the observation instruments previously developed have encountered certain problems:

1. Most observation schedules are used as research and preservice tools, but are not widely used by classroom teachers as part of inservice training.

Classroom observation instruments have enjoyed increasing popularity during the past decade among researchers and university instructors. This is because the paper-and-pencil classroom observation instruments provide systematic data on classoom dynamics with minimal interruption of natural on-going processes. Before the observation instrument, classroom interaction research was limited to anecdotal reporting, static sociogram methods or artificial manipulation of classroom processes in the laboratory setting. However, the classroom observation instruments, most notably Flanders' Interaction Analysis (Flanders, 1970), Medley and Mitzel's OScAR (1963), Bellack's Language of the Classroom (1963) and the Aschner-Gallagher Topic Classification System (Aschner, 1959) have failed to gain wide acceptance among practitioners, although this has been one of their stated intents. This lack of interest has occurred despite many possible classroom uses as described by Rosenshine (1970, 279):

> (Three) potential uses of these instruments (for the observation of classroom instruction / are /):

> assessing variability in classroom behavior, assessing whether the teacher's performance agrees with specified criteria describing classroom interaction, and determining relationships between observed classroom behavior and outcome measures.

The lack of practitioner enthusiasm, however, may be implied by Rosenshine's very statement: the suggested uses of the instrument are so multiple and non-directional as to be inappropriate for practitioners (Rosenshine, 1970, 293). The classroom teacher has minimal training in behavior modification and evaluation techniques. Thus tools with more explicit parameters are needed. Researchers have failed to develop classroom instruments which have specific applicability to a given behavioral model or instructional strategy. It seems crucial to the writer that the development of the classroom observation instruments should now evolve toward the design of categorization systems within conceptual teaching models.

2. An observation instrument must be developed with more numerous and explicit categories. (Meux, 1967, 549-550) The number, naming and defining of categories in the observation instruments provide very convenient, interpretable data for hypothesis testing of classroom interaction by the researcher. However, most systems are limited to ten or less categories that are intended to include <u>all</u> teacher statements and actions. Such is Flanders' Interaction Analysis (Verduin, 1967, 33-38) which is divided into (1) teacher talk-direct influence, (2) teacher talk-indirect influence, (3) student talk and (4) silence or confusion with a total of ten subcategories. Those systems that do isolate specific components of the teaching act, such as the classification of teacher (reinforcing)

verbal interactions by Wasik, Senn, Welch and Cooper (1969, 183) into (1)positive, (2) neutral, (3) question, (4) redirection and (5) negative (with behavioral examples), still employ gross categories that give little specific indication of alternative behavioral action that could be taken once the data is compiled. Practitioner use and interpretation is diminished because the finite categories each contain a wide spectrum of unspecified behaviors. A practitioner without extensive consultation, verbal explanation and guidance is unable to employ present observation instruments and alter her behavior on a continuing basis; and one of the requisites for analyzing and changing teacher behaviors is that the teacher is able to select behaviors from known alternatives. (MacDonald, 1966, 3)

Medley and Mitzel (1963, 298-303) make an important distinction between observation schedules that are category systems and those that are sign systems. They describe category systems as follows:

> The approach is to limit the observation to one segment or aspect of classroom behavior, determine a convenient unit of behavior, and construct a finite set of categories into one and only one of which every unit observed can be classified. . . . It is supposed to be exhaustive of behaviors of the type recorded . . . . Category systems have been used more often in studies based on well-developed or elaborated theories purporting to indicated specific behaviors to be looked for. . . .

Medley and Mitzel then summarize their findings by stating the basic rules for constructing a category system (1963, 301):

> There should be a relatively small number of categories, each of which is used an appreciable number of timeswith some behavior or aspect of behavior that is relatively common. If convenient, the tallies should be based on natural units; if not, the tallies should be based on brief time units. The behavioral cues on which the discriminations

> are to be made should be explicit even to the uninitiated, any discrimination should be easy for the observers to make.

This is contrasted with sign systems which are characterized as follows:

> The . . . approach is to list beforehand a number of specific acts or incidents of behavior which may or may not occur during a period of observation. The record will show which of these incidents occurred . . . and . . . how frequently each occurred (298-299) . . . The evolution of a sign begins with the idea that a certain behavior is symptomatic of some behavior believed to be important (301) . . . A noteworthy feature of signs is that one recorder can use a relatively large number of them simultaneously (301) . . . . A sign should pretty well define itself (302) . . . (by having) three characteristics: present tense, positive occurrence and singular number.

In making this distinction between category systems and sign systems, the basic characteristics of the classroom observation schedules are delimited. Most observation instruments have been category systems such as Flanders' (as described above). They are limited by definition in the number of classifications of behavior to be used (no more than ten are recommended). The sign systems have also been limited in practice in the number of categories used (see the Wasik, et.al., schema above). However, the listing of signs is potentially unlimited and thus offers greater possibilities for the generation of alternative behaviors with descriptive labeling. It is not a requirement of the sign system that all signs occur during a given observation period or in a specified setting. This makes it possible to gather information on what is not happening as well as what is happening in the classroom. Because of the condition that all signs do not have to occur in a

certain setting, some items can be drawn from behavioral research literature rather than exclusively from classroom experience.

Given the distinction between category and sign systems for classroom observation instruments, it is suggested that a sign system would be more suitable to the purpose of this study. This sign system should be developed, however, with many more alternatives and more explicit behavioral definitions than are presently employed in most instruments. The suggested procedure would give more explicit, descriptive alternatives for manipulations. The sign system also permits the analysis to be focused on one component of classroom functioning, teacher reinforcement behavior (which is the primary variable in the precision teaching model) rather than attempting to encompass all interaction as the category system does. Few sign systems exist to provide direction for this development. And even fewer instruments exist which separate a single construct or component in the teaching act such as reinforcement in a sign system (see Chapter II).

In order to provide the needed instrumentation for precision teaching, therefore, certain departures must be made from present practice. First, an instrument must be developed to isolate the teacher reinforcement component, which has little precedent. Second, a sign system rather than a category system must be written to contain more numerous descriptive alternatives for analysis and manipulation than are presently being written into observation instruments. The categories must be specified sufficiently to achieve an acceptable level of observer agreement for successful testing of an observation instrument. To achieve an acceptable reliability

requires the inclusion of some characteristics of a category system in development: "The behavioral cues on which the discriminations are to be made should be made explicit even to the uninitiated. . ." (Medley and Mitzel, 1963, 301) Also, in order to facilitate teacher use, tallies should be based on natural units as suggested for a category system. This procedure should result in an instrument appropriate for introducing precision teaching in the classroom.

3. A third point should be considered in the development of this instrument: the criteria for selecting the types and numbers of reinforcement techniques that could or should be attempted in the classroom. One might argue that the selection should be based upon the research literature, i.e. precision teaching calls for the use of positive reinforcers to modify behavior. But this does not provide a basis upon which to select among positive reinforcers. Further, certain information-giving techniques, called feedback in the literature (DeCecco, 1968, 253), must be included in any classroom interaction as reinforcers even though they are seldom considered truly positive in nature. Daley (Krumboltz and Thoreson, 1969, 42-45) has suggested giving each student a reinforcement menu from which to select a reinforcer when an appropriate behavior has occurred. But this conscious selection can only comprise a small portion of the reinforcers introduced into a classroom. A pattern of behavior must be ascertained that the practitioner could emulate or compare her performance to in order to make self-evaluations and corrective decisions. A strategy for establishing criterion models has been proposed (Shulman, 1970, 385-386):

> The strategy would involve initially identifying

> criterial educators, who, like the native speaker of the language in linguistic studies, are taken to represent some standard of excellence as practitioner of the educational arts. Careful descriptive protocols of the criterial educators verbal and non-verbal behavior would then be gathered and, using behavioral equivalents of the linguistic rule discovery tactics, educational researchers would attempt to write a grammar of their teaching behaviors. This grammar would be a set of rules adequate to account for their functioning. I would hypothesize that once made explicit and cross-validated, such rules could be used to develop instructional procedures to help new students attain the criterial performer's level of competence.

This strategy requires that competent teachers be identified and their reinforcement behaviors described as a criterion for practitioner performance.

A method has been researched (Henderson, 1968) for selecting competent teachers (see Chapter III). This method should be used to identify competent teachers (in a specified setting). The classroom actions of the "criterial performers" should then be described according to the teacher reinforcement behavior instrument. This would provide the interested practitioner with a comparative measure for self-evaluation.

To summarize, three specific changes are proposed in the development of a classroom observation instrument: First, instruments should be applicable to a given instructional strategy. Second, a sign system should be developed with more definitive, descriptive items than presently exist. And third, competent teachers should be identified and their behavior described quantitatively using the teacher reinforcement behavior instrument to serve as a criterion for the practitioner.

OBJECTIVES OF THE STUDY

Two major problems are apparent in this introduction. First, precision teaching offers substantial assistance to teachers as they attempt to bring about intended learning in students. But instrumentation is lacking for precision teaching to be generally adopted in the schools. Second, classroom observation instruments, appropriate instrumentation for precision teaching, have become highly sophisticated as research tools. But these instruments have not been designed within an instructional model with (multiple) definitive, descriptive items and identification of criterion performances to hasten their use and effectiveness in the classroom. Therefore, the development and testing of an observation instrument to categorize and quantify teacher reinforcement behaviors is needed to provide instrumentation central to the adoption of precision teaching in the classroom and, simultaneously, provide a model for the development of additional instruments incorporating the required characteristics.

It is the purpose of this research to develop a classroom observation schedule to categorize and analyze teacher reinforcement behavior according to the criteria established above. This research investigates in depth the feasibility, reliability and optimal procedures for designing, testing and implementing such an instrument.

THERE ARE TWO IMMEDIATE OBJECTIVES OF THIS RESEARCH. THE FIRST IS TO DESIGN A MULTI-SIGN SYSTEM WITH SUFFICIENT OBSERVER AGREEMENT AND STABILITY TO ESTABLISH AN ACCEPTABLE LEVEL OF RELIABILITY. Reliability is synonymous with dependability, consistency, accuracy and objectivity. As defined by Kerlinger (1965, 430), one approach to

reliability is to ask the question: "If we measure the same set of objects again and again with the same or comparable measuring instruments will we get the same or similar results?" Reliability is the accuracy or precision of a measuring instrument. Therefore, one criteria for reliability in this instance is the percentage of observer agreement in the recording of teacher behavior, using the designated instrument. Further, a stable record of teacher performance should be obtained for reliability; the frequency distributions for each teacher should not vary significantly over time. THE SECOND OBJECTIVE IS TO DESIGN A MULTI-SIGN REINFORCEMENT INSTRUMENT WHICH WILL GAIN SUFFICIENT DATA ON AND REFLECT A SIGNIFICANT DIFFERENCE BETWEEN THE REPERTOIRES OF THE SELECTED CRITERIAL PERFORMERS TO ESTABLISH INSTRUMENT VALIDITY. The criteria for validity are defined by Medley and Mitzel in Measuring Classroom Behavior by Systematic Observation (1963, 250):

> The validity of measurements of behavior . . . depends, then, on the fulfillment of three conditions: (1) A representative sample of the behaviors to be measured must be observed. (2) An accurate record of the observed behaviors must be obtained. (3) The records must be scored so as to faithfully reflect differences in behavior.

Medley further defines validity in a later article (Medley in Honigman, 1967, 24-25):

> A schedule may be said to be valid to the extent that records obtained with it yield an amount of information about teacher behavior which justifies the cost of collecting the data. . . . The need for validity suggests that the one which relates most meaningfully to teacher effectiveness is the best -- that is, the set of categories in terms of which the changes in behavior a teacher needs to make can be described most intelligibly and economically.

In the following chapters is a detailed description of the study that was carried out to achieve these objectives. A review of the literature was made to establish the validity of the precision teaching model and state a behavioral definition of reinforcement and its functional components. Also, the interaction analysis literature relevant to the development and testing of the instrument was reviewed. This is reported in Chapter II. An observation schedule was then compiled and synthesized from the descriptive analysis of video tape recordings of teachers in the Lansing, Michigan, Public Schools, a review of the category schedules and suggested reinforcement techniques in the literature and anecdotal records made by the author in Oakland County, Michigan, classrooms. Behavioral definitions and examples were provided for each category and subscript. This is reported in Chapter III. The training of the observers and the tests for observer agreement are also reported in Chapter III.

A sample of ten competent teachers in five elementary schools in Royal Oak, Michigan, were subsequently selected for observation as criterial performers. The teachers were each observed for ten, randomly selected, one-half hour periods over three weeks in April, 1970, by trained observers who were experienced teachers. Checks for observer agreement were made during 20% of the observation periods. Analysis of the distributions derived was performed through Gerig's Multivariate Extension of the Friedman Test, Kendall's Coefficient of Concordance and percentage comparisons. Population and sample selection of the criterial performers, and the recording of the data in the classroom are included in Chapter III. The summary of the data and the data analysis are incorporated into Chapter IV. Chapter

V discusses the inplications of the study for teacher education.

CHAPTER II

REVIEW OF RELATED RESEARCH

The literature in three major areas of educational research have direct bearing upon the development of a teacher reinforcement observation schedule: applied behavior analysis, interaction analysis and reinforcement research. First, applied behavior analysis as it applies to the efficacy of the precision teaching model will be reviewed to provide support for the position that positive conditioning techniques can be effectively employed in the classroom. Second, precedents and procedures for the development of a teacher reinforcement observation schedule will be cited from interaction analysis research. And, finally, the literature on reinforcement will be summarized to provide an operational definition and functional components for instrument development.

APPLIED BEHAVIOR ANALYSIS RESEARCH

Today the professional educator is placing greater emphasis on the emotional development of the student than ever before. Bodies of research are being accumulated that give ever-growing support to the conclusion that intellectual learning is dependent upon emotional stability and well-being. Yet to grapple with the concept of emotional stability and well-being is like trying to alter a "sea of putty" for the classroom teacher: its dimensions are nebulous and its content variables infinitely flexible. The clinical psychologist and

psychiatrist have effectively practiced in this area by training for years to develop constructs that can be manipulated on a one-to-one basis to achieve an acceptable level of emotional stability in their clients. However, for the professional educator, this set of circumstances is an impossibility. There are several reasons (Clarizio and Yelon, 1967):

1. The teacher is not trained to probe the causes of behavior.

2. Most teachers have control only over the school environment and cannot manipulate causes that may extend or originate outside the school.

3. Many maladaptive symptoms may continue to persist after the causes are eliminated.

4. Being responsible for thirty pupils simultaneously, the teacher must deal immediately with inappropriate behavior in order to establish or maintain a stable classroom environment in which all thirty students can function optimally.

Thus the teacher must employ techniques that can be utilized and controlled in the immediate environment to modify student behavior.

Those studies reported follow certain steps: (1) identification of an inappropriate behavior and the alternative behavior desired in the student; (2) assessment of the baserate of student behavior; (3) systematic application by the change agent of a prescribed operant conditioning technique; (4) evaluation of student behavior with periodic adjustments in the treatment if necessary. This makes good sense, as Bandura (1969, 16-17) explains:

> If progress in the understanding of human behavior is to be accelerated, psychological theories must be judged by their predictive power and by the efficacy of the behavioral modification procedure that they produce . . . . There is little to be gained from condemning delinquents for their history of anti-social behavior, but there is much to be gained from having them experience new response consequences that will help them develop a more effective way of life.

Bandura presents evidence (1969, 118-624) that cognitive and affective modifications can be achieved more successfully through planned behavioral change than through attempts to alter internal events directly. Skinner provides evidence (1968, 8-17) for the position that the contingencies of reinforcement can be effectively manipulated in the classroom and cites several areas where improvements can be made. The basis for this evidence, though, is consistently derived from the laboratory.

Recent studies in behavior modification have moved from the laboratory to the natural setting, thus providing more appropriate evidence for the educator on the use of reinforcement in the classroom. The principles utilized are extensions and applications of earlier research in the techniques of operant conditioning (Skinner, 1953). In this application to the natural setting, it has been found (Bijou, 1970) that psychological research can now offer education . . ."a set of concepts and principles derived exclusively from experimental research, a methodology for applying these concepts and principles directly to teaching practices, a research design which deals with changes in the individual child (rather than inferring them from group averages) and a philosophy of science which insists on observable accounts of relationships between individual behavior and its determining conditions."

