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EFFECTS OF A 5-DAY LABORATORY TRAINING PROGRAM FOR STUDENT TEACHERS ON ENGAGED STUDENT TIME IN THE PRACTICUM SETTING

The Ohio State University

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EFFECTS OF A 5-DAY LABORATORY TRAINING PROGRAM FOR
STUDENT TEACHERS ON ENGAGED STUDENT TIME IN THE PRACTICUM SETTING

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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The Ohio State University
1981

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Faculty for Exceptional Children
FOR MY PARENTS
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CHAPTER I: INTRODUCTION

From a behavioral orientation, learning is defined as "any enduring change in behavior produced as a function of the interaction between the behavior and the environment" (Sulzer-Azaroff & Mayer, 1977). People, as verbal organisms, learn new behavior in two ways. One way is through direct experience with contingencies. Contingency management entails effecting changes in behavior by arranging the contingencies of reinforcement. For example, desired behaviors can be shaped and maintained by arranging reinforcing consequences to immediately follow the desired behavior. Undesired behaviors can be decreased by arranging punishing consequences to immediately follow undesired behavior or by withholding the reinforcing consequences that currently maintain the behavior (Ferster & Perrot, 1968; Sulzer-Azaroff & Mayer, 1977). The second way people can learn new behavior is by following rules. A rule is a special class of discriminative stimulus which specifies the topography of the response to be made, the environmental conditions present when the response is to be made, and the consequences that follow the response (Skinner, 1969). Providing a rule allows the person to make the desired response correctly the first time without having to experience the consequences for the incorrect response.

Malott (1981) further draws a distinction between two types of rules. A strong rule is one which specifies consequences which are immediate,
highly probable, sizable and which serve to reinforce the behavior specified by the rule. A weak rule is one which specifies delayed, improbable, or small, cumulating outcomes which cannot serve as consequences that shape and maintain the desired behavior. Vargas (1977) notes that rules, as a special class of discriminative stimulus, occasion the response specified by the rule, but once the behavior is emitted, it must come under the control of the contingencies delineated by the rule. Since the outcomes of weak rules, however, do not come to control the behavior, additional reinforcing contingencies must be arranged by the verbal community.

One purpose of a teacher training program is to provide future teachers with skills (new behaviors) that will lead to student achievement in the classroom. In a very real sense, one aspect of the curriculum of a teacher training program consists of rules for a teacher to follow in the classroom that will lead to student achievement.

Research has shown that one key variable in student achievement is student opportunity to respond, a concept developed in the Juniper Gardens' research program (Hall, Delquadri, & Harris, 1977; Delquadri, Greenwood, & Hall, 1979). Hall and his colleagues concluded from their research that lack of student achievement stemmed not from lack of motivation or the poor quality of the curriculum materials used in the inner-city. Rather the lack of student progress came from the dearth of opportunities for the students to make academic responses.

The concept of opportunity to respond parallels the concept of Academic Learning Time that came from the research at the Far West Laboratory (Fisher, Berliner, Filby, Marliave, Cahen, Dishaw, & Moore,
Academic Learning Time is defined as the time a student is engaged with academic materials or activities that are at an easy level of difficulty. A student engaged at an easy level would make few errors and would experience a high success rate. Academic Learning Time is a concept that is philosophically consistent with a behavioral definition of learning which measures changes in behavior. Research indicates that student achievement is correlated with overt academic responses. Stated behaviorally, learning occurs when a student responds and the responses are strengthened by the contingencies of reinforcement. The research from Juniper Gardens and from the Far West Lab suggests that an effective teacher is one who evokes student academic responses which occur with a high rate of success. Opportunity to respond or Academic Learning Time can be viewed as the link between teacher behavior and student achievement. Consequently, observing the Academic Learning Time of the students would give a useful measure of the effectiveness of the teacher.

The definition of Academic Learning Time has two distinct parts. These two parts correspond with different skills of the teacher. The first part of the definition specifies that the student actively interact with academic materials, that he is engaged and making observable responses. To occasion this engaged time the teacher must provide instruction so that the student has opportunities to make academic responses. The second part of the definition specifies that the student respond at an appropriate level of difficulty. This addresses a different set of teaching skills. In order to insure that the student is responding at the appropriate level, the teacher must be able to initially assess the skill level of the student, plan instruction based on this assessment, and
continually monitor student progress to determine that the required responses do not become too easy for the student, nor too difficult.

Siedentop and his students adapted the concept of Academic Learning Time to the methodology of applied behavior analysis to develop a process approach to measure teaching effectiveness in physical education settings (Siedentop, Birdwell, & Metzler, 1979). Their system of observation and the definitions of student and teacher behaviors were modified for the purposes of this study to measure teaching effectiveness during small group direct instruction of reading or math.

**Purpose of the Study**

The purpose of this investigation was to examine the effects of a 5-day training program for student teachers on the amount of engaged time of their students in the student teaching practicum setting. The training program was based on the concept of Academic Learning Time, but the study was limited to dealing with only one aspect of the definition, that of engaged student time. The intent of the training program was to help student teachers provide instruction so that student engaged time would be maximized.

The training program consisted of four components. First, the student teachers were given rules to follow that would increase engaged student time. Second, they were provided opportunities to practice following these rules while teaching in a laboratory setting. Third, immediate automatic consequences were provided for following the rules. Fourth, delayed feedback was provided by the experimenter after each teaching session.
The training program was conducted in a Visual Response System (VRS) classroom (Wyman, 1968). The VRS is a specially designed resource room in which each student's desk is equipped with an overhead projector. Students' responses are projected on antikeystoned screens extending along walls behind the students' desks. The VRS facilitates active student response because all students respond to all probes presented by the teacher (Heward, 1978). As such, the VRS was reasoned to be an excellent environment for training student teachers to maximize engaged student time.

The student teachers were observed in the practicum setting throughout the study at a time during which they were providing direct instruction in either reading or math. Observational measures on student engaged time and on teacher behavior were taken during this period before, during and after the 5-day training program.

**Research Questions**

Two research questions which the study attempted to answer were:

1. Will there be a change in student engaged time in the practicum setting as a result of a 5-day training program in a laboratory setting for the student teachers?
2. Will there be a change in student teacher behaviors as a result of a 5-day training program?

**Assumptions of the Study**

1. Learning is defined as a change in behavior.
2. Inter-observer agreement measures taken periodically during the study
are representative of the reliability of the data collected throughout the course of the study.

3. Interval recording techniques yield a representative sample of student and teacher behavior to be found in continuous observation of behavior (Hall, 1971).

Definitions

Several important terms are used throughout the text and are defined below.

**Academic Learning Time:** the time a student is engaged with instructional materials or activities that are at an easy level of difficulty.

**Engaged student time:** the time a student interacts with academic materials or participates in academic activities at any level of difficulty.

**Rule:** a special class of discriminative stimulus that specifies the behavior to be emitted, the environmental conditions present when the behavior is to be emitted, and the outcomes that occur when the rule is followed. A rule may be either vocal or non-vocal.

**Discriminative stimulus:** a stimulus in the presence of which a given response is likely to be reinforced.

**Strong rule:** a rule which specifies immediate, highly probable, sizable outcomes which serve to reinforce the behavior specified by the rule.

**Weak rule:** a rule which specifies delayed, improbable, or small, cumulating outcomes which cannot serve as consequences that shape and maintain the specified behavior.
**Visual Response System (VRS):** a specially designed resource room in which each student's desk is equipped with an overhead projector.

**Practicum setting:** the classroom in which the student teacher is teaching during her student teaching practicum.

**Training Setting:** the Visual Response System classroom.

**Interval recording:** a system of observational recording used to measure the occurrence or nonoccurrence of a behavior within a specific time interval.

**Limitations of the Study**

1. The study was limited to observing three student teachers enrolled in an undergraduate student teaching practicum sponsored by the Faculty for Exceptional Children.

2. The study was limited to observing the student teachers during small group direct instruction of reading or math.

3. The study was limited to observing three target students in the class of each student teacher.
CHAPTER II: REVIEW OF THE LITERATURE

There has been a growing concern over the state of public education in the past two decades. This concern has had an impact on teacher training programs. One trend has been to move toward training teachers in specific skills that will lead to student achievement in the classroom. This concern has also lead to increased investigation to discover key variables that are associated with student achievement. Research has indicated that one variable that is correlated with student achievement is student engaged time. The more a student is engaged in academic activities, the more he learns. This finding is consistent with a behavioral view which defines learning as changes in behavior. In order to learn, the student must behave, he must make academic responses.

The purpose of this study was to examine the effects of a 5-day training program for student teachers on the engaged time of their students in the practicum setting. The intent of the intervention was to bring the student teachers under weak rule control, to reinforce following rules that would result in increased student engaged time. The training program was conducted in an environment, a Visual Response System classroom, which is specifically designed to promote active student response.

The review of the literature pertinent to the present investigation will include: 1) a review of current trends in teacher training; 2) a
Current Trends in Teacher Training

In the past twenty years there has been a mounting concern about the quality of education in the public schools. In the late 1960's increased costs of public education coincided with growing dissatisfaction with education provided in the inner-cities, especially with the quality of education of the economically disadvantaged and of racial and ethnic minorities (Semmel & Semmel, 1976). One consequence of this concern has been increased demand for accountability of teachers. As a result, there has been pressure on teacher training programs to train future teachers who will be effective in any classroom. In addition, teacher surpluses, along with these concomitant changes in society's expectations about college education, have given impetus to competency-based teacher education (Cooper, 1980).

Competency-based teacher education (CBTE) is predicated on the assumption that teachers can be trained in specific teaching skills. The focus of CBTE is on the skills that the future teachers can demonstrate. "Instead of being satisfied with testing what the trainee knows, CBTE programmes are more concerned with what the trainee can do with that knowledge." (Cooper, 1980, p. 143)

While CBTE programs vary considerably from college to college, one essential characteristic of such programs is the definition of learning objectives in terms of observable behavior and the knowledge of these
objectives by students and professors alike. Houston and Howsam (1972) expanded on the characteristics of a successful CBTE program. They list the following six criteria:

1. Specification of learner objectives in behavioral terms;
2. Specification of the means for determining whether performance meets the indicated criterion levels;
3. Provision for one or more modes of instruction pertinent to the objectives, through which the learning activities may take place;
4. Public sharing of the objectives, criteria, means of assessment, and alternative activities;
5. Assessment of the learning experience in terms of competency criteria;
6. Placement on the learner of the accountability for meeting the criteria. (p. 5)

The widespread influence of the competency-based teacher education movement was demonstrated in a 1977 survey of 686 institutes of higher education. It was reported that 58% of the institutes were involved in full-scale or limited competency-based teacher education (Sandefur & Westbrook, 1978).

Despite the movement to train specific skills in teacher-training programs, research indicated that university and college training programs have had little impact on the behavior of teachers once they have left the purview of the training program. Even during the student teaching practicum, the university supervisors have little effect on the behavior
of the student teachers. Numerous studies document that the cooperating teacher is the dominant source of influence on the behavior of the student teacher (Evans, 1976; Friebus, 1977; Karmous & Jacko, 1977). Schueler, Gold and Mitzel (1965) reported that no identifiable effects are produced by the university supervisor during the student teaching practicum. Morris (1974) further found that it is impossible to distinguish between students who have and do not have program-based supervision on the basis of their teaching performance.

Locke (1978), in a comprehensive review of literature on student teaching supervision, concluded that the viability of student teaching in its present form is questionable. He stated, "Teachers do not learn to teach in training programs. They learn to teach in the first years of service.... (p. 13)."