In moving to the natural settings, these concepts and principles were initially applied in institutions and special classrooms where the variables could most easily be controlled and recorded. Yet it is important to emphasize that the behavior modification techniques in the studies cited were applied while the client(s)

remained within the group setting. He was not singled out for treatment on a one-to-one basis but functioned in the natural setting. In many cases more than one person (and, occasionally, the whole group) was treated simultaneously. This obviously provides precedent for the classroom teacher.

The attentional deficits and disruptive behavior of a class of retarded boys was reduced through praise and tokens (Zimmerman, Zimmerman and Russell, 1969). Praise and candy evoked more cooperative play from two retarded boys in their play groups (Redd, 1969). In schools for the deaf, appropriate visual attending (Craig and Holland, 1970) and remaining seated in the classroom (Osborne, 1969) were increased through food and tokens and additional free time from school work.

In institutional settings, several types of undesirable behaviors were modified. Token procedures were used to reduce the excessive screaming and violence, apathy and general lack of response of psychiatric ward patients (Winkler, 1970). Barton, Guess, Garcia and Baer (1970) modified undesirable mealtime behaviors of a hospital cottage of retardates through contingent timeout procedures. Prompts and cigarettes were employed to produce increases in the rates of social greetings of chronic schizophrenics (Kale, Kaye, Whelan and Hopkins, 1968). And brief timeout for disruptive and aggressive behaviors and reinforcement for appropriate behaviors were successfully used with patients in a state hospital ward (Bostow and Bailey, 1969).

The undesirable behavior of adolescent "pre-delinquents" was also modified through reinforcement procedures. Aggressive statements and poor grammar were replaced by tidiness, punctuality and increased

homework completion in a home-style rehabiliation setting when the boys were given points toward home visitation, watching TV and riding bicycles (Phillips, 1968). In a subsequent study, home privileges contingent upon appropriate study behavior and obeying class rules also altered specified delinquent behaviors (Bailey, Wolf and Phillips, 1970).

More closely approximating the circumstances of the public and private school classroom and, thus,providing more adequate evidence for modeling, are the series of studies performed in the pre-school.

Teacher social reinforcement, such as praise and attention (Buell, Stoddard, Harris and Baer, 1968), increased a 3 year old's use of play equipment (which was intended as a contribution to her deficient motor skills), improved the cooperative play of a 5 year old (Hart, Reynolds, Baer, Brawley and Harris, 1968), produced a high frequency of verbal behavior in a previously non-verbal four year old (Reynolds and Risley, 1968) and modified the gross behavior disorders in a group of nursery school children (Harris, Wolf and Baer, 1964). Kirby and Toler (1970) induced a pre-school boy with a low rate of interaction with his classmates to pass out candy as a tactic to increase his rate of interaction with them. Tokens exchangeable for a variety of play activities and snacks were effective in eliciting desired handwriting skills in a Head Start program (Miller and Schneider, 1970.) In another pre-school classroom tokens were acquired by engaging in a variety of study behaviors (Bushell, Wrobel and Michaelis, 1968). The study behavior of each child was altered in the same direction, although at different magnitudes. Risley and Hart (1968) found that correspondence could be developed between children's non-verbal and verbal behavior such that

their non-verbal behavior could be altered simply by reinforcing through food snacks the children's verbal reports of their non-verbal class activities. In a related study Hart and Risley (1968) utilized several reinforcing techniques to induce disadvantaged pre-schoolers to use and acquire descriptive adjectives. Access to pre-school materials was found to be the most powerful reinforcer.

The main research, however, that must be perused for evidence of reinforcement practices in the classroom is centered at the elementary and secondary level. Based upon the previous experiences in institutions, special classrooms and pre-schools, more and more attention is being focused on the "normal" classroom.

Many of the studies at the elementary level are focused on the disruptive behavior of selected students. Yet all are manipulated within the class setting. Coleman (1970) developed a procedure for use in a public school classroom where only one of the children needed treatment, sophisticated apparatus was not feasible, personnel were untrained in conditioning techniques, and where disruption had to be minimized. Candy reinforcers were contingent upon the working behavior of each of four children and the candy divided equally among the class. The face-touching, poor posture and voice-loudness of a sixth grade girl were modified through tokens (exchangeable for bracelets, pins, dresses and hairstyling) given during the after-school viewing of video tapes of the child's behavior (Schwarz and Hawkins, 1970.) Broden, Bruce, Michell, Carter and Hall (1970) observed significant increases in the attending behavior of two boys seated at adjacent desks when the teacher systematically increased the amount of attention for appropriate attending behavior. Earning token points toward a model increased the

attending behavior of an underachieving nine year old male subject (Walker and Buckley, 1968). Teacher attention following study behavior and the ignoring of disruptive and dawdling behavior resulted in sharply increased study rates for one first grade and five third grade pupils in an investigation by Hall, Lund and Jackson (1968). The disruptive classroom behavior of four first grade children was reduced through the systematic use of teacher attention and positive comments while general reprimand and negative comments were controlled (Ward and Baker, 1968). The non-study behavior of our first grade public school students was successfully modified through the dispensing of tokens for special activities contingent upon appropriate behavior (Surratt, Ulrich and Hawkins, 1969). Also, the academic achievement of the fifth grade student allowed to dispense the reinforcers improved significantly when his participation in the study was made dependent upon this improvement. The appropriate classroom behavior of two second grade girls and a kindergarten boy (Abbott, 1969) was improved through the contingent use of teacher verbal interaction, withholding of social reinforcement and timeout from social reinforcement (Wasik, Senn, Welch and Cooper, 1969). Meacham and Weisen (1969, 147) report the increased correct word pronunciation in a graded word list through teacher manipulation of approving, disapproving and instructional statements for an elementary school girl. Finally, a child with chronic misbehavior problems was sent home according to the contract he had made, termed "systematic exclusion," whenever he got out of his seat, talked etc. (Keirsey, 1969, 89-113). Through this system, his behavior was remarkably modified.

Behavior modification and reinforcement techniques were also

employed with success when the target behaviors were group functions. Madsen, Becker and Thomas (1968), in a model study, found that ignoring inappropriate behavior and showing approval for appropriate behavior were very effective in achieving better classroom behavior. In a subsequent study (Thomas, Becker and Armstrong, 1968) the effects of teacher behaviors on the classroom behaviors of children were investigated by systematically varying approving and disapproving classes of teacher behavior. The subjects were 28 students in a middle-primary school class. It was demonstrated that approving teacher responses served a positive reinforcing function in maintaining appropriate classroom behaviors. Disruptive behaviors increased each time approving teacher behavior was withdrawn. When the teacher's disapproving behaviors were tripled, increases appeared most markedly in gross motor and noise-making categories of disruptive behavior. The findings indicate the importance of the teacher in producing, maintaining and eliminating disruptive as well as pro-social classroom behavior. A token reinforcement program reduced the frequency of disruptive behaviors in seven second grade children in one class, while a combination of rules, educational structure, praise and ignoring only eliminated the disruptive behavior of one child in a study conducted by O'Leary, Becker, Evans and Saudargas (1969). The "paying-attention behavior" in four elementary school classrooms was gradually increased through group contingencies and token-mediated reinforcement by Packard (1970). Excessive sound-intensity levels and, subsequently, out-of-seat behavior were suppressed in a regular public school classroom through additional gym period time and 2-minute breaks (Schmidt and Ulrich, 1969). And, finally, out-of-seat and talking-out behaviors were reduced

in a fourth grade class through the acquisition and loss of special privileges (Barrish, Saunders and Wolf, 1969), while the mean percentage of instructions followed by a kindergarten class increased to 78% when the teacher began attending to each child if an instruction was followed (Schutte and Hopkins, 1970).

At the secondary level, the variables are the most difficult to manipulate since students are in one class (usually) for a maximum of an hour per day. Yet studies have reported successful results and offer appropriate designs that could be followed. Arrangements between teacher, student and counselor have been used to mediate individual problems. Cantrell, Cantrell, Huddleston and Woolridge (1969) prepared written contracts specifying ways in which the child could obtain existing individualized reinforcers contingent upon approximations to desired appropriate behaviors chosen as incompatible with the referral problem behaviors. Initial results have been encouraging. A counselor was also able to establish (Castle, 1969, 33-36) a successful praise-and-ignoring program with a seventh grade boy's teachers to modify the wearing of bizarre hats, using baby talk, not completing assignments and being tardy to class. Two studies have been reported on the modification of the behavior of an entire class. The learning of history and geography material in four ninth grade classrooms was significantly improved through a self-determined token reinforcement program (Glynn, 1970). And the effects of teacher praise and disapproval on inappropriate talking and turning around were investigated in a high school English class (McAllister, Stachowiak, Baer and Conderman, 1969). The results indicate that the combination of disapproval for the target behaviors and praise for appropriate incompatible behaviors substantially reduced

the incidence of the target behaviors.

Each of these studies in applied behavior analysis provides support for the conclusion that operant conditioning techniques can be employed in the classroom. In each setting, institutional, special education, pre-school, elementary and secondary, systematic investigations were conducted that reduced specified undesirable behavior, primarily through the contingent application of teacher interaction such as praise and attention, food, tokens and special privileges. In several studies reinforcement was administered outside the classroom. The main conclusion to be drawn from these studies is that ample data is available to illustrate the effectiveness of positive reinforcers in altering student classroom behavior. Coupled with the ignoring of inappropriate behaviors or timeout procedures, these techniques negate the necessity of aversive stimuli in the classroom.

PRESENT SCHOOL PRACTICES AND PROBLEMS

Despite the evidence presented in the applied behavior analysis studies, Skinner contends that aversive stimuli still dominate the classroom (Skinner, 1968, 15, 93-114):

> It was a part of the reform movement known as progressive education to make the positive consequences more immediately effective. But any one who visits the lower grades of the average school today will observe that a change has been made not from aversive to positive control, but from one form of aversive stimulation to another.

The question must then be asked: Why does this continue to be true in the face of overwhelming research evidence indicating that the contrary is more effective? Initial objections to reinforcement research were based upon the premise that "rat research," coming

primarily from animals in the laboratory, was insufficient to be generalized to the classrooms which have human beings in a unique social setting. But how can these objections continue now that data from the classroom is available? It appears that there is objection to the employment of certain forms of extrinsic reinforcement on the grounds that the student will become dependent on them and will be unable to perform without them (Glynn, 1970, 123). Some support can be given to this argument since reversal to the baserate of behavior when treatment ended occurred in several studies (Keirsey, 1969, 89-113). Yet sufficient data is available to indicate that consistent use of a wide range of positive reinforcers should produce significant student behavior modification. But the problem is one of providing the teacher with a sufficient repertoire of reinforcers from which can be selected those most appropriate to a specific teacher style and classroom setting.

A second problem also exists. It is derived from the response many teacher have to a description of an applied behavior analysis study: "Why, what is new about that? I've been doing these things in my classroom for years." (Hanley, 1970, 597-598). Homme and Tosti (1964, 4), though, succinctly identify the difficulty:

> The difficulty can be primarily traced to the failure to <u>systematically</u> (emphasis added) apply what is known. It is not only that operant principles are not systematically applied, they are, if applied at all, sporadically applied.

Yet, it has been demonstrated (Hall, Panyon, Rabon and Broden, 1968; Rosenthal, Underwood and Martin, 1969; Cooper, Thomson and Baer, 1970; Hosford, 1969, 152-154) that teachers <u>can</u> be trained to systematically use positive reinforcement practices in the classroom. The problem

appears to be in developing a technique whereby teachers can select from a wide range of reinforcers and then monitor their use in a systematic fashion if the results of operant conditioning research are to reach a large number of classrooms.

In addition, given present school circumstances, a technique would seem to be needed that requires little expense, a minimum of disruption to the students and can be utilized by the teacher after brief in-service training. The technique that most nearly suits these requirements while providing data on systematic application of teacher behaviors in the classroom and a repertoire of alternative teacher behaviors is interaction analysis. The interaction analysis technique offers a technology and potential to implement positive reinforcement strategies in the classroom.

INTERACTION ANALYSIS SYSTEMS

Interaction analysis systems are described (Simon and Boyer, 1967, 1-2):

> Interaction analysis systems are "shorthand" methods for collecting observable objective data about the way people talk and act. They make possible a relatively simple record of what is happening but they do not record what is being said. . . . They differ from each other in a variety of ways, but all of them code some aspect of behavior. These systems are made up of sets of categories of behaviors . . . . Most of these systems are "content free," that is, they can be used with any subject matter or grade level.

Thus, interaction analysis is a coding system for objectively quantifying a certain dimension of classroom behavior into behaviorally defined categories. This quantifying is done by an independent observer trained to identify and categorize reliably the specified

behaviors. What results is a description of classroom transactions in the form of a distribution of tallies in the pre-determined categories (Medley and Mitzel, 1963, 253). For the purposes of this investigation, the data can be used to assist a teacher in altering and/or expanding her behavior repertoire by providing an objective description of the teacher's baserate behavior. The description can then be used to define intended changes to be instituted to conform with the operant conditioning model in terms of the behavioral definitions available. The analysis system can then be used to monitor the accomplishment of the stated objectives.

During the past ten years, much work has been done in the development of interaction analysis systems, but certain additional modifications must be made in order to suit the purposes of this study. As discussed in Chapter 1, these modifications include:

1. An instrument should be designed that specifically deals with a given instructional strategy (precision teaching).

2. The instrument should provide data that is interpretable and manipulable by the classroom teacher.

3. A sign system should be developed with a large number of categories to provide more numerous descriptive alternatives.

4. Items should be derived from both the laboratory and the classroom to provide options not only from what <u>is</u> presently occurring in the schools, but also what <u>could</u> be occurring.

Several category systems have been devised that deal with certain aspects of reinforcement. Dunn and Rankin (Cartwright and Cartwright, 1969, 2) delimited five categories in a reward preference profile: (1) adult approval; (2) competition; (3) consumable; (4) peer approval; (5) independence. A categorization of rewards to be earned

was also explored by Clarizio (undated) which considered (1) tangible rewards; (2) social rewards; (3) responsibility and authority; (4) intrinsic; (5) activities.

Zahorik (1969) authored a Teacher Verbal Feedback instrument utilizing twelve categories: (1) praise-confirmation; (2) reproof-denial; (3) positive answer; (4) negative answer; (5) positive explanation; (6) negative explanation; (7) response extension: development; (8) response extension: improvement; (9) solicitation repetition: several answers; (10) solicitation repetition: one answer; (11) lesson progression; different topic; (12) miscellaneous feedback. A feedback categorization was also devised by Yelon (1969, 38) which includes: (1) action feedback; (2) learning feedback; (3) intrinsic feedback; (4) augmented feedback.

Silberman (1969, 403) designed a four category recording system: (1) teacher contact; (2) positive evaluation; (3) negative evaluation; (4) acquiescence. In another study (Rosenthal, Underwood and Martin, 1969, 371-372), a special recording system was designed to consider certain ethnic needs: (1) verbal approval; (2) gestural approval; (3) physical approval; (4) verbal disapproval; (5) gestural disapproval; (6) physical disapproval; (7) non-interpersonal rewards; (8) sanctions or punishments; (9) verbal solicitation; (10) gestural solicitation; (11) physical solicitation. It was also recorded whether the teacher or the student initiated the response sequence. They reported (Ibid., 407) that, ". . . the pragmatic merits of the method appear to be its strongest recommendation: it required (little time) and no elaborate apparatus; it did not appear to disturb the students or disrupt the teachers who were visited."

Madsen, Becker and Thomas's study also uses a reinforcement analysis system (1968, 143) with nine definitive categories: (1) contact; (2) praise; (3) facial attention (approval); (4) holding child; (5) criticism; (6) threats; (7) facial attention (disapproval); (8) time-out procedures; (9) academic recognition.

However, each of these category systems is deficient according to one or more specific criteria previously established. The Dunn-Rankin preference profile and the Clarizio categorization focus only on rewards with no information to be gleaned on deterrents functioning in the environment. Zahorik's feedback instrument records only verbal academic feedback, eliminating the potential for recording affective and/or non-verbal behaviors. Further, this technique requires transcripts for analysis which adds considerable cost to any study. Yelon's also includes only feedback, not rewards or deterrents. Silberman's and Madson-Becker-Thomas's systems are too limiting given the objective of expanding teacher behavior repertoires, while the Rosenthal, Underwood and Martin technique is situation specific. Given the deficiencies of presently existing interaction analysis instruments, a new instrument must be designed which represents a synthesis of previous instruments with corrections made for deficiencies. Thus, the instruments cited can provide the basis for an item pool to be used in compiling a new, expanded instrument.

Items and developmental techniques can also be gained from several widely-used instruments which consider, in part, reinforcement techniques. In a highly complex system, Spaulding (1970, 11-12) considers (in the general transaction and social behavior categories) several reinforcers: (1) approval; (2) disapproval; (3) structuring;

(4) restructuring; (5) information; (6) listening and observing; (7) timeout; (8) withholds privilege.

In The Language of the Classroom (Bellack and Davitz, 1963, 172-173), Bellack includes definitive classifications for (1) substantive reactions, (2) rating reactions and (3) procedural reactions which are coded from transcripts. Similarly, Joyce and Harootunian consider reward and punishment in the application of sanctions and the development of procedures. Positive, negative and control functions are included in the Hughes system (1959). In Amidon's Modified Category System (Simon and Boyer, 1967, Amidon-5), categories are included for: (1) accepts feelings; (2) praises; (3) accepts ideas; (4) gives directions; (5) criticizes. The Multidimensional Analysis of Classroom Interaction (Simon and Boyer, 1967, Honigman-4) has categories for: (1) performs emotionally-supportive behavior; (2) designates student performance "acceptable;" (3) praises performance; (4) designates student performance unacceptable; (5) criticizes; (6) uses student's ideas; (7) uses student's emotional contributions. In the most frequently used of all interaction analysis systems, Ned Flanders (Medley and Mitzel, 1963, 273) included four specific reinforcing categories: (1) accepts feelings; (2) praises/encourages; (3) accepts/uses ideas; (4) criticizes/justifies. Each of these systems provides some direction in the development of a new system to categorize and analyze teacher reinforcement behavior. Yet none includes the full, definitive spectrum of potential teacher reinforcement behaviors.

Before items can be selected, however, from the item pool for potential inclusion, a definition of reinforcement and its major

components must be delimited and defined.

A DEFINITION OF REINFORCEMENT AND ITS COMPONENTS

Reinforcement was first described in 1911 as the Law of Effect by Thorndike (DeCecco, 1968, 250). Since that time much research has been done on the implications of reinforcement for animal behavior, including man. There have also been many efforts to define reinforcement in order to assist research and practice. Deese (1952, 16) defined reinforcement as " . . . any stimuli event that will increase or maintain the strength of a response or stimulus-response connection associated with it." Bigge (1964, 94) described reinforcement as " . . . a special kind or aspect of conditioning within which the tendency for a stimulus to evoke a response on subsequent occasions is increased by reduction of a need or of a drive stimulus." He further explained (1964, 125) that, "Reinforcement is changing (increasing) the future probability of a response in the same class." Miller and Dollard (1941, 29) defined reinforcement similarly: "Rewards (reinforcement) are events producing a reduction in drive . . . any event known to strengthen stimulus - response connections." Clarizio and Yelon (1967, 269) defined reinforcement as: "Whatever serves to maintain the occurrence or increase the strength of a response." In each of these definitions it is implied or clearly stated that reinforcement is synonymous with the receiving of a reward or pleasurable stimuli following a response.

Yet there are more subtle distinctions made in a complete conceptualization of reinforcement. Yelon (1969, 104) most aptly

describes three main reinforcement contingencies: positive reinforcement, negative reinforcement and punishment.

Positive reinforcement is the presentation of attractive stimulus and negative reinforcement is the withdrawal of an aversive stimulus. Punishment is either the withdrawal of an attractive stimulus or the presentation of an aversive stimulus. These distinctions are, in this author's experience, more in keeping with the practitioner's conceptualization of reinforcement as it functions in the classroom. Since this instrument is being designed for practitioner use, definitions should be appropriate to their understanding and use of the term, as well as reflecting research findings. In order to include positive and negative reinforcement as well as punishment in the working definition, reinforcement contingencies are defined for this instrument as: Any teacher action or verbal behavior that alters the future probability of a response in the same class, be either strengthening or weakening the stimulus-response connections.

Two major components of reinforcement contingencies are obvious for purposes of further categorization. First, positive reinforcement can be described as rewards, a more commonly used term in practitioner terminology. In keeping with existing definitions, rewards can be defined behaviorally as any pleasurable response or activity given to the student to indicate the desirable nature of a behavior, performance or action. Punishment is a second component. But because this term is frowned upon by many practitioners and because it excludes a number of techniques used to weaken certain behavior, a more amenable term, deterrents, has been selected. Deterrents are defined as any discouraging response or activity given to the student to indicate

the undesirable nature of a behavior, performance or action. Therefore, reinforcement contingencies are broken down into two major parts for categorization: rewards and deterrents.

However, a third component of reinforcement as defined above cannot be overlooked, although it is not often included in formal definitions. This is feedback. DeCecco (1968, 253) stressed the inclusion of feedback:

> In this procedure the student is given knowledge of his correct responses. Whereas the term reinforcement connotes the hedonic aspect of reward, the term feedback stresses the informational aspect of the teacher's function. . . . As yet we have no way of separating the reward function from the informational function.

Feedback is generally considered to be the giving of neutral responses as to the correctness or incorrectness of a student's academic action. Since feedback is not usually associated with either pleasant or aversive stimuli, it is not often considered a part of reinforcement. Yet, feedback is being given constantly in any classroom for the purposes of evaluation and management as any classroom teacher knows. The cumulative effect of feedback can have a greater impact than a single reward or deterrent. Zahorik (1969) recognized this when he constructed an interaction instrument for teacher verbal feedback and content development to analyze classroom transcripts.

Yelon (1969, 37-38) recognized the role of feedback in school learning also when he enumerated several types of feedback that could be used in evaluation. This vital third component of reinforcement, feedback, is thus included and defined as: giving neutral responses to indicate academic correctness; information

function; those verbal statements or behaviors which directly or indirectly reflect on adequacy, appropriateness or correctness of pupil statements in relation to academic subject matter development or classroom management.

Given the conclusions, implications and guidelines derived from previous research in applied behavior analysis, interaction analysis and reinforcement, the development and testing of a teacher reinforcement observation schedule was able to proceed. The categories were developed under the three major heading of rewards, feedback and deterrents.

CHAPTER III

PROCEDURES AND METHODOLOGY

Described in this chapter are the procedural steps taken to design and test the reliability and validity of a teacher reinforcement behavior observation schedule. Also discussed is the identification of "criterial performers." A rationale for the procedures accompanies each section.

The investigation was carried out in two phases in order to fulfill the stated objectives. Initially, the instrument was developed from video tapes, classroom visits and research descriptions. This instrument was then refined and tested for observer agreement. The second phase was the selection of a sample of "criterial performers" for systematic observation and the subsequent observation of these teachers. The entire study took place during the academic school year of 1969-1970.

DEVELOPMENT OF THE INSTRUMENT

In the spring of 1968, Judith Henderson conducted a study (Henderson, 1968) in which twelve competent language arts teachers were identified by their peers, supervisors and administrators through a rating technique. These Lansing, Michigan, teachers at the first, eighth and eleventh grade levels, both inner city and suburban, were subsequently video taped three times over an eight week period. These tapes were utilized in the initial descriptions of teacher

reinforcement behavior.

Every tape from the Henderson study was viewed. Each reinforcement behavior displayed was tentatively labeled and briefly described in a running written record. Because the classes were on video tape, the action was frequently stopped, replayed and discussed in order to develop more accurate descriptions. The individual behaviors were then sorted into rewards, feedback and deterrents.

In order to get additional behavior descriptions from a normal distribution of classrooms, since an interaction analysis system is designed as "content free" (Simon and Boyer, 1967, 1), the author visited classrooms at all grade levels and subjects, keeping the same running record for subsequent sorting.

Finally, useful labels and descriptions were derived from the literature to add to the item pool. The Learning Systems Institute at Michigan State University developed an Influence Techniques Instrument (1967, mimeo). The Dunn-Rankin reward preference inventory (Cartwright and Cartwright, 1969) listed adult approval, competition, consumable, peer approval and independence. Clarizio generated a list of rewards to be earned that included tangible rewards, social rewards, responsibility and authority, intrinsic rewards and activities. Madsen, Becker and Thomas (1968, 143) devised an analysis system that included rewarding actions such as contact (teacher), praise and facial attention and deterrents including threats, criticism, facial attention and time-out procedures. Silberman (1969, 403-404) suggested acquiescence, defined as granting appeals for assistance, permission or information, as a reward in addition to positive evaluation.

In considering feedback, Yelon suggested a four category division (1969, 38): action feedback, learning feedback, intrinsic feedback and augmented feedback. A further feedback item, teacher imposition, was suggested by Hughes (1959). Bandura's work (1969) provided an additional item labeled modeling, defined by Clarizio and Yelon (1967, 269) as a condition where the behavior to be acquired is demonstrated for the learner. Premack's principle as described by Bandura (1969, 229) was added to the item pool as contingency management. Finally, Ausubel's "advance organizer" was included.

Deterrent items suggested in the literature included physical restraint, isolation, extra homework and grades (Hughes, 1959) and redirects, defined as any statement with which the teacher attempts to redirect a student from an inappropriate to an appropriate behavior.

Further, work by Flanders (1970) and Rosenthal, Underwood and Martin (1969, 371) suggested that valuable data could be gained by recording the response sequences as teacher-initiated or student initiated.

The items from these three sources, video tapes, live classroom observation and previous research, were then sorted into major categories, subscripts and examples. The criteria designated for the development of a multi-sign instrument, particularly the listing of multiple, understandable categories with explicit definitions and examples, was followed. The resulting items are as follows (see the complete observation schedule in the appendices):

REWARDS

1. Tangible Rewards
   A. Consumable
   B. Token
   C. Use something of teacher's/ manipulable
2. Special Privilege or Activity
   A. Activity
   B. Teacher Concern
3. Affection
4. Signal Approval
   A. Facial
   B. Gestural
5. Praise/Encouragement
   A. Positively evaluates deportment/ideas/response/ task
   B. Challenge or pep talk
   C. Recognition from authority figures
6. Verbal Acquiescence
   A. Reacts to or acknowledges the students comments or appeals
   B. Accepts or utilizes the students's ideas or experiences
7. Intrinsic Rewards
   A. Accomplishment/mastery of the task/completion of academic activities
   B. Gaming
   C. Removes evaluation sanctions
8. Competition
   A. Measures or models for others or against an absolute
   B. Reads or posts student's work as best
9. Independence
   A. Given responsibility or authority
   B. Given choice or selects activity
10. Incentive/Conditional Promise
   A. Teacher assistance
   B. Reward for performing task
11. Peer Approval
   A. Class selection/recognition
   B. Praise or cooperation
12. Unclear/Muddled

FEEDBACK

1. Content/Substantive Reaction
   A. Adds new information
   B. Clarifies or synthesizes
   C. Gives answer
   D. Corrects or tells what should have been done
2. Elicits Response Elaboration
   A. Developmental questioning or elaboration
   B. Assists in developing plans or procedures
   C. Opens new possibilities/suggests alternatives/poses problem
3. Evaluates
   A. Positive rating
   B. Negative rating
   C. Implies accuracy of response by lesson progression or use of response
   D. Repeats or withholds rating
   E. Explanation/rationale
4. Structuring/Action Feedback
   A. Gives clue to expected response set
   B. Regulation of details
   C. Advance organizer
   D. Contingency management
5. Modeling/Response Facilitation
   A. Task
   B. Behavior
   C. Enthusiasm for task or content
6. Teacher Imposition
   A. Performs task for student
   B. Relates experiences/moralizes
   C. Admits mistake or apologizes
7. Change Environment
   A. Change goal
   B. Change content
   C. Change procedures
8. Augmented Feedback
9. Testing
10. Delays Feedback or Promises
11. Unclear/Muddled

DETERRENTS

1. Punishment
   A. Extra tasks
   B. Lowering grades
   C. Reordering environment
   D. Physical restraint/corporal punishment
   C. Deprives of privilege
2. Verbal Deterrents
   A. Criticism/sarcasm
   B. Reprimands or negates
3. Signal Deterrent
   A. Facial
   B. Gestural
   C. Proximity control
4. Threatens
5. Time-out Procedure
   A. Waits/lights out
   B. Keep in at recess or after school
   C. Deprives of social interaction
   D. Withholds positive reinforcement
6. Redirects
   A. Poses question to student
   B. Reminds of attending behavior or deportment
7. Peer Disapproval
8. Unclear/Muddled

Also included were: No Response and Miscellaneous

Reviews of the video tapes and additional classroom visits were then made by the author to determine that all reinforcement behaviors observed in the classroom could be tallied within the category system. It was also determined that judgments could be made as to the source of the response sequence (teacher or student).

An additional decision was made at this time concerning coding. Many elaborate techniques have been designed for coding according to the dominant action in a specified time unit. Also combinations of numbers and letters and even plus and minus are used. However, as Simon and Boyer state (1967, 12): "Coding complexity is one of the reasons why the use of many of these systems has never extended beyond the researcher who developed them." Since one of the objectives of this investigation is to design an instrument for teacher use, it was decided that the natural reponse sequence, defined as any single teacher reaction to a student statement or action or any teacher behavior giving the student information about the accuracy or value of a

future response, would be the unit of analysis. This means that each time the teacher responds to a student question or comment or gives a set of instructions, etc., it is recorded in the appropriate category, regardless of the time involved. Any complete thought or message, whether it is one sentence or a discussion of a few minutes duration, receives one tally. The only requisite is that the response be a message, thought or instruction conveying a single idea. If, in the middle of a response however, the teacher incorporates a second type of reinforcer, it should be tallied separately. A simple tally or slash would indicate a teacher-initiated response sequence and an abbreviated S or curved line would designate a student initiated response.

THE SELECTION AND TRAINING OF OBSERVERS

Again, since the instrument is primarily intended for inservice teacher training, experienced teachers were recruited as observers. One observer had five years experience as a high school speech and drama teacher, the second taught elementary music for two years and the third spent one year teaching junior high school social studies. The author, also working as an observer, has had two years experience in high school social studies. This team worked together for two weeks of training before observations began.

During the two week training period, approximately 20 hours were spent either reviewing video tapes or visiting classrooms. This is in keeping with Spaulding's experience (1970, 9) that observers can be trained in two to three weeks. The first

three three-hour sessions were spent looking at video tapes of classroom behavior, discussing the items and calling out behaviors as they occurred. It was at this time that several definitions were modified and refined at the suggestion of these experienced classroom teachers. The fourth session the four observers visited classes in a local elementary school to make a "trial run." During this session they acclimated themselves to live classroom coding. The observers went in teams so that they could discuss any problems they encountered in coding. It was at this time that the final revisions were made in the instrument. For the duration of the training period the observation schedule was assumed as a given.

The fifth session was devoted to intensive video tape viewing and mastery of the observation schedule.

The sixth and seventh sessions were devoted to reliability checks. Two methods were used for ascertaining observer agreement. First, three twenty-minute video tape segments, selected for audio and visual clarity, were coded simultaneously by the observers without interruption. Second, the teams of observers visited a classroom and coded the teacher interaction simultaneously for two twenty minute periods.

As suggested by Bijou, Peterson and Ault (1968, 184), Spaulding (1970, 79) and Madsen, Becker and Thomas (1968, 141), reliability for the three video taped segments and the two live classroom segments was calculated by scoring each interval as agree or disagree (match or mismatch) and dividing the total number of agreements by the total number of agreements plus the total number of

disagreements or:

$$\frac{\text{\# of agreements}}{\text{\# of agreements + \# of disagreements}}$$

An example of instrument scoring and calculation of agreement is included in the appendices.

Further, periodic reliability checks were made during the study by assigning two observers to 20% of the classroom sessions visited (Rosenthal, Underwood and Morris, undated, 2). Reliability was calculated as described above.

SELECTION OF THE POPULATION

Several major decisions were then made in selecting the population for study. Initially, it was hoped that both inner city and suburban schools would be included for comparative analysis. However, the inner city schools accessible to the researcher, specifically Detroit and Pontiac, Michigan, Public Schools, were not permitting outside research to be conducted at the time of this study. It is suggested that future research using this instrument be designed to include a description of the inner city schools (see further discussion in Chapter V). However, this study was necessarily limited to a suburban population.