In response to the recognized inadequacies of the student teaching practicum, Dwight Allen and Kevin Ryan developed microteaching as a method of instruction to augment or substitute for student teaching (Allen & Ryan, 1969). Microteaching grew out of a behavioral concept of human action. It was based on the view that teaching is a collection of skills and that it is the responsibility of teacher training programs to identify and train behaviors that would lead to effective teaching in the classroom (Guelcher, Jackson, & Necheles, 1970).

Like competency-based teacher education, microteaching quickly found widespread acceptance in higher education. Johnson (1968) reported that by 1968, 53% of all teacher education programs were using microteaching.
One of microteaching's primary contributions to teacher education was "...its emphasis on precise, observable behaviors that the teacher trainee was expected to demonstrate" (Cooper, 1980, p. 142). Microteaching, as a system of instruction identifies teacher behaviors and provides opportunities for the trainee to practice these skills under close supervision with a small group of students. Examples of skills that have been identified for use with microteaching are asking higher-order questions, reinforcement, closure and stimulus variation (Allen & Ryan, 1969). Only one skill is targeted for development during the microteaching session. Hargie (1977) described microteaching as "...a scaled-down teaching encounter in which the trainee teaches a small group of pupils (5 to 10) for a short period of time (5 to 10 minutes) during which time he focuses specifically on one particular skill of teaching..." (p. 87).

The actual methods employed by teacher training programs in using microteaching vary considerable. Sometimes school-aged children are used as students; sometimes peers act as students during the microteaching session. Videotapes and closed-circuit televisions are frequently employed to aid the supervisor in giving the trainee feedback. Electronic monitoring, however, is not a defining characteristic of microteaching. Sometimes the teaching sessions are simply monitored by a supervisor. A key component of a microteaching system is to allow the student to reteach a lesson after having received feedback on his performance. The teach/feedback/re-teach cycle can be repeated until the student has met specified criterion on the performance of a particular teaching skill.
Some problems are inherent in a microteaching system of instruction. One problem is that a lack of a coherent approach by supervisors and disagreement among faculty members on the identification of essential teaching skills can lead to confusion for the trainees. Another problem is that students often feel that microteaching is a contrived situation, especially when peers rather than school-aged children are used as students. A third problem is that, although microteaching attempts to approximate classroom teaching, generalization of teaching skills is often not planned (Guelcher, Jackson, & Necheles, 1970). Despite these problems, research has demonstrated that microteaching can be an effective method of training teachers.

Kissock (1971) compared two groups of students and found microteaching was more effective than a more traditional method of instruction. One group of students was instructed via microteaching in the use of higher order questions. The control group was given training in this skill by watching "model" tapes and by receiving verbal instructions on how to use higher order questions in the classroom. The students trained by microteaching showed a significant increase in the use of higher order questions while the control group did not.

Allen (1972) compared two groups of male college seniors. One group had been trained with microteaching; the other group had been trained by traditional methods. Allen found that microteaching was more effective for improving performance in the use of stimulus variation, reinforcement, developing main points, probing and closure than was the traditional approach.
Nuthall (1972) reported that students who received microteaching training in the use of questions used this skill to a significantly greater extent than did a control group. Kremen and Perlberg (1971), using pre- and post-training measures, found that students trained in the use of higher order questions increased the number and quality of such questions after a microteaching program.

Madike (1980) reported that microteaching was more effective in training student teachers in Nigeria than were other methods. In his study student teachers were randomly assigned to three groups: microteaching training; traditional apprenticeship to high school teachers; and a no-treatment control group. Ten teachers behaviors were found to be positively correlated with pupil achievement in mathematics. The microteaching group demonstrated a significantly higher frequency count of the ten teaching behaviors than either of the other two groups.

Not all the research, however, concludes that microteaching results in superior teaching skills when compared with other methods. Kallenbach and Gall (1969) compared two groups of student teachers. One group received microteaching training. The other group participated in a traditional student teaching practicum. The results of the experiment indicated that the two groups did not differ significantly from each other on any of the post-training ratings of teacher effectiveness. The authors concluded that microteaching was a superior training strategy, however, because it achieved similar results when compared with traditional methods and accomplished these results in only one-fifth the time.
The conclusions of the research reported above was based on observable changes in teacher behavior. Another body of literature using more subjective ratings of performance also supports the contention that microteaching is an effective method for training teachers. Jensen and Young (1972) found that students who participated in microteaching received higher ratings than did a control group of students who did not participate in microteaching. The ratings included evaluations of personality traits, warmth of the teacher, general classroom atmosphere, lesson usefulness, and teacher interest in pupils. Kremer and Perlberg (1971) also reported that the students received higher ratings of performance by two independent observers after a microteaching program.

One criticism of both microteaching and competency-based teacher education is that while both are firmly rooted in the training of specific teaching skills, there is little empirical base to determine specifically what essential teaching skills are. In 1971 Rosenshine and Furst criticized CBTE programs for failing to specify how performance objectives and criteria were selected. Since that time there has been increased emphasis on using expert opinion to determine skills to be taught (Semmel & Semmel, 1980). But expert opinion can only be a poor substitute for critical teaching variables unearthed by empirical research. In the 1970's, though, empirical research lead to the discovery that one key factor in student achievement is student engaged time. This discovery will be discussed in the following section.

Summary

Competency-based teacher education and microteaching have been two
of the most influential movements in teacher training in the past two
decades. While competency-based teacher education is a philosophical
approach to teacher training, microteaching is a more clearly defined
teaching strategy. Research indicates that microteaching is an efficient
and effective method of training specific teaching skills. While there
has been some criticism of the selection process for determining what
skills should be taught, research in the 1970's has led to the dis-
covery of engaged student time as a measure of teaching effectiveness.

Student Engaged Time

Educational research stemming from two different scientific orienta-
tions have come to the same conclusions: a key variable in student
achievement is the amount of time a student is successfully engaged in
making academic responses. Research conducted through the Juniper
Gardens Children's Project was rooted in applied behavior analysis. Hall
and his colleagues named this key variable Opportunity to Respond.
Berliner and his colleagues at the Far West Laboratory employed the meth-
odology of ethnographic researchers to discover essentially the same key
variable. Berliner et. al. termed the variable Academic Learning Time.
These findings, coming from applied behavior analysis and ethnographic
research, provides convergent validity (Johnson & Bolstadt, 1973) for
this concept.

The Juniper Gardens Children's Project is affiliated with the
Bureau of Child Research at the University of Kansas. One area of this
research focused on collecting normative-descriptive data from samples
of low income minority children and from middle class suburban children.
Results of the data showed that low income minority children with low IQ's and achievement scores receive infrequent opportunities to respond academically (Greenwood, Delquadri, Preston, & Hall, 1979). After the descriptive data were collected, researchers at the project conducted single subject and small group studies to determine if various interventions could increase student opportunities to respond. They reported that "Academic engaged time in reading, spelling, math and reading comprehension tasks can be greatly improved by (1) change in direct classroom instructions, activities or teacher treatments, (2) by using student peers, and/or (3) involving parents and the home in classroom related tutoring activities" (Greenwood, Delquadri, Preston, & Hall, 1979, p. 3). In other words, they found that direct intervention could result in increased academic engaged time and that this increase in engaged time would lead to increases in student achievement.

At essentially the same time that the research at Juniper Gardens was being conducted, Berliner and his colleagues were conducting research at the Far West Lab. Their project was entitled the Beginning Teacher Evaluation Study (BTES) and was initiated in 1972 by the California Commission for Teacher Preparation and Licensing. The purpose of the project was to examine various instructional factors that promote student learning from elementary school instruction in basic skills. The methodology employed to collect data during this project was derived from ethnographic research, a technology used by social anthropologists. This was thought to be a useful technique because it employed a direct observer who was fully part of the ongoing process (Berliner & Tifunoff,
The BTES was conducted in three phases. Phase I was a planning period. Phase II involved a large field study, development of instrumentation, and generation of research hypotheses. Phase III consisted of a series of field studies to identify classroom conditions and activities in grades two through five that lead to student achievement in reading and math.

Among the results reported during Phase III were the identification of 14 variables that were associated with student achievement (Fisher, Berliner, Filby, Marliave, Cahen, Dishaw, & Moore, 1978). Five of these findings delineated the relationship between student engaged time and student achievement. These findings were:

1. Teacher allocated time to instruction is positively associated with learning in that content area.
2. The portion of allocated time that students are engaged is positively associated with learning.
3. The portion of time that reading or math tasks provide a high rate of success is positively associated with learning.
4. The portion of time spent with a low success rate is negatively associated with learning.
5. Increases in Academic Learning Time are not associated with decreases in attitude toward math, reading or school.

Academic Learning Time (ALT) is defined as the amount of time a student spends engaged in relevant tasks with a high success rate. It is apparent that the first four findings led to the definition of Academic Learning Time. During the course of the day, a teacher allocates time to
to instruction. During some of this allocated time students are making academic responses; some of the time they are not. When the students are responding with a high rate of success, they are learning. Moreover, ALT does not result in a decrease in attitude toward school.

Rosenshine (1979) expanded on the importance of student engaged time in the results of a correlational study that compared the engaged time of students of two teachers and student achievement in reading in each classroom. He found that the students who were engaged more achieved more. The interesting finding of this study was that one teacher allocated less time and during the allocated time had a higher percentage of engaged time. The second teacher allocated more time for reading and had a lower percentage of engaged time during the allocated time. Even so, the second teacher had more engaged minutes than did the first teacher. His conclusion was that a teacher need not maintain high engagement at all times. The important factor in student achievement is the total number of academically engaged minutes. He wrote, "Teachers who make a difference in students' achievement are those who put students into contact with curriculum materials and find ways to keep them in contact" (Rosenshine, 1979).

Academic Learning Time can be viewed as the link between teacher behavior and student achievement. "The implication is that ALT can provide an on-going measure of student achievement and thus of teacher effectiveness. ALT can be treated as a dependent variable and intervened upon in an attempt to improve it, thus improving the effectiveness of the teacher" (Fisher, et. al., 1978, p. 6).
Siedentop and his students adapted the concept of Academic Learning Time to the methodology of applied behavior analysis to develop a process approach to measure teaching effectiveness in physical education settings (Siedentop, Birdwell, & Metzler, 1979). Their dependent variable was termed Academic Learning Time-Physical Education (ALT-PE). Two of his students investigated methods of effecting changes in ALT-PE in physical education classrooms. Birdwell (1980) found that instructions to teachers on changing specific teaching behaviors coupled with daily feedback were a successful and cost-effective method for changing teacher behavior and for helping teachers to change student behaviors. Whaley (1980) reported that daily monitoring and graphic feedback to teachers on students' ALT-PE had no effect on ALT-PE. He also reported that feedback on aspects of ALT-PE had no effects on teacher behavior.

In similar research conducted in remedial reading classes, Stallings, Needles and Stayrook (1979) found that feedback to teachers on their behavior could change both theacher behavior and student engaged time. Stallings et. al. extended the concept of student engaged time and broke engaged behaviors into two categories: Interactive On-Task and Noninteractive On-Task. Interactive On-Task consisted of student behaviors that required interaction with the teacher. Examples were reading aloud, discussion and drill. Noninteractive On-Task behaviors were those that did not require student-teacher interaction. Examples were written assignments, silent reading and sustained silent reading. Stallings et. al. found that Interactive On-Task instruction was positively correlated with student achievement and Noninteractive On-Task
instruction was negatively correlated with student achievement. Stallings et. al. also found that workshops based on these findings resulted in significant changes in teacher behavior. Teachers were observed and data collected on relevant teaching behaviors in an attempt to analyze the effectiveness of the workshops. Based on data collected in the teachers' classrooms, recommendations were made for changing their teaching behavior. A quasi-experimental design was used to analyze the results. Teachers who participated in the workshops made significant changes in their teaching and these changes maintained throughout the school year.