Second, this investigation was limited to elementary school. Financial considerations made it imperative that only one school level be included in this initial study. The elementary level was selected for three reasons: (1) precision teaching has its most immediate application at the elementary school level as indicated in Chapter II; (2) the Henderson study indicates that the highest

percentage of agreement on the identification of competent teachers is at this level; (3) a teacher's behavior could be sampled from throughout the day at the elementary school level and she would be interacting at all times with the same group of students. There are two additional advantages in sampling from throughout the day. First, all subjects (e.g. arithmetic, science, language arts, social studies, etc.) are observed, providing a more diverse, "content free," spectrum of behaviors. And second, observing the same class would mean the observer would more quickly be accepted as a "piece of the furniture," thus reducing observer effect.

Having limited this initial investigation to suburban elementary schools, Oakland County, Michigan, was selected as a representative suburban area. Located immediately north of Detroit and serving as a "bedroom area" for the urban center, the county is described by the Oakland County Schools Director of Social Studies (Platt, 1966, 14) as a mostly "middle class" area with a per capita income well above the national average. Also, it has a diverse racial, ethnic and religious population with 88.2% urban and suburban and 11.8% rural. Platt also reports that 28.8% of the total county population is presently in grades kindergarten through twelve and the percentage of high school graduates going to college is well above the national average. Persons residing in Oakland County range from the heads of major automotive corporations to several communities with scattered concentrations of welfare recipients. The Transportation and Land Use Study (TALUS), commissioned by the Planning Division of the Southeastern Michigan Council of Governments, reported in August of 1968 (15) that the median family income in Oakland County was $9020. This

compares with the median family income for the City of Detroit of $6350. The county averages $774.50 per pupil expenditures (Summaries and Surveys, 1970, 25) on an assessed per pupil property valuation of $19,977 (Summaries and Surveys, 1970, 38) for the school year 1969-1970.

Within Oakland County, the school district selected for investigation was the Royal Oak Public Schools. It was selected as the district most closely approximating the county averages. Thus, the Oakland County Schools Summaries and Surveys (1970, 25) reports the Royal Oak per pupil expenditure for 1969-1970 was $752.92 on an assessed per pupil property valuation of (1970, 38) of $18,716. Similarly, the TALUS report gives the average family income for Royal Oak as $9,140 (9). In summary, then, the comparative statistics for Oakland County and the Royal Oak Public Schools are:

	Oakland County	Royal Oak
Average Family Income	$9020	$9140
Per Pupil Expenditure	$ 774.50	$ 752.92
Per Pupil Assessed Property Valuation	$19,977	$18,716

The Royal Oak Public Schools have had a relatively stable pupil population for the past fifteen years. The school census figures for September, 1970, indicate that 18,879 students were enrolled (Summaries and Surveys, 1970, 3) in eighteen elementary, four junior high and two high schools. To serve this pupil population there are 883 full-time classroom teachers and 57 administrators (15).

SELECTION OF THE SAMPLE

The Royal Oak Public Schools administration was initially contacted by the investigator with the request that five elementary schools be selected for cooperation in this study. Five schools were suggested since this would reduce the effect of the nesting factor in subsequent analysis of the data. It was further requested that two competent teachers be identified in each school for observation. After several discussion sessions with the administration, five schools were identified as being the most willing to cooperate in a research endeavor. And each principal selected the most two competent members of his teaching staff to be observed. Of the teachers selected, three were teaching first grades, two third, one fourth, one fifth and three were teaching sixth grades.

The method for selection of the teachers to be observed was based upon evidence cited in the Henderson study (1968). In this study, a rating technique was devised for the identification of competent practitioners by principals, supervisors and teachers. Since teacher evaluation at present is primarily dependent upon ratings by administrators, supervisors and peers, it was this rating technique that was investigated by Dr. Henderson as to feasibility, reliability and optimal procedures. The teachers in the designated schools were evaluated on a one-to-ten scale with confidence weightings. The extent of practitioner consensus on teacher competence was then calculated. Evidence is presented that at the elementary school level, the percentage of agreement between the three groups on practitioner competence ranged from .69 to .82. Thus, research findings indicate

a sufficiently high degree of agreement on the identification of "criterial performers" to justify principal selection alone.

DESIGN OF THE STUDY

Boyd and de Vault (1967, 542) express concern about limiting generalizability of studies as a result of the failure to give sufficient attention to the sampling of situations. Thus, they contend that there should be a sampling of different settings which provide many opportunities and instigations for displaying the behaviors under study. In order to maximize the opportunity to observe each teacher in a variety of situations, ten one-half hour periods were randomly drawn from a three-week period for recording. The times were selected from all possible one-half hour periods between 8:30 and 3:00 excluding art, gym, music, recess and lunch periods.

The teachers were not shown the recording instrument at any time during the study. Nor were they informed as to when they would be observed. The only contact between the observers and the teachers was when the author met with each teacher prior to the study to explain the general purpose of the investigation. Because the teachers were selected for their competence and were informed of this factor, the usual practitioner concerns associated with the presence of an outside observer in the classroom were diminished.

During the three week observation period, two observers were assigned to 20% of the classrooms visited to provide a continuing reliability estimate. The observers entered the classrooms as unobtrusively as possible, seating themselves at the back of the room with their clipboard, observation schedule and watch prepared in

advance. The students were informed by the teachers of our impending visits and were instructed to continue with their work. When two observers entered the classroom they seated themselves at opposite sides of the room where possible. The observers appeared to have little effect on the naturalness of the setting as suggested by Kerlinger (1965, 505), Medley and Mitzel (1963, 306).

In addition to the minimal effect of the observer's presence in the classroom there were three other reasons for live classroom coding as compared to the frequently used video-taping or preparation of transcripts for subsequent analysis. First, live coding is the least expensive method. Since this was one of the stated objectives in developing the instrument it was a primary consideration. Associated with this is the second reason, live coding would be the technique most likely to be put to practitioner use, this being another objective. Finally, the most accurate data would be obtained through live classroom coding since no potential technical distortions or delays would be involved.

The tests for reliability and validity of the instrument, using the data gained from this study, are presented in Chapter IV.

ANALYSES

After the observations were made, frequency tables were tabulated for each teacher on each category during each observation. As an approximation of instrument reliability, percentage of observer agreement was calculated for each of the 20 times (two per teacher) that two observers recorded a teacher's behavior simultaneously. Gerig's Multivariate Extension of the Friedman Test was used for measuring the

effect of teacher behavior over time. The Kendall Coefficient of Concordance was used to measure the extent of agreement among the ten competent teachers on the ranking of categories. And finally, proportions were computed to describe the behavior distributions of the criterial performers.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

The results of the data gathering and analysis procedures described in Chapter III are presented in this chapter. The first two sections of this chapter, observer agreement in recording and stability of practitioner behavior, present the analyses essential to establishing the reliability of the instrument. The third section, practitioner agreement on category rankings, is closely related to instrument validity. And, finally, descriptive distributions of the teachers' reinforcement behavior are presented as criterion models by which to measure and compare future data derived from further use of the instrument in classroom practice, teacher training and research.

OBSERVER AGREEMENT IN RECORDING

The first test that must be considered in the design and verification of an observation schedule is the establishment of reliability. One factor in establishing reliability is observer agreement in recording. This is necessary in establishing the precision and objectivity of an observation technique. Lacking agreement, an observation technique would be subject to reinterpretation by each recorder, thus giving data with little value. Therefore, the first problem for analysis was the measure of observer agreement to assure accurate recording.

After the initial two week training period for the four observers, two methods were used for ascertaining observer agreement. First, three twenty-minute video tape segments, selected for visual and audio clarity, were coded simultaneously by the observers without interruption. These video segments were selected, as were the training tapes, from the recordings made during the Henderson research study in the Lansing, Michigan, Public Schools. The tapes viewed during the reliability check had not been analyzed previously by the observers. As indicated previously, observer agreement was calculated according to the following formula (Bijou, Peterson and Ault, 1968, 184; Spaulding, 1970, 79; Madsen, Becker and Thomas, 1968, 141):

$$\text{Percentage of observer agreement} = \frac{\text{number of agreements}}{\text{number of agreements + number of disagreements}}$$

The following percentages were obtained during the three twenty minute video-tape observations across all 28 major categories.

Table 1. VIDEO-TAPE RELIABILITY CHECKS

Observation #1

Observer Pairs	AxB	BxC	AxC	BxD	CxD	AxD
Percentage of agreement	.79	.81	.88	.82	.90	.83

$\overline{X}$ = .84

Observation #2

Observer Pairs	AxB	BxC	AxC	BxD	CxD	AxD
Percentage of agreement	.77	.67	.74	.82	.70	.79

$\overline{X}$ = .75

Observation #3

Observer Pairs	AxB	BxC	AxC	BxD	CxD	AxD
Percentage of agreement	.81	.88	.83	.90	.93	.83

$\overline{X}$ = .87

The second reliability check was made in a live classroom setting, since it was in this environment that the subsequent study would take place. All four observers recorded in a local classroom simultaneously. Two twenty-minute observations were made and the following percentages obtained. These percentages were also calculated across all 28 categories.

Table 2. LIVE CLASSROOM RELIABILITY CHECKS

Observation #1

Observer Pairs	AxB	BxC	AxC	BxD	CxD	AxD
Percentage of agreement	.53	.58	.76	.65	.75	.74

$\overline{X}$ = .67

Observation #2

Observer Pairs	AxB	BxC	AxC	BxD	CxD	AxD
Percentage of agreement	.74	.76	.71	.81	.78	.73

$\overline{X}$ = .76

As indicated, the percentages of agreement for all observer pairs were .84, .75 and .87 for the video tape observations and .67 and .76 for the classroom observations. When compared to acceptable

observer agreement levels established for other observation instruments (Medley and Mitzel, 1963, 261-274; Spaulding, 1970, 80), these percentages indicated a sufficiently high degree of precision and objectivity in the recording procedure to justify the use of the instrument without further revision.

The observation of the selected teachers was begun according to a random schedule over a three-week period. The reinforcement behavior of each teacher was recorded during ten one-half hour periods. In order to provide a continuing reliability estimate during the three-week period, two observers were assigned to 20% of the observation sessions. Thus, on eight occasions a teacher was observed by a single recorder and on two occasions, a second recorder was present. The percentages of observer agreement during the study were calculated by the same method as used at the termination of the training session. The percentages obtained are:

Table 3. OBSERVER AGREEMENT DURING THE STUDY

Teacher	Percentage of agreement	Teacher	Percentage of agreement
T_1	.92 .95	T_6	.87 .84
T_2	.86 .81	T_7	.78 .87
T_3	.85 .84	T_8	.57 .75
T_4	.84 .78	T_9	.75 .91
T_5	.82 .88	T_{10}	.74 .73

$\overline{X} = .82$

Thus, a high level of observer agreement on the recording procedure was maintained throughout the study, since a mean agreement measure of .82 was obtained across all teachers, observations and categories. This, combined with the training session measures, implies that the instrument was defined with sufficient specificity and clarity to obtain a highly accurate and objective data record.

STABILITY OF PRACTITIONER BEHAVIOR

In the development of an observation schedule, a second component of reliability is also necessary. This is related to the dependability or consistency of the descriptions obtained. Translated into the terms of this study, an observation instrument should record a pattern of teacher reinforcement behavior that does not fluctuate significantly over time (Medley and Mitzel, 1963, 292). Fluctuation over time would imply either inconsistent recording on the part of the observers or an attempt by the teacher to alter her behavior to conform to some imagined model. Since one of the purposes of this study was to describe the natural behavior of the "criterial performers," neither inconsistency in recording or altered teacher behavior, would provide reliable data for analysis.

In order to determine whether the teachers' behavior as recorded did in fact remain constant over the three week observation period, Gerig's Multivariate Extension of the Friedman Test was computed using rank-order data to test the null hypothesis (H_o) of equality of performance with respect to all categories and observations. It was determined that the null hypothesis would be rejected if the X^2 statistic exceeded .05.

In computing the Multivariate Extension of the Friedman Test, the twenty-eight categories were collapsed into the three major reinforcement contingencies: rewards, feedback and deterrents. This was done because any changes in teacher behavior over time would be reflected in the respective distributions of these three major observation components.

The reinforcement frequencies for each teacher were summed into the three categories for each observation: rewards (C_1), feedback (C_2) and deterrents (C_3). The frequencies were then ranked for each teacher (T) and category across observations (O). The highest frequency was ranked #1 and the lowest frequency #10.

One problem was encountered in the ranking procedure. There were several instances where tied numbers occurred. However, these ties were all two-way ties. To achieve unique rankings, the ties were broken by a probability process. The ranks assigned are as follows:

Table 4. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_1

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	8	4	5	1	6	9	3	10	7	2
C_2	8	3	6	7	5	2	1	10	4	9
C_3	9	8	4	3	1	7	2	5	10	6

T_1

Table 5. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_2

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	7	3	5	10	1	6	8	9	2	4
C_2	5	4	3	10	2	8	7	6	9	1
C_3	1	7	3	5	8	9	4	2	6	10

T_2

Table 6. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_3

T_3

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	5	1	2	4	7	3	10	9	6	8
C_2	6	2	3	10	8	1	4	7	9	5
C_3	1	2	6	7	4	5	10	9	3	8

Table 7. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_4

T_4

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	7	8	5	3	2	6	10	1	4	9
C_2	1	9	4	7	6	3	8	5	2	10
C_3	3	1	5	10	9	4	6	8	7	2

Table 8. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_5

T_5

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	2	3	5	7	1	6	10	4	9	8
C_2	2	6	9	7	1	5	3	4	10	8
C_3	7	8	3	1	4	9	10	2	5	6

Table 9. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_6

T_6

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	3	5	6	4	10	9	7	2	8	1
C_2	2	9	8	10	4	1	5	3	6	7
C_3	7	3	6	10	4	1	2	5	9	8

Table 10. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_7

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	4	7	3	8	10	5	1	6	2	9
C_2	5	9	8	7	10	6	4	2	3	1
C_3	6	3	2	9	10	1	8	7	5	4

Table 11. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_8

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	6	4	1	2	10	5	7	8	3	9
C_2	2	9	6	8	10	1	7	3	5	4
C_3	9	1	7	4	8	5	6	10	3	2

Table 12. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_9

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	2	5	4	3	10	8	7	9	6	1
C_2	6	2	3	8	10	9	1	5	7	4
C_3	5	1	9	3	7	4	8	2	6	10

Table 13. RANK-ORDER OF CATEGORY FREQUENCIES FOR T_{10}

	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}
C_1	4	9	1	3	7	2	5	10	8	6
C_2	3	9	8	4	10	7	5	6	1	2
C_3	4	7	3	8	9	10	2	1	6	5

From these category rankings, a mean ranking for each category during each observation for all teachers was obtained. These mean rankings are:

Table 14. MEAN RANK FOR EACH CATEGORY DURING EACH OBSERVATION

O_1C_1	O_1C_2	O_1C_3	O_2C_1	O_2C_2	O_2C_3	O_3C_1	O_3C_2	O_3C_3	O_4C_1
4.8	4.0	5.2	4.9	6.2	4.1	3.7	5.8	4.8	4.5

O_4C_2	O_4C_3	O_5C_1	O_5C_2	O_5C_3	O_6C_1	O_6C_2	O_6C_3	O_7C_1	O_7C_2
7.8	6.0	6.4	6.6	6.4	5.9	4.3	5.5	7.7	4.5

O_7C_3	O_8C_1	O_8C_2	O_8C_3	O_9C_1	O_9C_2	O_9C_3	$O_{10}C_1$	$O_{10}C_2$	$O_{10}C_3$
5.8	6.8	5.1	5.1	5.5	5.6	6.0	5.7	5.1	6.1

The variance and covariance terms were then calculated, placed in a variance-covariance matrix and the test statistic computed. The test statistic is $T' \Upsilon^{-1} T$ where T' is a row vector of the mean ranks assigned to each category for each observation minus the expected rank, Υ^{-1} is the inverse of the variance-covariance matrix and T is the mean rank assigned to each category for each observation minus the expected rank. The statistic derived from this procedure is as follows:

Table 15. RESULTS OF TEST FOR THE STABILITY OF PRACTITIONER BEHAVIOR

Gerig's Multivariate Extension of the Friedman Test:

$$X^2 = 36.055$$

$$X^2_{27}(.05) = 40.1133$$

Thus, the null hypothesis failed to be rejected at the .05 level.

There is reason, therefore, to conclude equality or stability of teacher behavior. The conclusion of stability of teacher performance is an important part of the instrument reliability as previously discussed. This conclusion, combined with the levels of observer agreement obtained in the use of the instrument, would imply that a highly reliable instrument was devised.

PRACTITIONER AGREEMENT ON CATEGORY RANKING

The criteria for establishing instrument validity have been discussed in Chapter 1 (see pp. 17-18). There are several facets to this problem. The first criterion, that a representative sample of behaviors be observed, was considered in two ways. Initially, the instrument was based upon previous research in reinforcement and applied behavior analysis to provide for content validity as defined by Kerlinger (1965, 446-447). Thus, the categories were constructed to represent the "universe" of reinforcement. Then, the study was designed so that a random sample of all teaching situations would be observed. Therefore, it could be said that a representative sample of behaviors was observed. The second criterion, that an accurate record of the observed behaviors be obtained, was established in the previous analyses in this chapter. It is the final criterion for validity that must be analyzed further. This criteria demands that a record be obtained that faithfully reflects differences in behavior while relating intelligibly to teacher effectiveness.

In order to consider the third criterion for validity statistically, the Kendall Coefficient of Concordance was calculated using rank order data. This procedure was selected as a measure of agreement by the ten teachers on the relative use or disuse of the designated reinforcement techniques. Since the sample was specifically selected for teaching competence, the records obtained by an instrument related to teacher effectiveness should reflect a high level of agreement on category rankings according to frequency of use. Thus, the Kendall Coefficient of Concordance was used to test the null hypothesis (H_o) of equality of mean category ranks which would indicate an absence of agreement. It was determined that the null hypothesis would be rejected if the X^2 test statistic exceeded the .05 level. In other words, did these ten "criterial performers" agree in the ranking of categories by frequency over the five hours they were observed; did they use the same categories more frequently than others or were they each concentrating on different techniques?

In order to compute the Kendall Coefficient of Concordance the frequencies in each of the twenty-eight categories were summed across all observations for each teacher. This was done since it had been shown by the Friedman Test that time did not have an effect on the frequency distributions. The categories were then ranked for each teacher from #1 for the most frequent to #28 for the least frequent.

As in the test for stability of teacher behavior, one problem was encountered in the ranking procedure. There were several instances where tied numbers occurred. To achieve unique rankings, the ties were broken by a probability process.

Kendall's W was then calculated according to the following formula:

$$W = \frac{12 \sum_{K=1}^{K} R_K^2}{n^2 K(K^2-1)} - \frac{3(K=1)}{K-1}$$

The category ranks, mean ranks and test statistics derived are as follows:

Table 16. THE RANKING OF CATEGORIES BY FREQUENCY FOR EACH TEACHER AND MEAN RANK FOR EACH CATEGORY FOR ALL TEACHERS

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	$\bar{R}_j$	
C_1	23	11	21	20	25	23	14	24	24	17	20.2	No Response
C_2	25	27	26	25	22	27	11	28	26	23	24.0	Tangible Rewards
C_3	16	12	19	13	13	12	16	12	10	13	13.6	Privilege
C_4	12	23	17	22	24	14	26	27	16	7	18.8	Affection
C_5	15	19	10	16	20	9	21	15	12	11	14.8	Signal Approval
C_6	6	10	18	7	10	11	8	7	8	9	9.4	Praise
C_7	8	9	11	9	7	7	7	4	5	2	6.9	Verbal Acquiescence
C_8	26	28	27	28	27	25	28	25	28	28	27.0	Intrinsic Rewards
C_9	14	18	25	12	20	26	10	17	21	16	17.9	Competition
C_{10}	19	26	22	23	17	19	18	14	13	25	19.6	Independence
C_{11}	17	25	24	21	26	22	24	21	19	21	22.0	Incentive
C_{12}	24	24	28	17	23	24	25	26	20	26	23.7	Peer Approval
C_{13}	4	2	5	3	3	2	5	3	6	4	3.7	Substantive Reaction
C_{14}	7	8	6	10	8	8	13	8	18	10	9.6	Response Elaboration
C_{15}	1	1	1	1	1	1	1	1	1	1	1.0	Evaluates
C_{16}	2	3	2	2	2	3	2	2	2	3	2.3	Action Feedback
C_{17}	3	7	7	6	4	4	3	9	3	5	5.1	Modeling
C_{18}	9	17	15	15	9	10	17	10	1	14	12.7	Teacher Imposition
C_{19}	13	15	23	25	11	13	19	19	14	15	16.7	Change Environment
C_{20}	28	4	20	4	28	28	27	11	27	27	20.4	Augmented & Testing
C_{21}	10	16	19	27	14	21	22	18	17	21	18.5	Delay Feedback
C_{22}	21	20	13	18	20	17	15	23	22	21	19.0	Punishment
C_{23}	11	6	3	8	5	6	6	6	7	8	6.6	Verbal Deterrent
C_{24}	20	13	8	14	12	15	9	16	9	12	12.8	Signal Deterrent
C_{25}	27	22	14	19	18	20	20	22	25	24	21.1	Threatens
C_{26}	18	21	9	25	15	16	12	13	23	19	17.1	Time-Out
C_{27}	5	5	4	5	6	5	4	5	4	6	4.9	Redirects
C_{28}	22	14	16	11	16	18	23	20	15	18	17.3	Peer Disapproval

$W = .7853$ (Kendall Coefficient of Concordance)

$x^2 = 212.24$

$x^2_{27}(.05) = 40.1133$

It can thus be concluded that there is a high level of agreement among the ten "competent" teachers on the relative use or disuse of the twenty-eight specified categories. Combined with the frequency distributions reported in the final section of this chapter, the analysis provides support for the conclusion that the instrument fulfills the third criterion for validity as discussed previously. This consensus may also indicate certain directions for teacher training and further research which will be discussed in Chapter 5.

DESCRIPTIVE DISTRIBUTIONS OF TEACHER REINFORCEMENT BEHAVIOR

The final set of analyses to be presented are the descriptive distributions of the teachers' behavior. One of the stated intents in designing and testing the instrument was to identify and describe the reinforcement behavior of competent teachers as a criterion for practitioner performance. This was done to ascertain a pattern of behavior that the practitioner could emulate or compare her performance to in order to make self evaluations and corrective decisions in utilizing the instrument. The data could also be used as a criterion by which to measure and compare future data derived from further use of the instrument in teacher training and research.

To provide analyses appropriate to this intent, several tables were derived. First, frequency distributions were calculated for each teacher in each category. These frequencies were summed across all observations since the results of the Friedman Test supported the conclusion that time did not have an effect on teacher performance. The subsequent table describes the behavior of each teacher in terms of the numbers of reinforce-

ment techniques used in each category over the five-hour observation time. Second, the mean frequency for each category and the respective proportions that each category represents were calculated. This table gives a composite description of the behaviors of the ten "competent" suburban elementary school teachers. Summary data was also compiled for each teacher to reflect the numbers of rewards, feedback and deterrents used during the observation period. A final set of analyses was tabulated with reference to the teacher-initiated/student-initiated response distinction. This table could provide some very revealing comparisons between teachers in different environments and teachers selected for observation according to different criteria than this sample. In interpretting the data in the teacher-initiated/student-initiated response table, one additional consideration must be made: the average percentage of observer agreement during the study was .78 when this distinction was included in the analysis as compared to a .82 average reliability when only the twenty-eight categories were considered.

Table 17. TOTAL FREQUENCIES IN EACH CATEGORY FOR EACH TEACHER

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	
C_1	4	23	7	10	2	4	29	2	4	9	No Response
C_2	1	1	1	5	4	0	35	1	1	3	Tangible Rewards
C_3	18	22	9	23	16	15	20	22	31	23	Privilege
C_4	26	5	10	8	2	9	6	1	10	63	Affection
C_5	19	9	34	12	6	24	11	10	21	33	Signal Approval
C_6	87	33	10	56	25	19	65	36	50	42	Praise
C_7	1	35	25	41	67	38	83	82	89	183	Verbal Acquiescence
C_8	68	0	0	0	0	3	2	2	0	0	Intrinsic Rewards
C_9	21	11	3	25	6	6	42	8	9	10	Competition
C_{10}	11	1	6	6	8	1	15	11	16	2	Independence
C_{11}	17	2	4	9	1	4	8	4	9	4	Incentive
C_{12}	2	3	0	10	3	3	6	1	9	2	Peer Approval
C_{13}	102	214	101	102	115	152	84	99	86	129	Substantive Reaction
C_{14}	75	57	73	35	30	33	30	32	9	34	Response Elaboration
C_{15}	400	523	490	565	282	335	420	271	482	404	Evaluates
C_{16}	196	166	142	403	183	147	209	166	186	136	Action Feedback
C_{17}	119	63	58	60	81	77	99	31	102	115	Modeling
C_{18}	37	15	13	13	29	22	17	31	22	20	Teacher Imposition
C_{19}	22	17	5	5	19	11	14	6	13	11	Change Environment
C_{20}	0	128	8	98	0	0	3	27	0	0	Augmented & Testing
C_{21}	31	16	23	4	15	5	11	7	10	4	Delay Feedback
C_{22}	8	9	19	10	6	7	24	2	7	4	Punishment
C_{23}	28	68	142	44	71	52	84	40	77	43	Verbal Deterrent
C_{24}	10	19	55	15	18	8	49	9	31	26	Signal Deterrent
C_{25}	0	8	14	10	7	5	13	3	4	3	Threatens
C_{26}	14	8	35	5	15	8	31	14	7	6	Time-Out
C_{27}	97	100	115	84	70	56	92	53	92	78	Redirects
C_{28}	6	18	11	27	11	6	10	5	12	7	Peer Disapproval

Table 18. MEAN FREQUENCIES FOR ALL TEACHERS IN EACH CATEGORY AND PROPORTION OF TOTAL BEHAVIORS IN EACH CATEGORY

	Mean Frequency	Proportion	
C_1	9.4	.007	No Response
C_2	5.2	.004	Tangible Rewards
C_3	19.9	.015	Privilege
C_4	14.0	.010	Affection
C_5	17.9	.013	Signal Approval
C_6	42.4	.032	Praise
C_7	64.4	.047	Verbal Acquiescence
C_8	7.5	.006	Intrinsic Rewards
C_9	13.8	.010	Competition
C_{10}	7.6	.006	Independence
C_{11}	6.2	.005	Incentive
C_{12}	3.9	.003	Peer Approval
C_{13}	118.4	.087	Substantive Reaction
C_{14}	40.8	.030	Response Elaboration
C_{15}	417.2	.311	Evaluates
C_{16}	193.4	.143	Action Feedback
C_{17}	80.5	.060	Modeling
C_{18}	20.9	.015	Teacher Imposition
C_{19}	12.3	.009	Change Environment
C_{20}	26.4	.020	Augmented & Testing
C_{21}	12.6	.009	Delay Feedback
C_{22}	9.6	.007	Punishment
C_{23}	64.9	.048	Verbal Deterrent
C_{24}	24.0	.018	Signal Deterrent
C_{25}	6.7	.005	Threatens
C_{26}	14.3	.011	Time-Out
C_{27}	83.7	.061	Redirects
C_{28}	11.3	.008	Peer Disapproval

Table 19. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_1

	Rewards	Feedback	Deterrents	
Teacher-Initiated	195	787	157	1141
Student-Initiated	76	195	6	275
	271	982	163	1416

Table 20. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_2

	Rewards	Feedback	Deterrents	
Teacher-Initiated	79	924	192	1195
Student-Initiated	43	275	38	356
	122	1199	230	1551

Table 21. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_3

	Rewards	Feedback	Deterrents	
Teacher-Initiated	59	700	369	1128
Student-Initiated	43	213	22	278
	102	913	391	1406

Table 22. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_4

	Rewards	Feedback	Deterrents	
Teacher-Initiated	144	1012	164	1320
Student-Initiated	51	273	31	355
	195	1285	195	1675

Table 23. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_5

	Rewards	Feedback	Deterrents	
Teacher-Initiated	52	487	163	702
Student-Initiated	86	276	35	388
	138	754	198	1090

Table 24. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_6

	Rewards	Feedback	Deterrents	
Teacher-Initiated	61	544	114	719
Student-Initiated	61	238	28	327
	122	782	142	1046

Table 25. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_7

	Rewards	Feedback	Deterrents	
Teacher-Initiated	180	647	255	719
Student-Initiated	113	240	48	401
	293	887	303	1483

Table 26. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_8

	Rewards	Feedback	Deterrents	
Teacher-Initiated	85	455	102	642
Student-Initiated	93	215	24	332
	178	670	126	974

Table 27. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_9

	Rewards	Feedback	Deterrents	
Teacher-Initiated	135	705	190	1030
Student-Initiated	110	205	40	355
	245	910	230	1385

Table 28. SUMMARY OF REINFORCEMENT BEHAVIORS FOR T_{10}

	Rewards	Feedback	Deterrents	
Teacher-Initiated	163	626	141	930
Student-Initiated	202	227	26	455
	365	853	167	1385

Table 29. TOTAL REWARD, FEEDBACK AND DETERRENT PROPORTIONS FOR EACH TEACHER AND MEAN PROPORTIONS FOR ALL TEACHERS

	Rewards	Feedback	Deterrents
T_1	.190	.694	.116
T_2	.079	.773	.148
T_3	.073	.649	.278
T_4	.116	.768	.116
T_5	.127	.691	.182
T_6	.117	.748	.135
T_7	.198	.598	.204
T_8	.184	.688	.128
T_9	.177	.657	.166
T_{10}	.263	.616	.121
	.153	.688	.159 MEAN

Table 30. PROPORTIONS OF TOTAL BEHAVIORS FOR EACH TEACHER IN TEACHER-INITIATED AND STUDENT-INITIATED CATEGORIES AND MEAN PROPORTIONS FOR ALL TEACHERS.

	Teacher-Initiated	Student-Initiated
T_1	.806	.194
T_2	.770	.230
T_3	.802	.198
T_4	.788	.212
T_5	.644	.356
T_6	.687	.313
T_7	.730	.270
T_8	.659	.341
T_9	.744	.256
T_{10}	.672	.328
	.730	.270 MEAN

CHAPTER V

DISCUSSION AND CONCLUSIONS

This final chapter contains interpretations of and conclusions related to the questions specified for the study. The primary questions addressed are those of the reliability and validity of the observation technique. Secondary questions discussed are those of the implications for teacher training, directions for future research and optimal procedures indicated for future instrument development.

INSTRUMENT RELIABILITY AND VALIDITY

Several issues related to instrument reliability and validity were discussed in Chapter IV. These issues dealt with defining and then fulfilling the stated criteria for reliability and validity. It would be well to reiterate the discussion at this point.

Reliability is the accuracy, precision and consistency of an instrument in quantifying specified teacher behavior. This means that the instrument is so designed that it will record the same or similar data as it is used repeatedly to quantify the same set of objects or phenomena (in this instance, a teacher's reinforcement behavior). In order to ascertain the reliability of the teacher reinforcement observation technique, two tests were applied. First, a percentage of observer agreement was calculated at the conclusion of the observer training session and, again, for 20% of the observation periods during the study. It was found that

the observers had agreement levels of .84, .75 and .87 during the video tape reliability checks .67 and .76 for the live classroom reliability check and an average agreement of .82 during the actual study. Given the levels of acceptable agreement in previous studies, these results land credence to the conclusion that the instrument was defined with sufficient specificity to insure reliability. Second, a measure of the stability of practitioner behavior was ascertained. This measure was calculated as a determinant of consistency in the utilization of the instrument. Gerig's Multivariate Extension of the Friedman Test was used for this purpose. The X^2 derived did not exceed the .05 level and, thus, the null hypothesis of equality of teacher behavior over the observation period failed to be rejected. This result can be interpretted as supporting the conclusion that teacher behavior was recorded consistently over time. In combination, the results of the observer agreement analysis and the Friedman Test meet the specifications of instrument reliability. First, it was shown, through observer agreement percentages, that the instrument could be recorded with accuracy and objectivity. And second, the data analysis indicated that the instrument derives a consistent record of teacher behavior over time.

Defining instrument validity is a more complex problem. Validity is defined as determining whether an instrument is measuring what it is intended to be measuring. This was translated to mean that this study must fulfill three criteria:

1. A representative sample of teacher reinforcement behavior must be observed.
2. An accurate record of the observed behaviors must

be obtained.

3. A record must be obtained that faithfully reflects differences in teacher behavior while relating intelligibly to teacher effectiveness.

In meeting the first criterion, two dimensions were examined: the sampling of teacher reinforcement behaviors through instrument construction and the sampling of teaching situations to be observed through a randomized design. Initially, the instrument was derived from an intensive review of the literature related to reinforcement, applied behavior analysis and interaction analysis plus extensive viewing of various teaching situations. In its design the teacher reinforcement observation schedule was constructed to represent the "universe" of reinforcement. The study was then designed so that teaching situations were randomly observed from all possible time periods throughout the day for each teacher. Thus, every subject, grouping and circumstance was represented in the data. These two dimensions can be interpretted as fulfilling the criterion for observing a representative sample of teacher reinforcement behaviors.