Summary

Research in the 1970's identified a key variable that was highly correlated with student achievement. This variable was termed opportunity to respond by researchers at Juniper Gardens and Academic Learning Time by researchers at the Far West Lab. The two terms are essentially two names for the same concept. By observing the engaged time of students, one can obtain a measure of the effectiveness of the teacher. Experimental studies have demonstrated that direct intervention can effect changes in student engaged behaviors.

Rule-Governed Behavior

The rationale behind the intervention procedures used in this study came from a behavioral orientation based on Skinnerian psychology. Skinner departs from stimulus-response psychology, asserting that "no account of the interchange between organism and environment is complete until it includes the action of the environment upon the organism after a response has been made" (Skinner, 1969, p. 5). Thus, an examination of
behavior must include more than an analysis of the stimulus that precedes a response and the response.

An adequate formulation of the interaction between an organism and its environment must always specify three things; (1) the occasion upon which a response occurs, (2) the response itself, and (3) the reinforcing consequences. The interrelationships among them are the "contingencies of reinforcement." (Skinner, 1969, p. 7)

This analysis forms the basis for research from which principles of behavior have emerged. One such principle is that desired behavior can be strengthened by arranging reinforcing consequences to immediately follow a response. Another principle is that undesired behaviors can be decreased by withholding the reinforcing consequences that currently maintain the behavior or by arranging punishing consequences to immediately follow the undesired behavior (Ferster & Perrott, 1968; Sulzer-Azaroff & Mayer, 1977).

Learning is defined as a change in behavior. Thus it follows that teaching is "...the arrangement of contingencies of reinforcement which expedite learning" (Skinner, 1969, p. 15).

People, as verbal organisms, can learn new behaviors in two ways. One way is through direct experience with contingencies. New behaviors can be shaped by reinforcing successive approximations until the desired new behavior is emitted. The second way is by providing rules. A rule is defined as a special class of antecedent stimulus which specifies the topography of the response to be made, the environmental conditions present
when the response is to be made, and the consequences that follow the response (Skinner, 1969). Providing a rule is a more efficient means of teaching new behaviors because the rule allows the individual to make the desired response correctly the first time.

A rule, however, is only one part of the three-term contingency. It is an antecedent stimulus that occasions a response. Because it is only one part of the three-term contingency, a rule alone is insufficient to change behavior. Reinforcing consequences for following the rule must be arranged if the new behavior is to be strengthened.

Research supports the contention that rules alone do not produce lasting changes in behavior. Madsen, Becker and Thomas (1968) examined the effects of rules alone and rules plus contingencies for following the rules on inappropriate behavior of three elementary school children. After a baseline phase two teachers were asked to give the children rules for appropriate behavior during a second phase of the experiment. During a third phase, one teacher was instructed to ignore inappropriate behavior. The other teacher was asked to continue to provide rules while ignoring inappropriate behavior. In a final phase both teachers were to provide rules, ignore inappropriate behavior and praise appropriate behavior. The results indicated that rules alone, rules plus ignoring, and ignoring alone were ineffective strategies for decreasing the undesired behaviors. Only when reinforcement was provided for following the rules did the behavior decrease.

O'Leary, Becker, Evans and Saudargas (1969) also found that rules alone were ineffective in decreasing disruptive behavior of second
graders. The purpose of their study was to examine the separate effects of Classroom Rules, Educational Structure (i.e., maintaining a rigid structure of classroom activities), Teacher Praise, and a Token Reinforcement Program on children's disruptive behavior. None of the first three procedures produced consistent results, although a combination of the three procedures nearly eliminated the disruptive behavior of one of the students. When the token economy system was introduced, the frequency of disruptive behavior declined for all but one of the children.

Packard (1970) examined the effects of group contingencies on classroom attention in four elementary classrooms. He found that explicit instructions without accompanying contingencies produced an increase in student attention in the fifth and sixth grade classes, but the changes in attention were temporary. When group contingencies were instituted in addition to the rules, student attention increased and stabilized.

Greenwood, Hops, Delquadri and Guild (1974) investigated the effects of various components of a treatment package on appropriate classroom behaviors in a first, second and third grade classroom. The various components of the intervention were Rules, Rules plus Feedback, Rules plus Feedback plus Group and Individual Consequences. The total intervention package was most effective in increasing appropriate behavior.

Rules plus Feedback produced favorable changes in two of the three classrooms. Greenwood et. al. reported that rules alone produced no change in classroom behavior.

The results of these studies indicate that just providing rules does not produce changes in behavior. Only when rules are coupled with
reinforcing consequences do changes in behavior occur.

Summary

Rules are a special class of antecedent stimulus and are an efficient means of teaching people new behavior. Research indicates that providing rules alone will not produce changes in behavior, though. Rules are only one part of the three-term contingency. Reinforcing consequences for following the rule need to be arranged in order for an individual to come under stimulus control of the rule.

The Visual Response System Room

The Visual Response System (VRS) is a specially designed resource room in which each student's desk and the teacher's desk are equipped with built-in overhead projectors. The students' desks are commonly arranged in a horseshoe configuration with the teacher's desk at the open end (see Figure 1). Student responses are projected on antikeystoned screens that extend along walls behind the students' and teacher's desks.

The VRS was created and designed by Wyman (1968) to increase the level of interactions in the classrooms for the deaf. The purpose was to provide the teacher with simultaneous, but individual visual responses from students rather than the usual one-at-a-time oral response.

Heward (1978) cites ten positive instructional features of the Visual Response System:

1. Active student response is generated. All students respond to all stimulus materials in the VRS, rather than taking turns.
2. All student responses can be observed directly. When emitted, all student responses are instantaneously projected, allowing
Figure 1: The Visual Response System Room at Buckeye Youth Center in Columbus, Ohio.
the teacher to observe and monitor each student's work.

3. Many types of behavior can be observed, measured, and conse-
quated. Over thirty different responses that can be made on
the overhead projector have been identified. Just a few of
these are writing, pointing, circling, matching, disclosing,
solving math problems and drawing.

4. Reinforcement can be delivered immediately. In one group of
eight students who were writing sentences in the VRS, the
average reinforcement delay (measured from the moment a student
placed a period at the end of a correct sentence until a teacher
delivered points registered on a point counter at the student's
desk) was four seconds (Heward, 1974). The immediacy of this
feedback compares favorably with a situation where students
perform academic responses and receive feedback in the form of
a graded paper the next day. Of course, the amount of rein-
fforcement delay varies with the responses students make, but
it will always be measured in seconds as opposed to days.

5. Many types of reinforcers can be used. Cartoon figures and
other visuals projected by the teacher's overhead, electron-
ically delivered points, music and other auditory stimuli, hand
delivered tangibles, and teacher praise and attention are some
of the reinforcers that can be employed in the VRS.

6. Remediation can be immediate and performed in a non-punishing
manner. After a set of responses has been made by students,
the teacher may place the correct answers on the teacher's
overhead or point out the correct responses of peers as models. Another way teachers can make remediation non-punishing and functional is to reinforce students with points for correcting their own errors.

7. Full interaction is encouraged in a group of students. Student-student interaction can become an integral part of the instructional process, since students can see all of the responses made by their peers.

8. Instruction can be individualized. The VRS affords the teacher a number of ways to individualize instruction: a) students can proceed through a sequence of projected questions or problems at their own pace; b) response requirements can be altered, for example, some students may be required to write the word red, while others only have to match the projected color by placing a piece of red acetate on their projectors; and c) by dividing a stimulus transparency into parts, different students can respond to different material varying either in content or in level of difficulty.

9. Evaluation of student progress can be a direct by-product of a lesson. If counters are used to deliver points for correct responses and the teacher keeps track of the total response opportunities in a given session, the teacher simply needs to review the point total for each student in order to measure success.

10. Students enjoy the VRS. Modern students are surrounded by
technological hardware every day. The VRS enables children to become users of technology rather than mere observers. Students take pride in operating their projectors, and teachers often note less disruptive behavior in the VRS. Many teachers have reported that students with a history of indifference have become motivated learners in the VRS. (p. 6)

Numerous studies have been conducted in the Visual Response System that have demonstrated it to be an effective and efficient teaching environment.

Eachus (1971) demonstrated that the rate, accuracy and complexity of sentence writing by deaf students could be improved by changing the consequences for sentence writing in the VRS. The VRS allowed the teacher to award points immediately following student responses and to remediate incorrect responses using the intercom system. The points were exchanged for back-up reinforcers in a token economy system. This combination of immediate reinforcement and remediation increased the number of correct sentences and increased their accuracy from 27-63% initially to 90-100% at the conclusion of the study.

Piper (1970) systematically replicated the Eachus study with deaf students. Social praise was used as a consequence instead of a token economy system. As in the Eachus study, both rate and accuracy of question writing increased.

Barrett (1971) used a Visual Response System to teach a standard high school chemistry curriculum to hearing students. Correct responses increased from 62% to 94% during two experimental phases.
Heward and Eachus (1979) conducted a replication of the 1971 Eachus study. The purpose of this study was to determine if the same procedures used by Eachus would result in the use of new linguistic components, adverbs and pre-nominal adjectives in written composition of hearing-impaired/aphasic students. The students increased their usage of modifiers from 0% correct to 80-90% correct.

A VRS was used with pre-school deaf children to increase color and shape discrimination (Gonzales, 1971). Accuracy of responses increased from a baseline of 20-35% to over 90% with intervention.

A number of studies have been conducted at the Visual Response System at an institution for incarcerated juvenile delinquents. In her work with eight juvenile delinquents, Marshall (1979) successfully increased verbal knowledge of behavior-management principles. This knowledge was then applied in individual self-management programs designed and conducted by the subjects themselves. In general, subjects reported success in these attempts, although interobserver reliability data were frequently low.

Cooke (1979) taught a four-unit course in map skills to six male juvenile delinquents. She was successful in obtaining an increase in these skills from the pre-test to the post-test.

In addition, studies have shown the VRS to be an effective environment for teaching the completion of employment applications (Joynes, 1978) and for teaching photosynthesis (Test, 1979).

Grossman (1981) demonstrated that the VRS is an effective environment for teaching the complex skill of reading comprehension to fifth
graders. Grossman defined the concepts of main idea, cause and effect, and sequencing. Students during instruction in the VRS showed improvement in both discriminating and generating correct answers to comprehension questions testing these concepts.

Summary

The Visual Response System is a resource room which facilitates active student responses and continuous monitoring of student responses by the teacher. Research has demonstrated that it is an effective teaching environment for instruction of a variety of skills with a wide age range of both hearing and hearing-impaired students.

Rationale for the Study

One trend in teacher education in the past two decades has been to train specific teaching skills. A traditional training format consists of coursework which culminates in a student teaching practicum. Research indicates that this format has been inadequate since training programs have little lasting impact on the behavior of trainees, both in the practicum setting and after the trainees have exited from the training program. Microteaching was developed to attenuate some of the inadequacies of training programs, especially the student teaching practicum. Microteaching, however, has been criticized for failing to identify critical teaching behaviors, and for failing to plan for and measure the generalization of the trained skills from the microteaching setting to a regular classroom setting.

Additionally, research at the Far West Lab has identified Academic Learning Time as a key variable in effective teaching. By measuring the
engaged time of the students one can get a measure of the effectiveness of the teacher.

One purpose of a teacher training program is to provide future teachers with rules for effective teaching. Research has demonstrated, however, that while rules may occasion behavior, rules alone are insufficient to produce lasting changes in behavior. Consequences for following rules must be arranged in order to shape and maintain new behavior.

Therefore, the purpose of this study was to examine the effects of a 5-day laboratory training program for student teachers on engaged student time in a practicum setting. The training was conducted in a Visual Response System (VRS) classroom. The VRS has been demonstrated to be an effective environment for changing academic behavior of a variety of school-aged populations. Since the VRS promotes active responding, its usefulness as an effective environment for training student teachers to increase engaged student time warranted investigation.

The distinguishing feature of this study was that it attempted to ameliorate the inadequacies of microteaching, include the strong data-based rationale for Academic Learning Time, focus on providing rules and consequences for following the rules, and combine these principles in an effective learning environment, the VRS.
CHAPTER III: METHOD

Three student teachers participated in a five day training program in a Visual Response System (VRS) room. The training program, designed to increase engaged student time in the practicum setting, was a package treatment consisting of four elements. First, the student teachers were given rules to follow to increase engaged student time. Second, the student teachers were provided opportunities to practice the behaviors specified in the rules while teaching in the VRS. Third, immediate automatic feedback on engaged student time was given to the student teachers in the VRS. Fourth, verbal feedback was given by the experimenter after each VRS teaching session. Student engaged time was monitored at the practicum sites throughout the study. Measures on student engaged time were also obtained in the VRS during the training sessions. In addition, observational measures were taken on teacher behavior in both settings.

The student teachers participated in the training program at different points in time. A multiple baseline design was used to determine if a functional relation existed between the training program and changes in student engaged behavior and teacher behavior.

Subjects

Student Teachers

The subjects of this study were three white females aged 24, 23, and 22. All three were in their final quarter at Ohio State University
completing the requirements for a B.A. in education, majoring in the education of Exceptional Children. Each was working toward certification in the area of the educably mentally retarded (EMR). At the time of the study each was participating in a student teaching practicum, and each expected to graduate at the end of her practicum experience. As part of her training each had taken several courses through the Faculty for Exceptional Children. Among the courses that were pertinent to this study were:

1. A course in the principles of behavior and their application in teaching social and academic skills. (The text for this course was Applying Behavior-Analysis Procedures with Children and Youth by Beth Sulzer-Azaroff and G. Roy Mayer.)

2. A course in applying behavioral approaches in the classroom. In this course the students were required to present a project conducted using the principles of behavior and the techniques of applied behavior analysis.

3. A course in assessment and instruction. This course included a supervised tutoring practicum in a clinical setting.

4. A course in measurement and evaluation techniques, research designs, geared to teacher application in the classroom. (The text for this course was Single Case Experimental Designs by Michel Hersen and David H. Barlow.)

Each of the subjects met the university criteria for successfully completing these courses. In addition, each subject successfully completed the requirements in her student teaching practicum and the seminar that was offered in conjunction with the student teaching practicum.
Students: Practicum Setting

Also considered as subjects in the study were nine school-aged students, three at each of the student teaching practicum settings. A morning period of the school day was selected by the experimenter because at this time each student teacher was giving direct instruction to a small group in either reading or math. Each of the student teachers selected three of her students who had the best attendance records to be targeted for observation.

The three targeted students in classroom 1 were white females aged 15, 15, and 17. All three were diagnosed as educably mentally retarded (EMR) using criteria established by the school district. The 17-year-old was in a work-study program. She attended classes at the high school in the morning and worked in the afternoons. The other two females were freshmen in the high school and were mainstreamed in health. All other classes they attended were with other EMR students.

The three targeted students in classroom 2 were aged 19, 15, and 16. All three were diagnosed as EMR. One was a white male, the other two were white females. None of the three students was mainstreamed in academic subjects. The male student took a woodshop class with nonhandicapped students, and one of the females took home economics with nonhandicapped students.

The three targeted students in classroom 3 were white males aged 11, 12, and 11. All three were in a self-contained EMR classroom and none was mainstreamed in any area.

Students: Training Setting

Seventy-six students at the elementary school where the VRS was
located also served as subjects. A total of 19 lessons were taught by
the student teachers in the VRS, a specially designed resource room. A
different group of four students participated in each of the 19 lessons.
There were 52 fourth graders, 16 preschoolers and 8 first graders. Dur­ing
each lesson three of the four students were randomly targeted for
observation.

Settings

There were two settings for each of the student teachers. One
setting was the student teaching practicum site. The other setting was
the Visual Response System room where the training was conducted.

Student Teaching Practicum Sites

Student Teacher 1 was placed through the University in a middle­
class high school in a suburb north of Columbus, Ohio. The population
of this high school was slightly more affluent than that of either of
the other two schools in which the other student teachers were placed.
The classroom was approximately nine meters by nine meters. The teacher's
desk faced the back wall and was partitioned from the main part of the
room by a three-foot high bookcase. Blackboards ran the width of the
front and side wall. The students sat at five large tables that were in
the center of the room. A Systems 80 machine was on a small table at the
side of the room and could be readily moved to one of the tables. The students had no place in the classroom to store materials on a regular
basis. During the period selected for observation the cooperating
teacher decided to divide the class into two sections. The student
teacher had six of the students for small group math instruction while
the cooperating teacher taught the remainder of the class. The student
teacher taught her small group at one of the large tables at the side of the room. She usually sat at the table with her students. The cooperating teacher normally positioned herself at the front of the classroom and her students sat at two large tables toward the front of the room. The instructional period lasted 55 minutes.

Student Teacher 2 was placed through the University in a rural high school south of Columbus, Ohio. The population of the high school was primarily middle-class. The classroom was approximately nine meters by nine meters. At the front of the room was a wall-length blackboard and a high table similar to a chemistry demonstration table. The teacher's desk was in the back of the room toward one side. There were three large tables in the middle of the room at which the students sat. There were no assigned seats, nor were there places in the room for students to regularly store materials. Against one wall were three study carrels. There were 14 students in the class during the period selected for observation and the student teacher structured her teaching so that she instructed all the students together. There was no small group work. As a result, the student teacher usually stood at the front of the room by the demonstration table. The instructional period lasted for approximately 45 minutes.

Student Teacher 3 was placed through the University in a middle-class elementary school in a suburb southwest of Columbus, Ohio. The classroom measured approximately eleven meters by nine meters. Along the front of the room was a blackboard. The teacher's desk was positioned sideways at the front of the room. In the middle of the room were individual desks to which the students were assigned. In the back
of the room were two separate work areas. One of the work areas was almost completely hidden from view by partitions. The second work area consisted of a large round table and a chartboard. It was at the second work area that the student teacher held her reading groups. There were 11 students in this self-contained EMR classroom. Five of the students were in the reading group selected for observation. By positioning herself with her back to the windows the student teacher could conduct the small group session while still being able to monitor the rest of the class. Since it was an elementary classroom, the length of the instructional period was left to the discretion of the student teacher. The reading group normally lasted about 15 minutes.

Training Site

The training was conducted in a Visual Response System (VRS) room in an elementary school in a suburb within the metropolitan area of Columbus, Ohio. The VRS is a specially designed classroom in which each student's desk is equipped with a built-in overhead projector (Wyman, 1968). The VRS was built in a classroom at the elementary school. Eight student desks were arranged in a horseshoe configuration with the teacher's console at the open end of the horseshoe. A carpeted false floor concealed the electrical conduits.

In the VRS student responses were projected on antikeystoned screens extending along walls behind the students' and teacher's desks. Student desks were each equipped with headphones linked to an intercom system and audio tape deck. A feedback unit at each student's desk included lights, a counter for registering points and a call button. When depressed, the call button activated a light on the teacher's console and
signaled that the student needed assistance.

The teacher's console contained individual and master buttons with which the teacher controlled the students' overhead projectors. The teacher's console also had switches which would deliver points that registered on the students' point counters. The switches would also activate a green light or a red light on the students' feedback units. On one side of the teacher's desk was an overhead projector. On the other side was a tape cassette and intercom system designed so that music or instruction could be delivered to any part of the student group.

**Behaviors Measured**

Measures were taken daily in the VRS room and in the practicum setting on student and teacher behavior.

Student behavior was coded as either engaged or not engaged. There were four categories of engaged behavior and four categories of not engaged behavior. The intention of this division was to enable the observers to classify any occurring student behavior in one of these eight categories. The categories and their definitions follow:

- **Engaged, Verbal**: The student is making a verbal response. He may be asking a question, answering a question, reading orally. This includes verbal behavior related to academic content, but does not include asking questions about directions or management tasks. "What page are we on?" or "Can I go to the bathroom?" is coded as Not Engaged, Management.
Engaged, Writing
The student is writing or erasing.

Engaged, Reading
The student is reading silently.

Engaged, Other
The student is engaged in another academic behavior, like sorting, holding up cards, pointing.

Not Engaged, Off-Task
The student is off-task, either verbally or motorically. He may be chatting with another student, with the teacher, looking out the window, shooting rubber bands.

Not Engaged, Waiting
The student is waiting for the next assignment or for his turn or for the teacher to help him. The student does not have an opportunity to make an academic response, but is not off-task. If the student is day-dreaming, but is also waiting (i.e., doesn't have the opportunity to respond), code the behavior Not Engaged, Waiting.

Not Engaged, Management
The student is on-task, but not academically. He may be sharpening a pencil or getting out his books. Or he may be asking a non-academic question.

Not Engaged, Listening
The student is listening to the teacher or another student. This includes listening
to a lecture, to directions, to another student make an academic response. It does not include listening to the teacher give feedback to another student. If the student is supposed to be making an academic response, but is listening to the teacher, code the behavior Not Engaged, Off-Task. If the student is waiting and incidentally listening, code Not Engaged, Waiting. Code Not Engaged, Listening only if the student is supposed to be listening.

In addition to these eight categories, there was another category of student behavior coded in the VRS:

Not Engaged, Looking

The student is looking at other students' responses projected on the antikneystone screens or at the teacher's screen.

This category was added because students in the VRS are encouraged to look at each other's work.

There were originally 11 categories of teacher behavior. Again, the intent was to be able to classify any teacher behavior in one of these 11 categories. The categories and their definitions follow:

Teacher Behavior

This is teacher behavior that does not require a student response. It includes lecturing (giving academic information), giving directions (e.g., "Turn to page 56.")
or "After you are finished, go back to your seat and do the worksheet.") and management tasks (taking attendance, finding the place in the teacher's manual, cleaning transparencies, handing out papers). This category also includes transition behaviors emitted while switching from one activity to another. In addition, code Teacher Behavior if the teacher is monitoring actual academic responses made by the students.

**Modeling**

The teacher models a response, with or without accompanying verbal behavior. Examples are spelling a word for a student, providing an answer for an academic question. There is a strict point to point correspondence between the teacher's response and the student's response. If the teacher is modeling a math problem and has the child do a similar type of problem (but not the same identical problem), code Teacher Behavior (lecturing).

**Monitoring**

The teacher watches the students but does not give feedback. This would include listening to a student's answer.
or listening to a student's question concerning academic content only. Listening to non-academic questions (e.g., What page are we on?) would be coded Teacher Behavior. The teacher sets the occasions for an academic response. Teacher verbal behavior could be in the form of a statement as well as a question.

e.g., "What is 2 plus 5?"
   "Do problem #72."
   "How much does this cost?"
   "Draw an equilateral triangle."