The second criterion of accuracy in recording has been discussed with reference to observer agreement. This illustrates the interrelatedness of reliability and validity. They are not mutually exclusive requirements. Thus it was necessary to define the instrument items with sufficient specificity to insure accurate recording for both reliability and validity. One requires precision and the other requires authenticity, yet the tests are similar. The percentages of observer agreement, using experienced

teachers as observers, were sufficient to conclude accuracy in recording.

The final criterion of recording differences in teacher behavior while relating the data intelligibly to teacher effectiveness could be the most controversial aspect in determining validity. How is teacher effectiveness to be defined? And how, if it is defined, can it be related to a teacher reinforcement instrument? However, as discussed previously, a technique was designed and tested (Henderson, 1968) by which peers, supervisors and administrators could agree upon the identification of "competent" teachers without stating a common criteria or definition. This technique permitted the identification of "competent" teachers for this study and left a discussion of common attributes open for post hoc analysis. In assuming that the ten teachers selected were competent by identification, their behavior could be correlated to determine whether they used common reinforcement behaviors. This correlation was measured by calculating the agreement on category rankings by frequency for each teacher through use of Kendall's Coefficient of Concordance. A high correlation could be interpretted as supporting the conclusion that teacher effectiveness can, in part, be described through frequency distributions on the instrument. Given that the null hypothesis of lack of concordance between teachers on category rankings was rejected, it was concluded that the data was related to some common attributes of teacher effectiveness. This is further illustrated by the descriptive distributions of teacher behavior that were derived from the data.

Having met the three criteria for observation instrument validity as established by Medley and Mitzel, it is reasonable to conclude that the multi-sign instrument as designed and tested is a valid measure of teacher reinforcement behavior in the classroom.

IMPLICATIONS FOR TEACHER EDUCATION

A wealth of data was gleaned from this study on the reinforcement behavior of "competent" practitioners. Much of this data suggests directions for teacher training. However, additional comparative data must be gathered for more complete validation of teacher differences as described on this instrument before these suggestions can be widely adopted. First, the average number of reinforcers used over the five hour period, approximately 1,341 or 268 per half hour period, could be used as a mark or model for practice teachers at the elementary school level. It is found in many instances that teachers retreat behind their desks and have minimal interaction with their students. If the trainee were informed prior to entering the classroom of the nature of the instrument, asked to learn the various techniques, presented with the frequency distributions of these ten or subsequent teachers observed, and then, in consultation with a supervisor, established reinforcement goals which could be evaluated periodically through use of the instrument, student-teacher interaction could be increased in many classrooms. Further, certain preferred techniques could be emphasized and other techniques minimized. It should be noted on the frequency distribution how little the teachers used punishment, delay of feedback,

no response and tangible rewards. In the suburban setting, the teachers focused on constant evaluation, action feedback and substantive reaction and tempered this with a balance of praise, verbal acquiescence, verbal deterrents and redirecting statements.

This instrument seems to be highly compatible with one of the newest areas in education, micro-teaching during pre-service training. The desired reinforcement behaviors could be learned in successive approximations with the trainee doing his own evaluation from video tape after each episode. Thus, the trainee could work toward a desired goal or objective without the pressure of evaluation. Using the instrument during pre-service training and student teaching has the potential for emphasizing the importance of reinforcement, focusing the trainee on specific desired techniques (e.g. time-out which is emphasized in applied behavior analysis or independence and intrinsic rewards which are emphasized in the British Infant School technique) and bringing to his awareness an entire spectrum of alternatives.

Several other characteristics of the frequency distributions recorded during this study could be emphasized. First, on the average, the teachers used a balance of rewards and deterrents, 15.3% and 15.9% respectively of the reinforcers observed. This balance seems to be an important element although more research would have to be done to make any conclusive statements. Second, the instrument has been written in such a way that analysis is very concise and descriptive. Thus, the behaviors are very clearly stated for subsequent perusal and discussion. Finally, the proportion of teacher-initiated responses to student-initiated

responses is of interest. This proportion of 27% to 73% should be examined quite closely in future use of the instrument. The indication is that these 10 teachers have a far higher rate of student participation than most classrooms.

Therefore, this instrument and the study data could be used extensively in teacher training programs for general reinforcement instruction or, more specifically, to prepare trainees to practice precision teaching.

This instrument can also be used for in-service training. Teachers could work in teams to observe and analyze their own classroom behavior while they work toward stated goals. Singly, a teacher could use this instrument while viewing a class session(s) on video tape. Given the nature of the instrument, it is very amenable to in-service classroom use.

In order to have maximum use in pre-service and in-service instruction, additional comparative data should be obtained. This point must be stressed since the only data now available is for "competent" teachers.

SUGGESTIONS FOR FURTHER RESEARCH

The primary emphasis in future research on the teacher reinforcement observation data should be concentrated in gathering more comparative information. There are many dimensions that could be considered. THIS STUDY FOCUSED ON "COMPETENT" SUBURBAN ELEMENTARY TEACHERS IN A TRADITIONAL CLASSROOM SETTING. First, comparable data could be gained at the junior high and high school level for various subjects.

Also, classrooms in communities with different socio-economic levels should be considered. The data that should be derived can be graphed as follows:

HIGH SCHOOL SUBURBAN	HIGH SCHOOL URBAN	HIGH SCHOOL EXURBAN & RURAL
JUNIOR HIGH SUBURBAN	JUNIOR HIGH URBAN	JUNIOR HIGH EXURBAN & RURAL
ELEMENTARY SUBURBAN	ELEMENTARY URBAN	ELEMENTARY EXURBAN & RURAL

Previous educational research has indicated that there may be different teaching styles required in each of these settings, and, thus, model data should be obtained for each.

Two additional dimensions should be considered where circumstances permit it. First, comparative studies should be made between teachers identified for competence, teachers identified as having difficulties in teaching and/or a random sample of teachers. This data would be vary valuable in trying to determine those attributes associated with competent instruction. At this time, conclusive descriptions of this nature are lacking. Second, comparative studies should be made between teachers using various teaching models. It may be possibe to hypothesize that those using the "open classroom" do not have the same reinforcement distribution as teachers in a traditional classroom although each may be competent in their respective settings. Thus, much comparative data must be obtained using this instrument to describe teacher behavior in a variety of circumstances before conclusive statements on the attributes of competent teachers can be made. Once this

data is obtained, it may be possible to talk of the instrument's potential as a teacher assessment tool as well as a pre-service and in-service training tool.

Another area for further research is the development of comparable multi-sign instruments to categorize and analyze cognitive restructuring behaviors in the classroom. Combined with the reinforcement instrument, this instrument could be a valuable tool in educational development. The procedures developed in designing the reinforcement instrument indicate several optimal strategies for future instrument development.

OPTIMAL PROCEDURES FOR FUTURE INSTRUMENT DEVELOPMENT

It has been suggested that a cognitive restructuring instrument also be designed and tested to use with the reinforcement instrument. Several procedures used in this study can be followed in this development. Developing and testing an observation technique is a very valuable but expensive procedure, and mistakes can add greatly to the cost. The procedure reported here was a very efficient one, with expense minimized. Several procedures, in particular, should be noted:

A. Developing a sign system with very explicit behavioral definitions and multiple examples that were derived from both research and classroom observation, reduced observer training time to a minimum while obtaining acceptable reliability levels.

B. Employing experienced teachers as observers facilitated the training sessions while, most importantly, making

the study more acceptable to the public schools whose cooperation we are dependent upon.

C. Competent teachers were observed so that test data for the instrument and model data for subsequent analysis was derived simultaneously.

D. The development of a multi-sign instrument has a pragmatic application at both the pre-service and in-service level. Thus, both the university and the public schools are willing to lend assistance.

E. Designing an instrument that is linked to a teaching model provides explicit parameters for practitioner use and, thus, increases the likelihood that a bridge will be made between research and practice.

There is much still to be accomplished in translating behavioral research into classroom practice. But the teacher reinforcement instrument that was designed provides an important link in assisting teachers to maximize intended learning through reinforced practice.

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APPENDIX I

OBSERVATION SCHEDULE AND INSTRUCTION MANUAL

OBSERVATION SCHEDULE

TEACHER REINFORCEMENT BEHAVIORS

The purpose of this observation schedule is to record the feedback and reinforcement techniques of classroom teachers. The assumption is made that all behavior which can be observed have certain recurring functional components which can be recorded objectively and categorized to facilitate understanding, prediction and control. In this investigation we will be looking at only one aspect of teacher behavior, reinforcement, which is defined as any teacher action or verbal behavior that alters the future probability of a response in the same class, either by strengthening or weakening the stimulus-response connections. The unit of analysis is any single teacher reaction to a student statement or action or any teacher behavior giving the student information about the accuracy or value of a future response. Each occurrence of a teacher reinforcement behavior is to be recorded by the observer on the prescribed observation schedule. Definitions and examples of the category alternatives accompany this introduction.

In order to facilitate the recording of the classroom teacher's reinforcement behavior in the most professional and reliable manner, certain protocol must be observed.

1. Each teacher to be observed has been informed in advance of the basic objectives of the study and the potential use of the data. However, the specific functions to be observed have not been specified. It is essential to the study that this not be revealed until the conclusion of all observations. Thus it is necessary to refrain from speaking to this with the teacher. Ideally, there should be no

interaction between the teacher and the observer.

2. Similarly, there is to be no interaction between the observer and the students. The teacher has been requested to inform the students that we will be watching their class occasionally over the next few weeks and that they are to go on with their normal activities. If a child should speak to you, terminate interaction as quickly as possible by telling the child to go on with his other activities. The child has been told in advance that you must work and cannot talk with him.

3. The teacher and the administration have been assured that this study will be carried out with minimal disruption. Please enter the room as unobtrusively as possible and take a seat within convenient hearing range of the teacher. Be sure that you have informed the principal's office of your presence and prepared your clipboard, observation schedule, pencils and watch before you enter the room.

4. Finally, this study is to be done with complete anonymity for the teacher. This means that anything occurring in the classroom is not to be discussed except among observers for the purpose of clarifying the recording system. It is very important that this stipulation be observed.

Upon entering the classroom the observer should wait for a natural break in the on-going interaction before beginning to record. However, this waiting period should not exceed five minutes. If at the end of five minutes no natural break has occurred, the recorder should begin to record the on-going action. Be sure to note the time that recording began.

In recording the teacher behaviors according to the following schedule, one mark should be made for each complete message of the teacher to the student or each complete dialogue between the teacher

and the student. If more than one category occurs simultaneously, the recorder should score all categories that occur. Each statement or action should be recorded on the following prescribed recording sheet as:

S ⟶ pupil or group actively solicits the teacher's attention or assistance.

T ⟶ teacher dispenses a reinforcer contingent upon student response to some request, directive or other teacher-generated activity.

Be sure that you are completely familiar with these instructions, the observation schedule and the definitions and exemplars. Complete observance of these instructions is necessary to insure the reliability and effectiveness of this study.

REWARDS

1. TANGIBLE REWARDS
   - A. Consumable
   - B. Token
   - C. Use t's possessions
2. SPECIAL PRIVILEGE OR ACTIVITY
   - A. Activity
   - B. Teacher Concern
3. AFFECTION
4. SIGNAL APPROVAL
   - A. Facial
   - B. Gestural
5. PRAISE/ENCOURAGEMENT
   - A. Positively eval.
   - B. Challenge/pep talk
   - C. Recog auth figures
6. VERBAL ACQUIESCENCE
   - A. Reacts/ack s's ideas/exp
   - B. Accpt/util s's ideas/exp
7. INTRINSIC REWARDS
   - A. Accomplish task
   - B. Gaming
   - C. Removes evaluation
8. COMPETITION
   - A. Measure for others
   - B. Read/post work
9. INDEPENDENCE
   - A. Responsibility/auth
   - B. Choice/select activity
10. INCENTIVE/CONDITIONAL PROMISE
    - A. Teacher assist
    - B. Reward/enjoy task
11. PEER APPROVAL
    - A. Class selection
    - B. Praise/cooperation
12. UNCLEAR/MUDDLED

FEEDBACK

1. CONTENT/SUBSTANTIVE REACTION
   - A. Add new info
   - B. Clarify/synth
   - C. Give answer
   - D. Corr/tell do
2. ELICITS RESPONSE ELABORATION
   - A. Dev quest/elabor
   - B. Assist plan/proced
   - C. Opens poss/altern
3. EVALUATES
   - A. Positive rating
   - B. Negative rating
   - C. Imply by lesson prog
   - D. Repeats/withholds
   - E. Explanation/rationale
4. STRUCTURING/ACTION FEEDBACK
   - A. Clues expect resp set
   - B. Reg details/dir/instr
   - C. Advance organizer
   - D. Contingency manage
5. MODELING/RESPONSE FACILITATION
   - A. Task
   - B. Behavior
   - C. Enthus task/content
6. TEACHER IMPOSITION
   - A. Perform task
   - B. Relate exp/moralize
   - C. Admit mistake/apol
7. CHANGE ENVIRONMENT
   - A. Goal
   - B. Content
   - C. Procedures
8. AUGMENTED FEEDBACK
9. TESTING
10. DELAY FEEDBACK
11. UNCLEAR/MUDDLED

DETERRENTS

1. PUNISHMENT
   - A. Extra task
   - B. Low grades
   - C. Reorder environ
   - D. Physical restraint/ punish
   - E. Deprive of privilege
2. VERBAL DETERRENT
   - A. Criticism
   - B. Reprimand/negate
3. SIGNAL DETERRENT
   - A. Facial
   - B. Gestural
   - C. Proximity control
4. THREATENS
5. TIME-OUT PROCEDURE
   - A. Wait/lights
   - B. Recess/after school
   - C. Deprive social inter- action
   - D. Withhold positive reinf
6. REDIRECTS
   - A. Pose question
   - B. Remind behavior/deport
7. PEER DISAPPROVAL
8. UNCLEAR/MUDDLED

NO RESPONSE

MISCELLANEOUS

REWARDS: any pleasurable response or activity given to the student to indicate the desirable nature of a behavior, performance or eliciting action.

1. TANGIBLE REWARDS--any object having form and substance which is awarded to the learner.

   A. Consumable--the learner is given something to eat.

      Examples:
      *A child has successfuly read an entire page in his reader and the teacher states: "Good, Jimmy! Here is a cookie for that."
      *The teacher states: "You children have been so good this afternoon that we are going to take a break and have some suckers I bought for you."

   B. Token--the learner is given a symbolic reward for his behavior such as money or a prize.

      Examples:
      *A child completes a difficult task and the teacher states: "I'm going to give you a book mark for being so good."
      *A child completes a perfect paper and a gold star is placed on her paper. The teacher states: "Here is a blue ribbon for doing so well."
      *The teacher puts a smiling face on a child's workbook.
      *A student is given a card with the word he has just learned to read written on it.
      *The students are quiet enough that the teacher opens the door to the hall.

   C. Use something of teacher's/manipulable--the teacher permits a student to use something that belongs to her.

      Examples:
      *"Susie, you are entitled to use my whistle during recess today."
      *A child is given the teacher's stapler and magic markers for a project.
      *The teacher gives a student her mirror to see what his theater makeup looks like.

2. SPECIAL PRIVILEGES AND ACTIVITIES--a very obvious favor or advantage is given to one student or group; the learner (s) is granted a unique or pleasurable experience or activity which does not normally occur in this setting.

   A. Activity--the student is allowed to perform a special, unique or pleasurable activity.

      Examples:
      *The teacher, after due consideration, states: "I've decided that Lettie and Joe should be the team captains."

*Sally has completed her work before the rest of her classmates and the task is done correctly. The teacher states: "Sally, you can do the bulletin board in the back for me."
*The students are asked to sing their favorite songs for a classroom visitor while they are working on a paper mache project.
*A child shows the class the new shoes she received for her birthday.
(N.B. One tally should be made for each child talking to the class during any "show-and-tell" or special recitation.)

B. Teacher concern--the teacher shows concern for an individual child by assisting with a problem or expressing awareness of a problem.

Examples:
*The teacher asks as she begins the explanation of an assignment: "Jeff, can you hear from there?"
*A child is sent home because he is not feeling well.
*The teacher puts a band-aid on a cut the child received during recess.
*The teacher buttons a child's dress where it has come unbuttoned.
*A child is seated at the center table because he can't see the blackboard from his desk.