This doesn't include statements like "Turn to page 29 and do problems 16 through 33."
This is considered giving directions and coded Teacher Behavior.

The teacher is engaged in an activity not related to academic content or management of the class.

e.g., hanging up her coat
talking to the principal
chatting with a student

The teacher praises an individual.

The teacher praises the group.
### Punishment
The teacher punishes a student verbally or physically for an academic or non-academic response. This would include any attention to off-task behavior.

- e.g., "You all did a nice job."
- e.g., "John, pay attention."
- "Sally, you never remember to raise your hand."
- "We are waiting for you to finish, Joe."

This would not include an attention-getting statement like "All eyes up here, please, class." That would be coded Teacher Behavior.

### Points
The teacher delivers points or tokens without pairing the delivery with verbal praise.

### Feedback
The teacher provides academic feedback to the student. She may or may not require the student to make the correct academic response. This is different from praise. Praise occurs when the student makes the correct response and the teacher acknowledges or praises it. Feedback occurs when the student's response is incomplete or wrong and the teacher provides information for the
student to correct or extend the response. Punishment occurs when the student response is wrong and the teacher provides no information for the student to remediate his response. Examples of Feedback:

"No, carry the two."

"That's good, but you need to be neater."

"Remember your periods, Jeff."

Working with other students

The teacher works with students who are not part of the small group involved in direct instruction. The teacher may be answering a question from a student who comes to the teacher during group. She may be monitoring the rest of the class. She may even leave the group to work with other class members. If the teacher does leave the group, the behavior would be coded either Working or Non-functional.

During the second week of the study, the experimenter eliminated the Feedback category. This was done in an attempt to simplify the coding system and improve inter-observer agreement. Any feedback was subsequently coded as Teacher Behavior.

When the study was first planned the experimenter tried to include a system of coding the difficulty level of the students' responses. Three levels of difficulty and corresponding definitions follow:
<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Easy</td>
<td>The responses that the student is making are too easy and the student makes virtually no errors.</td>
</tr>
<tr>
<td>Appropriate</td>
<td>Few errors are made and the student performs appropriately with little effort, experiencing success frequently.</td>
</tr>
<tr>
<td>Too Hard</td>
<td>Many errors are made and the student appears to be unable to perform appropriately, experiencing lack of success frequently. Chances of success are not much better than luck.</td>
</tr>
</tbody>
</table>

These levels were incorporated into the Observation Training Manual (see Appendix A) but were never used in the study. As the experimenter was developing the recording system while watching a videotape of a reading group, she tried to code difficulty level. She decided, however, that it was too difficult to make decisions regarding the level of difficulty and decided to omit this aspect from the study. The observers were instructed to ignore the level of difficulty while coding in the field.

In addition to the behavior definitions, a decision log was kept by the experimenter. This provided a permanent record of decisions to coding problems encountered. The log included the following decisions.

1. If the student is listening to or watching another student who is off-task, code the student Not Engaged, Off-Task.
2. If a student is proofing his writing, code the behavior Writing even though he is reading. Proofing is part of the writing process.
3. Redirection is a teacher behavior. If the teacher says, "Look up here, please, class." code the behavior Teacher Behavior. Some statements, however, could be either Teacher Behavior or Punishment, depending on her tone of voice. If the teacher says, "Eyes up here," and her tone of voice indicates her statement is a reprimand, code it Punishment. If her tone indicates that she is just redirecting their attention, code the behavior Teacher Behavior.

4. If you observe teacher behavior that may be praise and/or feedback (e.g., "It's great that you remembered periods, Mark, but don't forget the capital letters, too."), record both Praise and Feedback. (After the Feedback category was eliminated, the observers were instructed to code Teacher Behavior and Praise.)

5. "Is that O.K?" asked by a student may be either Verbal or Not Engaged, Waiting, depending on how specific the question is.

6. If the student's eyes are oriented toward his work, code the behavior Engaged (Writing, Other). If the student's eyes are not oriented toward his work (if he is looking around, gazing out the window), code the behavior Not Engaged, Off-Task.

Observers

Ten trained observers were used during the course of this study. Seven of the observers were graduate students. One was an undergraduate student in the Department for Exceptional Children at Ohio State University. Two were graduate students in the Department of Physical Education at Ohio State. Included in this group of observers was the experimenter who collected both primary and reliability data. All ten had taken at least one course in applied behavior analysis prior to the
to the quarter in which the study was conducted. None of the observers was paid for observing but all were reimbursed for mileage to and from the practicum sites.

Six of the observers collected data throughout the entire study. Two of the observers collected data only during the first three weeks of the study. Two of the observers were trained during the second and third week of the study and collected data during the last three weeks.

All observers attended seven or eight training sessions. Because of scheduling difficulties the observers were not trained as a group, but met individually or in groups of two or three with the experimenter. Prior to the first training meeting each observer was given a training manual. Each observer was asked to read through the definitions and complete written exercises in the manual designed to test his familiarity with the definitions.

During the first training session the experimenter reviewed the definitions, went over the answers to the written exercises and answered questions. During the next several training sessions, the experimenter and the observers viewed a videotape. The videotape was made specifically for these training sessions. On the videotape was a student teacher (not one of the subjects in the study) conducting a small group creative writing lesson and a DISTAR spelling lesson with three students.

During the second training session the observers coded student behavior orally. The experimenter provided continuous feedback to the observers and stopped the tape whenever there were questions or a point needed to be clarified.

During the third session the observers listened to the tape that
was to be used as a cuing devise in the field. The observers listened
to the cuing tape and coded student behavior only. The experimenter
coded concurrently. The three students on the videotape were coded
sequentially and only nine to fifteen intervals were coded, after which
the experimenter stopped the videotape and the tape recorder to check
agreement and to discuss any problems. During the third training session
the observers also coded teacher behavior orally, using the same proce­
dure employed during the second training session for student behavior.

During the fourth training session the observers and the experimenter
concurrently coded both student and teacher behavior while observing the
videotape and listening to the cuing tape. Only nine to fifteen intervals
were coded before the tapes were stopped, reliability checked and ques­
tions answered.

For the next two or three sessions progressively longer segments
of the videotape were coded. When reliability between an observer and
the experimenter was at least 80% for both student and teacher behavior,
the observer and experimenter concurrently coded an entire coding sheet
(see Appendix B) of 81 intervals (27 intervals for each of the three
students). All observers met criterion of 80% agreement with the ex­
perimenter before continuing with the final training session.

For the final training session arrangements were made to observe
a small group reading lesson in a first grade classroom. Each observer
attended this last session individually. The experimenter and the obser­
ver coded the reading lesson concurrently and agreement was assessed.
Each observer met criterion of 80% on this last training session, al­
though two observers asked the experimenter to arrange another session
Observational Recording System

An interval recording system consisting of a 45 second cycle was used. During the cycle each targeted student was observed for five seconds and the teacher was observed three times for two seconds each time. After each five second student observation interval, the observer was allotted five seconds to record the behavior. After each two second teacher observation interval, the observer was allotted three seconds to record the behavior. The students were observed sequentially and the teacher was observed after each student was observed.

A tape cued the observers in the field. The tape indicated which student was to be observed, when the student behavior was to be recorded, when the teacher was to be observed and when the teacher behavior was to be recorded. When the tape cued recording student behavior, it also indicated which interval it was in order to prevent the observer from losing his place on the coding sheet.

An example of a 45 second cycle on the cuing tape follows. The tape said, "Observe 1," indicating the observer was to observe the first student. After five seconds the tape said, "Record 1, 16," indicating the observer was to record the first student's behavior in the 16th interval block. After five seconds the tape said, "Observe teacher," indicating the observer was to observe the student teacher. After two seconds the tape said, "Record teacher" indicating the observer was to record the teacher's behavior in the 16th interval in the first student's row. After five seconds the tape said, "Observe 2," indicating the observer was to observe the second student. In five seconds the tape said,
"Record 2, 16," indicating the observer was to record the second student's behavior in the 16th interval block. After five seconds the tape said, "Observe teacher," and in three seconds it said, "Record teacher," indicating the observer was to record the teacher's behavior in the 16th interval block in the second student's row. After three seconds the tape said, "Observe 3," indicating the observer was to observe the third student. In five seconds the tape said, "Record 3, 16," indicating the observer was to record the third student's behavior in the 16th interval block. After five seconds the tape said, "Observe teacher," and in three seconds the tape said, "Record teacher," indicating the observer was to record the student teacher's behavior in the 16th interval block in the third student's row. In three seconds the tape said, "Observe 1." This was the beginning of the next cycle.

The observers used an earplug while listening to the tape. This allowed the tape to be heard only by the observer and not by the students or the student teacher.

**Reliability**

Reliability measures were obtained by having two trained observers code simultaneously, both in the practicum setting and in the VRS. The two observers listened to the cuing tape by using a split-jack. The expansion on the split-jack was sufficiently long to allow the observers to position themselves so they could observe the three subjects and the student teacher, yet be far enough apart from each other that they could code independently.

The observers did not tally their own data nor did they compute reliability. After the observation session the observers gave the
recording sheets to the experimenter and the experimenter tabulated data and calculated inter-observer agreement.

**Intervention**

**General Procedures**

During the first week of baseline the student teachers were given a list of four rules by the experimenter. When the experimenter handed the student teacher the rules, she said that this was a list of rules to follow for effective teaching. The rules were based on concepts that the student teachers learned in previous course work and the list was to serve as a reminder of those concepts. This list was as follows:

1. Research indicates that a student learns more when he is responding, when he is actively interacting with academic materials. Plan your lessons so that the number of times each student responds is maximized.

2. Lecture as little as possible.


4. When a student responds correctly, praise him. If he responds incorrectly, give him feedback that will enable him to respond correctly. Then immediately give him the opportunity to make the correct response.

Each student teacher participated in a five session training program in the VRS for five consecutive afternoons. For that week each student teacher, by prior arrangement, was relieved of her student teaching responsibilities. Student Teacher 1 began the training program after six days of baseline. Student Teacher 2 began the training program after eleven days of baseline and Student Teacher 3 started the
program.

During the first session the student teacher became familiar with some of the hardware in the VRS. Specifically, she learned to operate the student overhead projectors and the teacher overhead projector; how to deliver points to individual students; how the call buttons on the student's desks worked; how to clean transparencies. She did not become familiar with other aspects of the VRS technology, such as the sound system or the slide system, now was she responsible for learning how to change the bulbs in the overhead projectors.

During the first session the experimenter also discussed some effective teaching strategies for the VRS. These strategies were:

1. When you want the students to attend to the teacher's overhead projector, turn off the student overhead projectors to minimize distractions.
2. When the students are first required to make a response, turn on all the student overhead projectors to allow the students to model the correct response for each other. Encourage them to look at each other's responses.
3. If a student cannot make the correct response, ask him to look at the correct response another student has made and allow him to make the correct response.
4. When you feel each student has mastered the response, turn off the student overhead projectors and ask them to make another response and to press the call button when they are finished. When all students have completed the
response, turn on the student overhead projectors to determine if each student can respond correctly without looking at another student's response.

5. Be generous in delivering points paired with praise for both correct academic responses and good classroom behavior.

After these strategies were discussed, the experimenter and the student teacher looked at the lesson to be taught by the student teacher during the first half of the second session. All lessons taught by the student teacher in the VRS were lessons in the VRS library at the school. These lessons were not designed specifically for the study, but were lessons designed previously by graduate students at Ohio State.

The experimenter explained the format of the lesson plan and demonstrated how to prepare to teach a lesson by going through the teacher materials and the student materials for the lesson. After the experimenter had modeled going through a lesson plan and through the materials, the experimenter taught half of the lesson while the student teacher acted as a VRS student. The student teacher then taught the same lesson in its entirety while the experimenter acted as a VRS student. At the end of the first session the student teacher was given the option of taking the two lessons that she would be teaching the next afternoon home with her to prepare for the next day or of coming in before she was scheduled to teach to review the lessons.

The lessons to be taught were chosen in advance by the manager of Project Interaction. Project Interaction was the federally-funded model project through which the VRS was constructed at the elementary school.
The project manager also selected the students who participated in the lessons in the VRS. Her decisions were made by interviewing several teachers at the school to determine what skills the teachers would like their students to learn. The project manager chose students based on two criteria: 1) the students had deficiencies in particular areas; and 2) lessons had already been prepared for VRS instruction.

A VRS lesson plan (see Appendix C) included a terminal objective, prerequisite skills, a task sequence that led to the terminal objective, a list of teacher procedures, a list of student responses and suggestions for providing consequences. In addition to the lesson plan, the teacher and student materials had been previously prepared. The student teacher was informed that she could not have the lesson plan in front of her while she taught the lesson. Thus, even though the student teacher did not design the lessons that she taught in the VRS, it was necessary for her to become familiar with the progression of the lesson in order to teach it.

During the second training session the student teacher taught the two lessons she had reviewed the previous day. Four different students participated in each lesson. Each lesson lasted approximately 30 minutes. It was emphasized to the student teacher that she need not worry about completing the entire lesson. Many of the VRS lessons were designed to be broken down into numerous teaching sessions. The student teacher was simply to start at the beginning of the lesson and teach for 30 minutes.

During the first half of the third training session the project manager, who was thoroughly competent in all aspects of the VRS, taught
a lesson to four students in the VRS. As she taught, the experimenter and the student teacher watched through a one-way mirror located in the VRS. Throughout the teaching session, the experimenter pointed out the effective teaching behaviors of the project manager. During the second half of the third training session the student teacher taught four different students a lesson she had previously reviewed.

During the fourth and fifth sessions the student teacher taught four more lessons, two each afternoon. When a different lesson was to be taught, the student teacher was given the materials to take home to review. In no instance did the student teacher teach a lesson with which she was unfamiliar.

During each lesson taught by the student teacher the experimenter sat in one corner of the VRS to code student and teacher behavior. Three of the four students were selected randomly as target students during each lesson.

Another trained observer also sat in the VRS. This observer randomly selected one of the four students to observe. This student was always one of the target students whose behavior was being coded by the experimenter. The observer watched the randomly selected student continuously to determine whether the student was engaged or not engaged. When the student was engaged, the observer activated a light on the teacher's desk. This light was a small red 15-watt bulb. It was taped to the teacher's console where it was readily visible to the student teacher but not visible to the students. The light was activated by a switch which the observer held in his hand. The observer switched on the light when the selected student was engaged. The light remained on as long as the
student was engaged. When the student was not engaged, the light was turned off. Before the student teacher taught her first lesson in the VRS, it was explained to her that one of the four students would be selected randomly for observation. She would not be told which student was selected. The student teacher was provided with the definitions of engaged and not engaged time used by the observers. It was explained to the student teacher that whenever the randomly selected student was engaged, the light would be turned on. When the student was not engaged, it would remain off. The experimenter also told her that since students learn more when they are engaged, she should try to teach so that the light remains on as much as possible. The light was used to provide continuous automatic feedback to the student teacher on engaged student time. It was hoped that the light bulb would reinforce the teacher behaviors that evoked engaged student behavior.

After each half hour teaching session, the experimenter tabulated engaged student time. Together the experimenter and the student teacher calculated the percent of engaged student time for each of the three target students. A mean percent engaged intervals for the three students was computed and graphed. After the student teacher and the experimenter looked at the student engaged time, the experimenter told the student teacher rules to follow that might help increase engaged student time. These rules differed for each student teacher and were formulated by the experimenter from looking at the data collected on teacher behavior. The rules were also the product of the experimenter's informal and subjective observations. The specific rules given to the student teachers are delineated in the following section.
On the fifth afternoon before the student teacher taught the final set of lessons in the VRS, the experimenter and the student teacher compared the data taken in the VRS with the data collected in the practicum setting. The experimenter and the student teacher then redesigned one of the lessons the student teacher had prepared to teach the following week in the practicum setting. The purpose of this was to provide for more active student responses in the lesson. The experimenter explained to the student teacher that while the VRS was a controlled environment that promoted each student's responding to each probe and while the VRS facilitated monitoring student responses, some of the teaching strategies could be adapted to a regular classroom environment. For example, the student teacher could encourage choral responses. She could encourage students to model correct responses for each other. After the experimenter and the student teacher discussed generally how the teaching techniques used in the VRS might be adapted for regular classroom use, they devised some specific strategies to modify the lesson plan to be taught in the practicum setting.

The preceding was the general format followed during the five days of training. The first session, the orientation session, remained essentially the same for all three student teachers. The procedures for the next four training sessions varied, depending on the individual strengths and weaknesses of the student teachers.

Specific Procedures

Student Teacher 1: Student Teacher 1 taught seven lessons in the VRS to six groups of fourth graders and one group of first graders. The student teacher did not teach a different lesson each time, although
the student who participated were different for each lesson. The first and sixth lessons were the same: teaching measurement to the quarter inch to fourth graders. The second, third, fifth and seventh lessons were the same: teaching time to the quarter hour to fourth graders. The fourth lesson was teaching short vowel sounds to first graders.

As previously indicated, after each lesson the experimenter tabulated student engaged time for each of the three students observed, calculated the percentage of intervals of engaged time for each student and, together with the student teacher, graphed the mean percent of intervals of engaged time for the three students.

After the second lesson the experimenter formulated two rules based on the observation of the sessions. The student teacher was told to follow these rules in subsequent lessons:

1. If the students have responded and you have checked each student's response individually, don't model the correct response again.
2. Try to use more individual specific praise instead of so much group praise.

Before the student teacher taught her third lesson, she watched the project manager teach the lesson on measurement to the quarter inch.

After the student teacher taught the third lesson, the experimenter formulated an additional rule which she instructed the student teacher to follow:

Don't ask the students to do two things at once. Don't ask them to clean transparencies and listen to you present new information at the same time.
During the final session before she taught the sixth and seventh lessons, the experimenter and the student teacher redesigned a lesson that the student teacher intended to teach the next school day at her practicum site. The student teacher had planned to review basic single-digit addition math facts with her students by using flash cards and going around the group, having students respond individually. After discussing ways to increase engaged time with the experimenter, the student teacher decided to revise the format of the activity. First, each student would make a set of fact cards on 2 x 4 inch file cards. Then the student teacher would assign the students to work in pairs, each holding the flash cards for his partner. The addition problem would be printed on the front of the card, the answer would be written on the back. This would enable the student to not only present the problem, but would also enable him to give accurate feedback.

Student Teacher 2: Student Teacher 2 taught only five lessons in the VRS. She was unable to attend the final training session. The student teacher's first and fourth lessons were teaching the long a sound to preschoolers. The second, third and fifth lessons were teaching alphabetizing to the second and third letter to fourth graders.

As with Student Teacher 1, the experimenter calculated and graphed a mean percent of engaged intervals for the three students observed after each lesson.

After the second teaching session, the experimenter formulated rules based on the observations. The student teacher was instructed to follow these rules:

1. Don't give unnecessary feedback. If the students are making
correct responses, reinforce the responses, but don't then go over the answers again.

2. Pair giving points with individual praise.

3. Wait for the students' attention. Direct their attention where you want it and don't be afraid to wait for it.

Before the student teacher taught her third lesson she watched the project manager teach the lesson on alphabetizing. After the student teacher taught her third lesson, the experimenter gave her an additional rule to follow, based on the observation immediately preceding:

Don't let the slowest student determine your pace. Waiting for the slowest student may be reinforcing to him. Keep your pace brisk and reinforce him for keeping up with you.

In addition to verbally giving this rule to the student teacher, the project manager taught a segment of a lesson and the experimenter acted as a VRS student who was slow to respond to probes. This was done to model for the student teacher the technique of keeping up the pace and reinforcing quick responses.

During the third session before the student teacher taught her third lesson, the experimenter and the student teacher discussed one of the lessons the student teacher planned for the practicum site. The student teacher had planned two activities. First, she was going to write words found on park signs on the board, read the words to the students and have the students read them after her. Second, she was going to have the students, as a group, visually trace a route on a city map. After discussing ways to increase engaged student time, the student teacher
decided to modify the format. First, she planned to divide the class into pairs. Each pair would make a set of signs and then practice reading the signs to each other. Second, the student teacher called the American Automobile Association and obtained a free set of city maps. She planned to have the students continue to work in pairs and trace a route with a marker on the map, and then write directions to correspond with the traced route.

Student Teacher 3: Student Teacher 3 taught a total of seven lessons in the VRS. Her first and third lessons were teaching the long a sound to preschoolers. Her second, fourth, fifth and seventh lessons were teaching time to the quarter hour to fourth graders. The sixth lesson was also teaching time to the quarter hour, but the students were first graders.

It was apparent to the experimenter after observing Student Teacher 3 teach the first two lessons that her pace was rapid. Consequently, her engaged student time was very high in the VRS (see Results). Her engaged student time in the practicum setting, however, was highly variable. Having observed her in both settings, the experimenter decided it wasn't her rate of presentation that resulted in low engaged student time, rather it was her classroom management skill that resulted in low engaged student time. At her practicum site the student teacher had frequent discipline problems. Because of these problems, the experimenter decided to alter the intervention strategy slightly. Student Teacher 3 taught four lessons in the VRS (instead of two) before she watched the project manager model a lesson. After the student teacher taught her second lesson, the experimenter and the student teacher discussed strategies for reducing in-
appropriate behavior. Specifically, they reviewed the following points:

1. Any attention to inappropriate behavior may be re-inforcing.

2. Putting inappropriate behavior on extinction usually results in the behavior becoming more frequent or more intense before it reduces in rate.

3. Attending to inappropriate behavior occasionally has the effect of putting the behavior on an intermittent schedule of reinforcement, if the attention is reinforcing.

4. A behavior on an intermittent schedule is more resistant to extinction than one on a continuous schedule or reinforcement.

5. The most effective way to successfully reduce inappropriate behavior while using extinction is to reinforce an incompatible appropriate behavior.

During the first half of the fourth session, before the student teacher taught her fifth lesson in the VRS, she watched the project manager teach telling time to the quarter hour to four first graders. These students were selected by the project manager because they were identified by their classroom teacher as discipline problems. They were particularly discipline problems in the VRS and, as a result, the classroom teacher regularly excluded these students from lessons that she taught in the VRS. These students sat in the principal's office while the rest of their reading group would go with their regular classroom teacher to the VRS. When the student teacher taught her sixth lesson, she continued the lesson started by the project manager and taught these
same students. Before she taught this sixth lesson, the experimenter reminded the student teacher to ignore inappropriate behavior.

After the student teacher taught her fifth lesson in the VRS she and the experimenter discussed revising one of her lesson plans. The student teacher used an unvarying format when conducting her reading group. First, the students spelled new words aloud. Second, each student took a turn reading a paragraph from the basal reader. Third, the student teacher led a discussion based on the story the students read. The experimenter suggested that a possible reason for the students' frequent off-task behavior was that each had to wait for a long period of time before it was his turn to read aloud. After discussing the lesson format with the experimenter, the student teacher decided to have each student read only a sentence during round-robin reading. This would shorten the waiting time between responses. The experimenter then discussed specific problems she had observed during reading group and suggested that the student teacher might be reinforcing off-task behavior by attending to it. Strategies were discussed for ignoring tantrums that were likely to arise with the change of format.