3. AFFECTION--any friendly or positive physical contact between teacher and student.

Examples:
*A child who is working quietly at his desk receives a pat on the head from the teacher.
*The teacher walks over and hugs a child who is having obvious troubles with a task he is working on.

4. SIGNAL APPROVAL--any positive motion, facial gestures or postural changes from the teacher.

A. Facial attention--any indication of approval through facial expression such as a wink, smile or nod.

B. Gestural--any indication of teacher approval using the hands such as pointing to a child with the correct answer, signaling o.k. or clapping.

5. PRAISE/ENCOURAGEMENT--verbal comments indicating approval, commendation, or achievement in task-related endeavors.

A. Positively evaluates deportment/ideas/response/task--praise is given for appropriate student behavior.

Examples:
*When nearly all the children in a class know the answer, the teacher states: "All of you are certainly smart today."
*The teacher compliments a child, "That's a pretty dress,

Susan."
*"My you are enthusiastic today."
*A child has done particularly well on an assignment and the teacher states: "You must have studied hard."
*The teacher praises those who have improved as they report their math homework grades.
*"That's good. You make me happy when you do that."
*The teacher questions the student: "Doesn't that make you feel happy that you did it right?"

B. Challenge or pep talk--the teacher encourages the pupil (s) to compete with themselves, each other, the teacher or an arbitrary criteria or challenges the students to work harder in difficult circumstances.

Examples:
* The teacher challenges the students: "I'm going to give you a difficult job to do. Can you do this . . .?"
*The teacher is circulating around the room and states: "You can all improve. You can all do better."
*"Wow, Tommy found a real hard one."
*"Let's see if you remember your reading words from this morning."

C. Recognition from authority figures--obvious social rewards are given to the learner for correct behavior or task performance by the parents, principal, teacher or other authority figure.

Examples:
*The principal enters the room and states: "I want to see all the wonderful things you are doing, so I came to visit."
*The class is invited to display their art work at the local shopping mall.

6. VERBAL ACQUIESCENCE--the teacher is receptive to student initiated appeals for permission, guidance, or information or responds to a comment of a personal nature.

A. Reacts to or acknowledges the students comments or appeals--the teacher meets individual requests of pupils, listens to personal interests and experiences unrelated to the content under consideration.

Examples:
*A student asks for and receives help in finding a hanger to put his coat on.
*The teacher listens attentively while a child tells her about a movie she saw the day before.
*A student request to go to the lavatory is granted.

B. Accepts or utilizes the student's ideas or experiences--a student's ideas, suggestions or experiences are incorporated into the classroom setting.

Examples:

*A student comments that his parents have gone to Florida and the teacher stops to show him where Florida is on the map.

*A student tells the class about an interesting news event that has occurred the day before.

*A child, as an expert on space, is consulted by the teacher for a point of information.

*The teacher listens to a child who approaches her, stating: "Teacher, guess what we did last night? . . ."

7. INTRINSIC REWARD--indication of the accuracy of a response or action is included in the task so that success is guaranteed when the task is completed; a unique academic experience which has the essential feedback components built into it, rather than requiring teacher direction.

A. Accomplishment/mastery of the task/completion of academic activites--being able to engage in pleasurable, successful activities as a part of on-going classroom activities; success is guaranteed for every child completing or experiencing the task.

Examples:

*The teacher gives the student an exercise involving sentences. One half of a sentence is written by the teacher and the student finishes the sentence (the only requirement is that the sentence make sense.)

*The tape recorder is used to encourage listening and language.

*The teacher states: "This is an easy task. You can't fail this one."

*The students write about "My Three Wishes" to be included in their cumulative records.

*The students figure out a crossword puzzle together or independently.

B. Gaming--the students participate in a competitive activity in which correct responses are necessary to proceed to the next step or to accumulate points.

Examples:

*The students work in a group with spelling cards. The group leader hands each student the card as he spells the word correctly.

*The student participates in a simulation game which guides him through successive success experiences.

C. Removes evaluation sanctions--the teacher allows the student to perform a directed or self-selected activity without concern for being graded.

Examples:

*The teacher is anxious to know of the learner's opinions on an activity in the classroom and she states: "Let's be

honest with each other in this situation. There will be no grades given for answers to my questions and I won't hold any bad comments against you."
*The students are given an optional assignment with no grading.
*The students go through a slide program or lab experiment by themselves or in a group.

8. COMPETITION/STUDENT AS MODEL--the learner is placed in an overt competitive situation in which his performance is evaluated in relation to others or his performance or knowledge is used as a model for imitation.

   A. Measures or models for others or against an absolute--a child is given a high ranking for his performance or is requested to display a special talent or ability.

      Examples:
      *"I've decided after this contest that Ann should speak to the principal for us."
      *"The following children are on the President's Physical Fitness Team . . ."
      *Those children with the neatest papers are given a double A.
      *A student gives the correct answers to the math assignment and explains how they were worked.
      *Papers are returned to those children who are behaving according to the teacher's expectations.

   B. Reads or posts student's work as best--the student's work is made public to classmates as a superior product.

      Examples:
      *"You know, this is so good that I'm going to put it on the bulletin board."
      *A child has worked quietly for an extended period of time and the teacher puts his paper on the board for the most improved behavior.
      *After a student explains about the problems of Apollo 13 in returning to the earth, the teacher states: "I wish that all of you had a special interest and a wealth of information in a topic like Sam does."

9. INDEPENDENCE--the teacher gives the learner the right to make individual choices about certain aspects of his learning environment.

   A. Given responsibility or authority--the learner is placed in complete control of a class function or control over some activity of his classmates.

      Examples:
      *A child is asked to be attendance taker for the day.
      *An upper elementary child is asked to be a tutor for the first grade in reading or asked to care for the class pets over the weekend.
      *The students tell the teacher what to write on the board.

*The teacher states: "Tim, you check your table to make sure that everyone is really ready."
*A student is asked to locate a movie projector in the building for another teacher.

B. Given choice or selects activity--the learner(s) chooses an activity either independently or from a list given by the teacher.

Examples:
*The teacher states after giving an assignment: "We are going to be doing biography, but let me know if you are interested in something else and you can read it."
*The children are sitting with their paper and pencils out for language arts and the teacher states: "I've decided that you can write about anything you want. You choose."
*The students are to vote on whether or not they want to see a movie for a second time.

10. INCENTIVE OR CONDITIONAL PROMISE--the teacher promises the learner a reward; the giving of a reward is delayed until some future time.

A. Teacher assistance--the teacher offers to do a personal favor or assist with a task.

Examples:
*The teacher states: Any time you're having trouble with this, come to me. After all, I'm here to help you."
*A child is having trouble with an assignment, and the teacher states: "If you stay for a few minutes after class, I'll be glad to help you with that."

B. Reward for performing task--a positive reinforcer is offered as a consequence of successfully performing a specified task or activity.

Examples:
*"Tomorrow I'll write some of the best ones you have done on the board."
*The teacher explains: "If this is terrific when we are finished, we'll use it for our Mother's Day present."

11. PEER APPROVAL--a pupil's classmates express interest or approval in his task-related work or behavior. (Be certain this is task-related as all other approved behavior may not be encouraged or intended by the teacher.)

A. Class selection/recognition--formal selection by classmates for a given honor or award.

Examples:
*The teacher asks the children to select their representatives to the service squad.

*The students select the five drawings they want to display in the hall.

B. Praise or cooperation or assistance--the learner is given verbal approval of his task-related work or behavior.

Examples:
*One student helps another to spell several words for his story.
*A pupil is completing a project for science and one of his classmates states: "Gee, is that ever good. Come see this guys."
*All the pupils clap when a child has successfully read a page aloud.

12. UNCLEAR/MUDDLED--the response elicited by an occasioning move is not sufficiently audible to be categorized other than as a reward.

FEEDBACK: giving neutral responses to indicate academic correctness; information function; those verbal statements and behaviors which directly or indirectly reflect on the adequacy, appropriateness or correctness of pupil statements in relation to academic subject matter development or classroom management. (This should be recorded when a student is giving feedback to his classmates as in a demonstration or report.)

1. CONTENT/SUBSTANTIVE REACTION--the teacher modifies the substantive content of an occasioning move.

A. Adds new information--additional data is given to the learner to modify or compliment his occasioning move or the teacher relates some interesting trivia about a topic the student introduces.

Examples:
*"Yes, it is correct to say that butterflies migrate to Mexico. But it must be understood that this is only the Monarch."
*During a demonstration speech, the student speaker answers the questions of his peers.
*The teacher answers a child's question or request for information.

B. Clarifies or synthesizes--the teacher brings together all parts of a discussion or idea for the purpose of making the idea more clear to the learner.

Examples:
*The class is discussing various protest movements and the

teacher finally ends the discussion by saying: "All right, you seem to be making the following points . . . ."
*The class has just finished making individual reports on the systems of the human body and the teacher states: "All right, now let's put all of this together. First, . . ."
*The teacher states: "The majority opinion seems to be that this is a well written news article because . . ."

C. Gives answer--the teacher states the correct answer to a question or comment when asked or supplies the correct response when a learner is silent.

Examples:
*"I've waited long enough, Jean. The correct answer is five food groups have been studied."
*The student asks the teacher whether the earth or the sun is the center of the universe and the teacher responds: "The sun is at the center of our universe and the earth rotates around it."
*A child is writing a story and asks a classmate, "How do you spell sparkling?" The classmate responds, "S-P-A-R-K-L-I-N-G."

D. Corrects or tells what should have been done--the teacher modifies the occasioning move of the learner by assisting him in making a more accurate and/or precise response.

Examples:
*The teacher has just returned the students' stories and she approaches one child, stating: "Will, your paper would have been more correct if you had more carefully worded your topic sentences. Also, in one case there should have been an additional paragraph."
*The teacher asks a child when the Civil War began and then states: "No, although as you say, the war became inevitable with Lincoln's election in 1860, the actual fighting did not begin until 1861."

2. ELICITS RESPONSE ELABORATION--the teacher encourages further communication of the student's thoughts or ideas or elicits divergent/creative thinking processes from the student.

A. Developmental questioning or elaboration--the teacher probes for further response by posing further questions; elicits further development of an idea with no threat of evaluation implied.

Examples:
*"Why did you say that?"
*"In creative writing it is your feelings we are interested in. You should come through."
*"All right. That's a pretty decent answer. Tell me more."
*"Think of something no one else will think of."
*The teacher states: "There are many ways to do this, so I want you to do the problems the easiest way for you."

*"Listen and think."

B. Assists in developing plans or procedures--the teacher helps the learner(s) to determine a standard of performance, plan or procedure; the teacher assists the student(s), probably through questioning, to make a decision regarding activities or goals.

Examples:
*The students and teacher are standing in an informal group and the teacher is asking questions and calling upon students to make a decision about their activity for the day.
*A student requests the teacher's help in selecting a topic for a story. She sits down at his desk to assist him, asking him questions about his special interests and activities.

C. Opens new possibilities/suggests alternatives/poses problems--the teacher makes suggestions as to new ideas or options the students might consider with reference to the task or topic under consideration.

Examples:
*The teacher states: "Why don't you try . . .?"
*The teacher asks: "If they hadn't given the date, how would you have known when the story took place?"
*"You know there are several ways we could attack this problem. We could add and then divide by a fraction, we could add and then multiply or we could divide each one and then add them up."

3. EVALUATES--the teacher values the truth, falsity, appropriateness or inappropriateness of the occasioning move.

A. Positive rating--the teacher accepts a student response by indicating mild approval.

Examples:
*In response to a student answer the teacher says, "That's right," or "o.k."
*"I was very pleased with your performance on this assignment."
*"Yes, Sally, two plus two is four."
*"That seems to be a reasonable approach to the problem."
*A student accurately selects the topic sentence for a paragraph and the teacher writes it on the board.

B. Negative rating--the teacher negates a student by indicating its inaccuracy.

Examples:
*A student gives the wrong date for an event in history and the teachers states: "That's not right."
*The teacher shakes her head and frowns as a student answers a question at the end of the chapter in the science textbook.

C. Implies accuracy of response by lesson progression or use of response--the teacher indicates the correctness of a student statement by continuing with the lesson or incorporating the response into subsequent statements.

Examples:
*"Could anyone give us another point?"
*After a student has answered an arithmetic problem or reads a page in the reading book aloud, the teacher responds: "Jim, would you take the next one, please."
*"As Larry suggested, we are going to clean up the playground as our project for Earth Day."

D. Repeats or withholds rating--the teacher repeats the student statement with no explicit rating or states the contrary; the teacher fails to make the rating explicitly, leaving the valuing to the student.

Examples:
*"Well, that could be right. What do you think?"
*"Yes, that's a possibility."
*After asking the students to suggest ways that they could prevent air and water pollution, the teacher writes every student suggestion on the blackboard.

E. Explanation/rationale--the teacher states her reasons for an action or direction.

Examples:
*A student calls the teacher repeatedly to help and the teacher states: "I'm helping Ricky first because we need to make sure he knows it."
*"Pat, we are doing it this way because . . ."
*"It seems to me that this is our only reasonable alternative because of the time we have left to finish."
*The pupils complain about a task and the teacher states: "Like it or not -- unfortunately for you -- we have to have it."
*"I wouldn't count that wrong because we haven't learned that letter yet."

4. STRUCTURING/ACTION FEEDBACK--the teacher indicates what the learner should co next, organizes, structures or establishes limits of future action; the teacher elicits convergent thought processes in organizing classroom procedures.

A. Gives clue to expected response set--cues are given to elicit a specific response or behavior from the student that has been explicitly determined by the teacher.

Examples:
*"All right, this is a test now and there is to be no more talking."

*The teacher explains explicitly how an assignment is to be completed.
*Further questions are posed and clues given that will remind the student of a specific fact he has been asked to recall.

B. Regulation of details--the teacher describes, directs, instructs or sets limits; the teacher states specific consequences that will result from a future action.

Examples:
*In introducing a lesson the teacher states: "Copy this down."
*The teacher explains: "The grade on this task is one-third of the marking period."
*In explaining what should be done on a project the teacher states: "I'll help you and you help me. We'll all help each other."
*"Agree among yourselves what supplies you will need for your project and give me a list."
*"Remember, during work time you can go get a drink when you wish. Especially in this hot weather."

C. Advance organizer--the teacher provides a framework or gives certain clues which will facilitate student learning or performance.

Examples:
*The teacher spells WEIGHED on the board for a child and then explains, "That's one of those words you just have to learn to spell."
*The teacher carefully spells out the criteria of evaluation before the students give their oral news reports.
*"Be prepared to tell me at the end of the story whether the boys' wishes were selfish or not."

D. Contingency management--the teacher controls one behavior by giving the learner the opportunity to engage in another highly desirable activity or structures the environment or behavior to avoid anticipated undesirable circumstances although no inappropriate behavior has yet occurred.

Examples:
*"I'm taking my time to take you on this field trip. If you go into a store and steal something there won't be any more field trips. Act like you were brought up right."
*The teacher explains that an extended period of quiet can earn extra privileges such as a longer break or gym period.

5. MODELING/RESPONSE FACILITATION--the teacher demonstrates how the learner should act or perform; the condition where the behavior to be acquired is demonstrated for the learner, with the expectation that this behavior will be immediately imitated. (Student assistance with a task should also be included in this category.)

A. Task--the teacher demonstrates how the learner should perform an assigned task or assists in performing a task by illustrating the appropriate skills or facilitating completion by providing materials.

Examples:
*One child helps another with reading words and the child repeats them.
*Each child is given a marker to underline his words as he reads.
*The teacher guides a child's hand as he writes his name.
*The teacher carefully sounds out each syllable while the students are taking a spelling test.
*The teacher states: "Look, Betsy, you should do it this way." The teacher then shows Betsy how to cut out her paper snowflakes.

B. Behavior--the teacher demonstrates how the learner should perform an assigned task.

Examples:
*In a lesson on manners and etiquette, the teacher shows the students how to make a proper introduction and shake hands.
*The teacher raises her hand to remind the students how they should perform in seeking her attention.
*The teacher asks the students to write a story and draw a picture on "If I were a _____ I would _____." She holds up the picture and story she has written as an example entitled, "If I were a raindrop I would _____."

C. Enthusiasm for task or content--the teacher encourages an interest in the subject matter under discussion through an enthusiastic presentation.