Experimental Design

A multiple baseline across subjects (Baer, Wolf & Risley, 1968) was used to determine whether a functional relation existed between the independent and dependent variables. Each student teacher participated in the training program at different points in time. If changes in engaged student time occurred only after the point of intervention for each subject, then a functional relation would have been demonstrated. A prototype of a multiple baseline design is presented in Figure 2.
Figure 2: Prototype of a multiple baseline graph.
CHAPTER IV: RESULTS

Data are presented on observational measures obtained on student behavior in the practicum settings and in the training setting. Although observational measures were also taken on student teacher behavior, only reliability data will be presented. A total of fifteen reliability checks were taken on the three student teachers in the practicum settings. Ten of the fifteen inter-observer agreement scores were below 80% using an interval by interval method of calculation. Reliability scores on separate categories of teacher behavior were computed to be better than could have been obtained by chance only 20 of 44 times. Because inter-observer agreement was low, the data collected on teacher behaviors cannot be considered reliable.

Student Behavior

Reliability

Reliability of observational data was assessed by having two trained observers code student behavior independently in both the practicum setting and the training setting. Data are presented and reliability assessed on the collapsed categories of Engaged and Not Engaged behavior.

Reliability is presented graphically by plotting frequencies obtained by both observers and by plotting a disagreement range centering on the mean of the two observers' reported rates of behavior (Birkimer & Brown, 1979). Calculation of the disagreement range is:
Disagreement range = \( \frac{\text{Disagreements}}{\text{Total number of intervals}} \times 100 \)

The interpretation of the range is that the target behavior may have occurred anywhere within the range. The lower bound of the range indicates the point where both observers agreed on the rate of occurrence of the target behavior. The upper bound of the range indicates the point where both observers agreed on the rate of nonoccurrence. The closer the boundary lines are to one another, the closer the agreement. The farther the boundary lines are from one another, the less the agreement.

In addition, obtained reliability is compared with reliability that may have occurred by chance (Birkimer & Brown, 1979). Calculation of the chance disagreement range is:

\[
\text{Chance disagreement range} = \frac{O_1 \cdot N_2 + O_2 \cdot N_1}{T^2} \times 100
\]

\(O_1\) and \(O_2\) represent the frequencies of occurrence by the two observers. \(N_1\) and \(N_2\) represent the frequencies of nonoccurrence. \(T\) represents the number of observation occasions (intervals). If obtained disagreement ranges are substantially smaller than chance disagreement ranges, the data may be said to be reliable.

Disagreement ranges and chance disagreement ranges for data collected in the practicum settings are listed in Table 1. In only one of the 35 pairs of ranges presented does the disagreement range exceed the chance range.
Table 1
Disagreement Ranges and Chance Disagreement Ranges for Percentage of Intervals of Engaged Student Behavior in the Practicum Settings

<table>
<thead>
<tr>
<th>Subject</th>
<th>Session</th>
<th>Disagreement Range</th>
<th>Chance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>School 1</td>
<td>Student 1</td>
<td>1 15%</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 0%</td>
<td>49%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 14%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 10%</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>Student 2</td>
<td>1 12%</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 3%</td>
<td>49%</td>
</tr>
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<td>10 9%</td>
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<td>20 0%</td>
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<td>School 3</td>
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<td>5 9%</td>
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<td>27 13%</td>
<td>50%</td>
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<td>49%</td>
</tr>
<tr>
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<td>Session</td>
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<td>Chance Range</td>
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<td>--------------------</td>
<td>--------------</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Student 2</td>
<td>5</td>
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<td>34%</td>
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<td>29%</td>
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<td></td>
<td>18</td>
<td>22%</td>
<td>46%</td>
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<td></td>
<td>27</td>
<td>9%</td>
<td>49%</td>
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<tr>
<td></td>
<td>29</td>
<td>13%</td>
<td>51%</td>
</tr>
<tr>
<td>Student 3</td>
<td>9</td>
<td>13%</td>
<td>37%</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>19%</td>
<td>68%</td>
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<tr>
<td></td>
<td>27</td>
<td>13%</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>0%</td>
<td>45%</td>
</tr>
</tbody>
</table>
Engaged Behavior: Practicum Settings

School 1: The frequencies of engaged behavior for the three targeted students of Student Teacher 1 are presented in Figure 3. The mean of intervals of engaged time during baseline for Student 1 was 45% and ranged from 27% to 81%. During intervention the mean percentage for Student 1 was 57 and ranged from 31% to 80%. The median percentage of engaged intervals for Student 1 was 39 during baseline and 57 during intervention. The mean of intervals of engaged time during baseline for Student 2 was 44% and ranged from 27% to 69%. During intervention the mean was 48% and ranged from 19% to 73%. The median for Student 2 was 39% during baseline and 48% during intervention. During baseline the mean of intervals of engaged time for Student 3 was 39% and ranged from 20% to 73%. During intervention the mean was 56% and ranged from 33% to 88%. The median for Student 3 was 33% during baseline and 52% during intervention.

School 2: The frequencies of engaged behavior for the three targeted student of Student Teacher 2 are presented in Figure 4. The mean percent of engaged intervals for Student 1 was 38% and ranged from 13% to 65% during baseline. During intervention the mean was 42% and the frequencies ranged from 0% to 68%. The median for Student 1 was 39% during baseline and 48% during intervention. For Student 2 the mean intervals of engaged behavior was 31% and ranged from 0% to 72% during baseline. During intervention the mean was 36% and ranged from 0% to 58%. The median percentage of engaged intervals was 38 during baseline and 39 during intervention. The mean percentage of engaged intervals for Student 3 during baseline was 29 and the frequencies ranged from 2% to 58%.
Figure 3: Percentage of intervals of engaged time for three students of Student Teacher 1.
Figure 4: Percentage of intervals of engaged time for three students of Student Teacher 2.
Figure 5: Percentage of intervals of engaged time for three students of Student Teacher 3.
During intervention the mean was 29% and ranged from 0% to 47%. For Student 2 the median was 26% during baseline and 35% during intervention.

School 3: The frequencies of engaged behavior for the three targeted students of Student Teacher 3 are presented in Figure 5. The mean of intervals of engaged time for Student 1 during baseline was 33% and ranged from 15 to 56%. During intervention the mean was 39% and the frequencies ranged from 0% to 67%. The median for Student 1 was 34% during baseline and 47% during intervention. The mean percentage of engaged intervals for Student 2 during baseline was 25% and the frequencies ranged from 0% to 45%. During intervention the mean was 46% and ranged from 15% to 83%. For Student 2 the median percentage of engaged intervals was 22 during baseline and 43 during intervention. During baseline the mean for Student 3 was 27% and the frequencies ranged from 11% to 46%. During intervention the mean was 41% and ranged from 0% to 59%. The median was 29% during baseline and 53% during intervention.

Eight of the nine students showed a mean increase in the percentage of engaged intervals from baseline to intervention (see Table 2). All nine students showed an increase in median percentage of engaged intervals from baseline to intervention (see Table 3). A t-test was computed across subjects to determine if these changes in mean could have occurred by chance. The unit of analysis used for the t-test was the mean percentage of engaged time per phase for each of the nine practicum students. Because a multiple baseline design was used to analyze the effects of the intervention, the number of observation sessions during baseline and during intervention varied from school to school. Consequently, a weighted measure of the mean percentage was used to adjust for the differences in
Table 2
Mean Percentage of Engaged Intervals During Baseline and Intervention, and Mean Changes From Baseline to Intervention for the Nine Practicum Students.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Percentage</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Intervention</td>
</tr>
<tr>
<td>Student Teacher 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>45%</td>
<td>57%</td>
</tr>
<tr>
<td>Student 2</td>
<td>44%</td>
<td>48%</td>
</tr>
<tr>
<td>Student 3</td>
<td>39%</td>
<td>56%</td>
</tr>
<tr>
<td>Student Teacher 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>38%</td>
<td>42%</td>
</tr>
<tr>
<td>Student 2</td>
<td>31%</td>
<td>36%</td>
</tr>
<tr>
<td>Student 3</td>
<td>29%</td>
<td>29%</td>
</tr>
<tr>
<td>Student Teacher 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>33%</td>
<td>39%</td>
</tr>
<tr>
<td>Student 2</td>
<td>25%</td>
<td>46%</td>
</tr>
<tr>
<td>Student 3</td>
<td>27%</td>
<td>41%</td>
</tr>
</tbody>
</table>
Table 3
Median Percentage of Engaged Intervals During Baseline and Intervention, and Median Changes from Baseline to Intervention for the Nine Practicum Students

<table>
<thead>
<tr>
<th>Subject</th>
<th>Median Percentage</th>
<th>Median Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Intervention</td>
</tr>
<tr>
<td>Student Teacher 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>38%</td>
<td>57%</td>
</tr>
<tr>
<td>Student 2</td>
<td>39%</td>
<td>48%</td>
</tr>
<tr>
<td>Student 3</td>
<td>33%</td>
<td>52%</td>
</tr>
<tr>
<td>Student Teacher 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>39%</td>
<td>48%</td>
</tr>
<tr>
<td>Student 2</td>
<td>38%</td>
<td>39%</td>
</tr>
<tr>
<td>Student 3</td>
<td>26%</td>
<td>35%</td>
</tr>
<tr>
<td>Student Teacher 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>34%</td>
<td>47%</td>
</tr>
<tr>
<td>Student 2</td>
<td>22%</td>
<td>43%</td>
</tr>
<tr>
<td>Student 3</td>
<td>29%</td>
<td>53%</td>
</tr>
</tbody>
</table>
observation sessions. The formula used to compute the $t$ statistic was:

$$
t = \frac{(P_2 - P_1) - 0}{\sqrt{\frac{P_1 (1 - P_1)}{N_1} + \frac{P_2 (1 - P_2)}{N_2}}}
$$

$P_1$ is the total proportion of engaged intervals for the nine students during baseline. $P_2$ is the total proportion of engaged intervals during intervention. $N_1$ represents the total number of observation sessions during baseline. $N_2$ represents the total number of observation sessions during intervention.

A $t$ value of 1.30 was obtained. This is significant at the .10 level but not significant at the .05 level. This can be interpreted to mean that the observed mean differences from baseline to intervention could have occurred only one of ten times by chance.

In order to present a summary of the data by schools, a mean percentage of engaged intervals for the three targeted students in each setting was computed for each session. These data are presented in Figure 6. The grand mean for the three students at School 1 during baseline was 43% and the means ranged from 25% to 74%. The grand mean during intervention was 55% and the means ranged from 33% to 78%. The grand mean for the three students at School 2 during baseline was 33% and the means ranged from 7% to 65%. During intervention the grand mean was 35% and the means ranged from 0% to 56%. The grand mean for the three students at School 3 was 28% and ranged from 20% to 39% during baseline. During intervention the grand mean was 42% and the means during intervention ranged from 12% to 68%.
Figure 6: Mean percentage of intervals of engaged time for three students at Schools 1, 2 and 3.
Engaged Behavior: Training Setting

As previously noted, reliability measures were obtained in the training setting by having two trained observers code simultaneously. Disagreement ranges were calculated and graphed for data collected in the training setting. Chance disagreement ranges were also calculated. The disagreement range and chance range for each session are presented in Table 4. In all five pairs the disagreement range is substantially smaller than the chance range.