Examples:
*In listening to a recording of Hal Holbrook as Mark Twain, the teacher laughs and reads along with the record.
*The teacher stands at the front of the room smiling, clapping her hands and exclaiming, "Isn't it exciting that we are learning all these wonderful things!"

6. TEACHER IMPOSITION--the teacher extends personal assistance, uses personal experiences or abilities to assist or relate to pupils or admits personal limitations.

A. Performs task for student--additional assistance is offered to the learner in accomplishing an assignment which a learner is normally expected to complete imdependently.

Examples:
*"Keep your seat. I'll bring it to you."
*The teacher walks to the back of the room to search through a stack of magazines for some pictures for the students.
*The students encounter difficulties in preparing a drawing of

the human body and the teacher completes it for them.

B. Relates experiences/moralizes--the teacher overtly introduces her own ideas, attitudes, opinions or experiences into the classroom setting.

Examples:
*As an aside the teacher states: "I saw 'Anne of the Thousand Days,' yesterday and it is excellent. You should try to see it."
*A child asks about Missouri and the teacher tells of her experiences there.
*The teacher refuses to give the students free pencils although the school normally supplies them, explaining: "My previous classes used too many of them when they were free. I don't think that you take care of them."

C. Admits mistake or apologizes--the teacher admits to certain shortcomings or oversights on her part.

Examples:
*"All right, I may not have made that as clear as possible."
*A child asks a question and the teacher states: "Quite honestly, I don't know."
*"You know that with a memory like mine, I forget. So you remember to go."
*"I don't know either because I haven't got my teacher book."
*"How many of you need to check back to p. 64 to remember? I would if I were you. I still need to sometimes."

7. CHANGE ENVIRONMENT--the teacher diverts from intended content, goals or procedures due to student interest or changes plan or procedures when learners demonstrate inappropriate entry behaviors.

A. Change goal--the intended end of a set of experiences or activities is altered.

Examples:
*When several students have completed an assignment on time the teacher states: "Most of you seem to need more time so this won't be due until tomorrow."
*"Since we didn't have school yesterday, we'll have to see how far everyone has gotten."

B. Change content--the subject matter to be discussed is modified when the students demonstrate insufficient entry behaviors.

Examples:
*When the pupils give several incorrect answers at the beginning of a lesson the teacher states: "I can see that this will never do. We'll have to do some additional background reading."
*"I didn't plan to get on science during this period, but I guess we did."

*The teacher states: "I feel as though something is wrong. Put down your pencils and let's talk about it."

C. Change procedures--the means specified to achieve a given end are modified.

Examples:
*When a student seems reluctant to assume a task the teacher states: "Let's see who else might do this."
*"Let's do this another way so that we don't take up too much of your time."
*When all but one child has finished an assignment, the teacher states: "You go in the hall to finish while the rest of us go on."
*The teacher lowers the shades when she realizes that the sun is shining in several children's eyes.
*The teacher has the children stand up and stretch when they start wiggling too much in their chairs while she's reading a story to them.

8. AUGMENTED FEEDBACK--media utilized to assess the value or accuracy of learner behavior or assist the learner to assess the accuracy himself. (Record one tally for every 20 seconds that the media is utilized.)

Examples:
*Several children are seated at a table with ear phones on and following along in their books to a tape-recorded reading of their story.
*A child is seated at a computer terminal working out his arithmetic assignment.

9. TESTING--the learner receives feedback on the accuracy of his performance, behavior or responses by taking an appropriate test. (Record one tally for every 20 seconds that the test is being given.)

Examples:
*The students are sitting at their desks writing out from memory the systems of the human body.
*A standarized arithmetic test is passed out for the students to take and compare their performance with the performance of other students at their grade level.

10. DELAYS FEEDBACK OR PROMISES--a response is postponed by the teacher until a future time.

Examples:
*The teacher is talking and a student asks a question. The teacher replies: "I'll answer that when I'm finished."
*"I'm going to tell you about that later."
*"Let's do this and then come back to what John said."
*"Put it on my desk and I'll check it later."

*"We'll talk about the design after our trays are made."
*"I'll read that for you when I get a chance."

11. UNCLEAR/MUDDLED--the response elicited by an occasioning move is not sufficiently audible to be categorized other than as feedback or information-giving.

DETERRENTS: any discouraging response or activity given to the student to indicate the undesirable nature of a behavior, performance or action.

1. PUNISHMENT--discouraging undesirable behavior by directly manipulating the consequences.

   A. Extra tasks--additional work is assigned to a student for inappropriate behavior.

      Examples:
      *The pupil is given an additional homework assignment for talking too much in class. "Johnny, since you have so much time to throw paper wads, copy your spelling words ten times each."
      *A child is kept after school to clean out his desk.
      *When a student misspells a word on his spelling test he is required to write that word 100 times.

   B. Lowering grades--a student evaluation is reduced because of inappropriate behavior.

      Examples:
      *"Your grade is being lowered from a B to a C for the day because you are being too noisy."
      *"Usually I would give you 100 for this. But since you wrote so sloppy, I'm only going to give you a 90."

   C. Reordering environment--the teacher manipulates classroom space and equipment to modify inappropriate pupil behavior.

      Examples:
      *A student is looking at a yearbook in her lap while the rest of the class is discussing poetry. When asked a question about the poetry she responds that she doesn't have a textbook. The teacher states: "Slide your desk over and share Pat's book for this period. And I'll take that yearbook for now."
      *"This group doesn't seem to be getting their work done because they're talking too much. Move your desks apart. You over here and you over there."

   D. Physical restraint/corporal punishment--the teacher comes into forcible contact with the learner in order to deter him from

an inappropriate behavior.

Examples:
*Several children are fighting and the teacher grabs a couple of them and forcefully pulls them to their seats.
*The teacher shakes a child for responding in a particular manner.
*The teacher pushes a child into his chair or seat.

E. Deprives of privilege--a pupil is denied an advantage or special activity as a result of misbehavior.

Examples:
*"Tim, since you can't behave yourself, you are losing your turn as team captain."
*A child loses his place at the front of the recess line because he is misbehaving.
*The teacher takes a student's toy away until after school.
*The bathroom pass is taken away because of inappropriate behaviors.

2. VERBAL DETERRENTS--critical statements are directed at a student indicating inappropriate behavior with no overt indication by the teacher as to the appropriate behavior expected.

A. Criticism/sarcasm--critical comments of high or low intensity, yelling, scolding or raising voice.

Examples:
*A child could not answer a question and the teacher states: "Glen, you have not been paying attention in class. You're not being very good this morning."
*The teacher comments to a pupil: "The next time you have a bag, put it over your head."
*"Larry, you're interrupting now."
*"Stop acting like a big baby."

B. Reprimands or negates--the teacher chides the pupil for inappropriate behavior without redirecting to an appropriate one.

Examples:
*"That's a stupid thing to say."
*A student tries to leave for Student Council and the teacher states: "Tom, I know better."
*"Jim, stop your talking."
*"Shhh."
*A student asks a question and the teacher states: "Hold it. We don't have time for things like that."

3. SIGNAL DETERRENTS--negative non-verbal gestures by the teacher.

A. Facial--any indication of disapproval through facial expression.

Examples:
*When a class responds with an incorrect answer, the teacher frowns.
*The teacher makes a face at a child who is out of his seat and talking to another child.

B. Gestural--any indication of teacher disapproval using the hands such as pointing or shaking his finger.

Examples:
*The teacher points to the place in the student's book where he is supposed to be reading.
*The teacher shakes her finger at a group that has become too noisy.
*The teacher signals to a child to sit still and quiet down.

C. Proximity control--the teacher places herself in close proximity to a student for the purpose of controlling his behavior.

Examples:
*There seems to be a disagreement among several pupils and the teacher moves to the trouble center while maintaining on-going activity.
*The teacher puts her hand on a child's shoulder to keep him in his seat while the other students complete an activity.
*The teacher seats himself with a large group of boys while they watch a film.

4. THREATENS--consequences mentioned by the teacher to be used at a later time. If _____ then _____ statements indicating the negative consequences if an inappropriate behavior recurs or continues.

Examples:
*"I'm going to have to be cross if this continues."
*A child takes several pokes at one of his classmates and the teacher states: "Ron, if that happens again you'll be put off by yourself."
*"I'm going to collect your papers if you don't get to work."
*"The next person who talks will have to put his head down."

5. TIME-OUT PROCEDURE --the teacher removes herself or the learner from social interaction.

A. Waits/lights out--the teacher quietly waits or turns the lights out in the classroom until the learners are displaying appropriate behaviors.

Examples:
*The teacher turns out the lights when the class returns from recess and waits for the children to take their seats.
*The teacher turns her back on a noisy group of children until they are quiet.

B. Keep in at recess or after school--the student is deprived of interaction with his classmates by being kept in the classroom while his peers are together in another location.

Examples:
*"Tom, since you can't play fairly, you'll have to sit on the bench with me while the rest of the children play volley ball at recess."
*A child forgot to bring his book to school and the teacher states: "Tom, for forgetting your book, you'll have to spend your lunch hour inside with me."

C. Deprives of social interaction--the student is removed from interaction with his peers during on-going class activities.

Examples:
*"Joyce, you'll have to go back to your seat while we continue since you can't behave."
*A child is sent to the hall until he can be quiet.

D. Withholds positive reinforcement--the teacher refuses to acknowledge a student request, comment or appeal until appropriate behaviors are displayed.

Examples:
*"I'll help you with that only after you raise your hand like you're supposed to."
*The teacher stops in mid-sentence to wait until all the students are listening to her.

6. REDIRECTS--the teacher guides the learner from an inappropriate to an appropriate activity.

A. Poses question to student--a question is directed to a negligent student for the purpose of cuing him in to appropriate behaviors.

Examples:
*A child is staring out the window as another student makes a statement. The teacher asks the child: "Francie, what do you think about what Lisa just said?"
*The teacher asks the students if they know what they were doing wrong on the playground.
*The teacher asks: "Why do you suppose that I asked you to do it that way?"

B. Reminds of attending behavior or deportment--suggestions for proper conduct or expected behavior are made when a student is performing inappropriately.

Examples:
*"You should be listening now."
*One student asks another one to speak up.
*"Could we have your attention, please?"

*"There are several boots that are not against the wall. Would you do that now."
*"Let's be quiet so that those who have started can concentrate."
*The teacher continues to give answers but raises her voice above student talking.

7. PEER DISAPPROVAL--a pupil's classmates express disapproval or displeasure at his task-related work or behavior.

Examples:
*One child addresses another: "Tom, you have gum. Go throw it away."
*One student complains to the teacher about the uncooperative behavior of another student.
*The students express disbelief of a classmate's stories about his adventures.

8. UNCLEAR/MUDDLED--the response elicited by an occasioning move is not sufficiently audible to be categorized except as a deterrent.

NO RESPONSE/IGNORE: the occasioning move of a student receives no overt response from the teacher. This category is to be checked only if the teacher apparently fails to hear or acknowledge a student's appeal, request or statement.

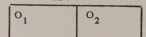
MISCELLANEOUS: the nature of a teacher response is not sufficiently apparent to accurately discriminate for purposes of categorization.

APPENDIX II

CALCULATION OF OBSERVER AGREEMENT

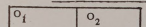
REWARDS

1. TANGIBLE REWARDS



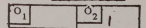
A. Consumable
B. Token
C. Use t's possessions

2. SPECIAL PRIVILEGE OR ACTIVITY

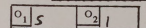


A. Activity
B. Teacher Concern

3. AFFECTION

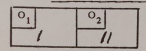


4. SIGNAL APPROVAL



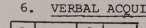
A. Facial
B. Gestural

5. PRAISE/ENCOURAGEMENT



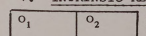
A. Positively eval.
B. Challenge/pep talk
C. Recog auth figures

6. VERBAL ACQUIESCENCE



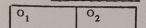
A. Reacts/ack s's ideas/exp
B. Accpt/util s's ideas/exp

7. INTRINSIC REWARDS



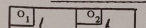
A. Accomplish task
B. Gaming
C. Removes evaluation

8. COMPETITION



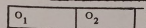
A. Measure for others
B. Read/post work

9. INDEPENDENCE



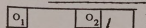
A. Responsibility/auth
B. Choice/select activity

10. INCENTIVE/CONDITIONAL PROMISE



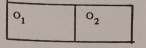
A. Teacher assist
B. Reward/enjoy task

11. PEER APPROVAL



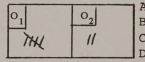
A. Class selection
B. Praise/cooperation

12. UNCLEAR/MUDDLED



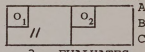
FEEDBACK

1. CONTENT/SUBSTANTIVE REACTION



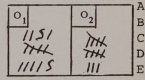
A. Add new info
B. Clarify/synth
C. Give answer
D. Corr/tell do

2. ELICITS RESPONSE ELABORATION



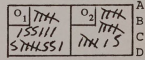
A. Dev quest/elabor
B. Assist plan/proced
C. Opens poss/altern

3. EVALUATES



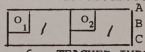
A. Positive rating
B. Negative rating
C. Imply by lesson prog
D. Repeats/withholds
E. Explanation/rationale

4. STRUCTURING/ACTION FEEDBACK



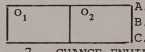
A. Clues expect resp set
B. Reg details/dir/instr
C. Advance organizer
D. Contingency manage

5. MODELING/RESPONSE FACILITATION



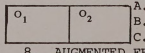
A. Task
B. Behavior
C. Enthus task/content

6. TEACHER IMPOSITION



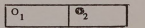
A. Perform task
B. Relate exp/moralize
C. Admit mistake/apol

7. CHANGE ENVIRONMENT

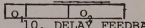


A. Goal
B. Content
C. Procedures

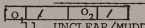
8. AUGMENTED FEEDBACK



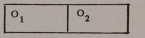
9. TESTING



10. DELAY FEEDBACK

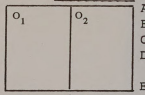


11. UNCLEAR/MUDDLED



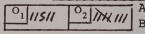
DETERRENTS

1. PUNISHMENT



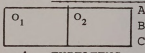
A. Extra task
B. Low grades
C. Reorder environ
D. Physical restraint/ punish
E. Deprive of privilege

2. VERBAL DETERRENT



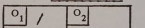
A. Criticism
B. Reprimand/negate

3. SIGNAL DETERRENT

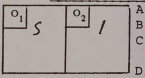


A. Facial
B. Gestural
C. Proximity control

4. THREATENS

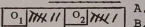


5. TIME-OUT PROCEDURE



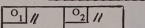
A. Wait/lights
B. Recess/after school
C. Deprive social interaction
D. Withhold positive reinf

6. REDIRECTS

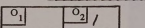


A. Pose question
B. Remind behavior/deport

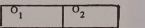
7. PEER DISAPPROVAL



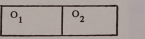
8. UNCLEAR/MUDDLED



NO RESPONSE



MISCELLANEOUS



On the preceding page is a copy of the observation schedule with the tallies recorded by two observers during a single observation session. There are two ways that observer agreement can be derived from these distributions depending upon the intended use of the results. Observer agreement can be calculated for the sum totals in each category or agreement can be calculated using the teacher-initiated/student-initiated differentiation in each category. This explanation gives the agreement for the sum totals in each category. Disagreements are considered to be those tallies recorded by one observer that do not have a corresponding tally on the second observer's record. Thus, for this observation the agreements and disagreements are as follows (deleting unclear/muddled and miscellaneous; combining augmented and testing; and considering no response as C_1 before beginning with tangible rewards as C_2):

	Agreements	Disagreements		Agreements	Disagreements		Agreements	Disagreements
C_1	0	0	C_{10}	1	0	C_{19}	0	0
C_2	0	0	C_{11}	0	0	C_{20}	0	0
C_3	0	0	C_{12}	0	1	C_{21}	1	0
C_4	0	1	C_{13}	2	3	C_{22}	0	0
C_5	1	0	C_{14}	0	2	C_{23}	5	3
C_6	1	1	C_{15}	13	1	C_{24}	0	0
C_7	0	0	C_{16}	17	3	C_{25}	0	1
C_8	0	0	C_{17}	1	0	C_{26}	1	0
C_9	0	0	C_{18}	0	0	C_{27}	6	1
						C_{28}	2	0
	2	2		34	10		15	5

Putting this into the formula:

$$\% \text{ of agreement} = \frac{\#\text{ of agreements}}{\#\text{ of agreements} + \#\text{ of disagreements}} = \frac{51}{51+17} = .75$$