Because the students who participated in the VRS were different each lesson, continuous measures could not be taken on individual students as they were in the practicum settings. Consequently, a mean percentage of engaged intervals was calculated for the three randomly selected students each lesson. The means for each student teacher are presented in Figure 7.

The grand mean of engaged intervals for Student Teacher was 44% and the means ranged from 32% to 56%. For Student Teacher 2 the grand mean of engaged intervals was 42% and the means ranged from 35% to 54%. The grand mean for Student Teacher 3 was 53% and the means ranged from 42% to 65%.

Teacher Behavior

Observational measures were taken on teacher behavior in the practicum settings. Ten categories of teacher behavior were defined and coded throughout the course of the study. Reliability of the data was assessed by having two trained observers code teacher behavior independently. The
Table 4
Disagreement Ranges and Chance Disagreement Ranges for the Mean Percentage of Intervals of Engaged Student Behavior in the VRS

<table>
<thead>
<tr>
<th>Student Teacher</th>
<th>Teaching Session</th>
<th>Disagreement Range</th>
<th>Chance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>12%</td>
<td>49%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9%</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>8%</td>
<td>53%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>21%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>14%</td>
<td>45%</td>
</tr>
</tbody>
</table>
Figure 7: Mean percentage of intervals of engaged student time for Student Teachers 1, 2 and 3 in the VRS.
results of the reliability calculations are presented in Table 5. Overall reliability was computed for each observation session using an interval by interval method (Hawkins & Dotson, 1975). The formula for this method is:

$$\text{Percentage of Agreements} = \frac{\text{Agreements}}{\text{Total number of intervals}} \times 100$$

An agreement occurred when each observer recorded the same teacher behavior in the same interval. A disagreement occurred when the two observers recorded different behaviors in the same interval.

Reliability calculations are also presented on five categories of teacher behavior: Teacher Behavior (TB); Monitoring (M); Questioning (Q); Individual Praise (IP); and Punishment (P). Since the other five categories (Modeling, Group Praise, Non-functional, Points and Working with other Students) were rarely coded by observers, no reliability calculations will be presented for these categories. Reliability measures for the individual categories were computed using the scored-interval method (Hawkins and Dotson, 1975). In calculating scored-interval agreement, intervals in which neither observer coded the behavior are ignored. The formula is the same as the one used for interval-interval calculations, however, only intervals where one of the observers coded the behavior are considered disagreements.

In order to compare obtained reliability with reliability that may have occurred by chance, Table 6 lists the disagreement ranges and the chance disagreement ranges for the three most frequently coded teacher behaviors (Teacher Behavior, Monitoring and Questioning). The formulae
Table 5

Reliability Scores for Teacher Behavior Using an Interval-Interval Method, and Reliability Scores on Five Categories of Teacher Behavior Using a Scored-Interval Method

<table>
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<th>Session Interval-Interval</th>
<th>TB</th>
<th>M</th>
<th>Q</th>
<th>IP</th>
<th>P</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>76%</td>
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<td>66%</td>
<td>51%</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>83%</td>
<td>78%</td>
<td>77%</td>
<td>63%</td>
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<td>57%</td>
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<td>76%</td>
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<td>50%</td>
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<td>78%</td>
<td>55%</td>
<td>70%</td>
<td>62%</td>
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<tr>
<td><strong>Student Teacher 2</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>70%</td>
<td>62%</td>
<td>55%</td>
<td>40%</td>
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</tr>
<tr>
<td>8</td>
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<td>81%</td>
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<td>100%</td>
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<td>43%</td>
<td>43%</td>
<td>57%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Student Teacher 3</strong></td>
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<tr>
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<td>65%</td>
<td>64%</td>
<td>42%</td>
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<td>25%</td>
</tr>
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<td>65%</td>
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<td>33%</td>
<td>15%</td>
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<td>90%</td>
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<td>50%</td>
<td>50%</td>
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<tr>
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<td>81%</td>
<td>23%</td>
<td>50%</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. TB represents Teacher Behavior; M represents Monitoring; Q represents Questioning; IP represents Individual Praise; P represents Punishment.
<table>
<thead>
<tr>
<th>Session</th>
<th>Disagreement Range (Chance Range)</th>
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</thead>
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<td>Monitoring (M)</td>
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<td>32 (43)</td>
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<tr>
<td>5</td>
<td>22 (50)</td>
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<td>61 (32)</td>
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<td>29 (46)</td>
</tr>
<tr>
<td>27</td>
<td>24 (46)</td>
<td>55 (35)</td>
</tr>
<tr>
<td>29</td>
<td>45 (46)</td>
<td>30 (51)</td>
</tr>
<tr>
<td>Student Teacher 2</td>
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<tr>
<td>1</td>
<td>38 (50)</td>
<td>45 (38)</td>
</tr>
<tr>
<td>8</td>
<td>17 (46)</td>
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<td>25 (49)</td>
</tr>
<tr>
<td>15</td>
<td>26 (49)</td>
<td>70 (28)</td>
</tr>
<tr>
<td>25</td>
<td>57 (49)</td>
<td>57 (43)</td>
</tr>
<tr>
<td>Student Teacher 3</td>
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</tr>
<tr>
<td>4</td>
<td>36 (48)</td>
<td>58 (37)</td>
</tr>
<tr>
<td>14</td>
<td>39 (46)</td>
<td>67 (38)</td>
</tr>
<tr>
<td>16</td>
<td>10 (21)</td>
<td>50 (8)</td>
</tr>
<tr>
<td>20</td>
<td>19 (31)</td>
<td>77 (13)</td>
</tr>
</tbody>
</table>
used to compute disagreement ranges and chance ranges were presented previously in this chapter concerning reliability on student behaviors.

In 24 of 44 pairs of ranges in Table 6 the disagreement range is larger than the chance range. In order to consider the data to be reliable, the disagreement range must be substantially smaller than the chance range (Birkimer & Brown, 1979).

Because of low agreement scores the measures taken on teacher behavior cannot be considered reliable and consequently the raw data are not presented. A summary of the raw data is presented in Appendix D.
CHAPTER V: DISCUSSION

The purpose of this study was to examine the effects of a 5-day training program for student teachers on the amount of engaged time of their students in the student teaching practicum setting. In this chapter conclusions are drawn based on the data collected during the investigation, speculations are made concerning the contingencies operating on the student teachers in the training setting and in the practicum settings, suggested modifications of the intervention treatment package are proposed, and implications for teacher training are discussed. Limitations of the study are presented and directions for future research are suggested.

Conclusions

Student Engaged Behavior in the Practicum Settings

The primary research question of this study was:

Will there be a change in student engaged time in the practicum settings as a result of a 5-day training program for the student teachers?

Visual inspection of the graphed data indicate that experimental control was not demonstrated. The intervention treatment package clearly did not produce large stable changes in student engaged time. The ranges from phase to phase overlapped considerably for all nine practicum students. And in all cases there was marked variability after intervention, as there was during baseline.

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While visual inspection of the graphed data indicate that the training program was not successful in producing clinically significant changes in student behavior, analysis of measures of central tendency suggest that there may have been slight changes in student engaged time as a result of the treatment package.

Eight of the nine students showed an increase from baseline to intervention in the mean number of engaged intervals (see Table 7). It should be noted that the magnitude of the mean changes was not large. Four of the students' mean changes were less than 10%. Nevertheless, the mean changes were consistently in a positive direction. Moreover, the one student whose mean did not improve did not show a decrease in performance; his mean remained the same from phase to phase.

A t-test was conducted across subjects to determine if the average baseline percentage was significantly different than the average intervention percentage of engaged intervals. A t statistic of 1.30 was obtained. This is significant at the .10 level. This can be interpreted to mean that the mean changes observed during the investigation would have occurred only one of ten times by chance.

Examination of the median percentage of engaged intervals further supports the notion that small changes in engaged student behavior may have occurred as a result of the intervention package (see Table 8). All nine students had a positive change in the median percentage of engaged intervals. Five of the nine median changes were over 10%

In no case does an analysis of measures of central tendency suggest that student engaged time deteriorated after intervention. The results
Table 7
Mean Percentage of Engaged Intervals During Baseline and Intervention, and Mean Changes from Baseline to Intervention for the Nine Practicum Students

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Percentage</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Teacher 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>45%</td>
<td>57%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Student 2</td>
<td>44%</td>
<td>48%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Student 3</td>
<td>39%</td>
<td>56%</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Student Teacher 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>38%</td>
<td>42%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Student 2</td>
<td>31%</td>
<td>36%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Student 3</td>
<td>29%</td>
<td>29%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Student Teacher 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>33%</td>
<td>39%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Student 2</td>
<td>25%</td>
<td>46%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Student 3</td>
<td>27%</td>
<td>41%</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>
### Table 8
Median Percentage of Engaged Intervals During Baseline and Intervention, and Median Changes from Baseline to Intervention for the Nine Practicum Students

<table>
<thead>
<tr>
<th>Subject</th>
<th>Median Baseline</th>
<th>Median Intervention</th>
<th>Median Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Teacher 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>38%</td>
<td>57%</td>
<td>19%</td>
</tr>
<tr>
<td>Student 2</td>
<td>39%</td>
<td>48%</td>
<td>9%</td>
</tr>
<tr>
<td>Student 3</td>
<td>33%</td>
<td>52%</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Student Teacher 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>39%</td>
<td>48%</td>
<td>9%</td>
</tr>
<tr>
<td>Student 2</td>
<td>38%</td>
<td>39%</td>
<td>1%</td>
</tr>
<tr>
<td>Student 3</td>
<td>26%</td>
<td>35%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Student Teacher 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 1</td>
<td>34%</td>
<td>47%</td>
<td>13%</td>
</tr>
<tr>
<td>Student 2</td>
<td>22%</td>
<td>43%</td>
<td>21%</td>
</tr>
<tr>
<td>Student 3</td>
<td>29%</td>
<td>53%</td>
<td>24%</td>
</tr>
</tbody>
</table>
of the t-test support the contention that the mean changes did not occur by chance.

One can conclude from analysis of these data that while there may have been small positive changes in student engaged time as a result of the treatment package, the intervention did not produce large stable changes in student behavior. The effects of the treatment package may have been statistically significant, but they clearly were not clinically significant.

**Teacher Behavior**

A second research question of this study was:

> Will there be a change in student teacher behavior as a result of the 5-day training program?

Since interobserver agreement on teacher behaviors was low, the data cannot be considered reliable. The disagreement ranges were so large in many instances and so close to ranges that may have occurred by chance, no conclusions can be drawn from the data obtained. Possible reasons for low agreement will be discussed in a later section.

**Student Engaged Behavior in the Training Setting**

While no research questions were posed regarding student engaged time in the training setting, it is interesting to compare this engaged time with student engaged time in the practicum settings. For all three student teachers the mean engaged time in the VRS was higher than in the practicum setting during baseline. For two of the three teachers it was also higher than the mean engaged time after intervention. Only for Student Teacher 1 was mean engaged time after intervention higher in the
practicum setting than in the VRS. Moreover, engaged time in the VRS was considerably less variable than in any practicum setting during either baseline or after intervention. Speculations about the contingencies operating on the student teachers in both settings will be discussed in a later section.

**Analysis of Student Engaged Time**

In this section the component parts of the intervention treatment package will be discussed in terms of their rationale in behavior principles. Speculations about the contingencies operating on the student teachers in the training setting and in the practicum settings will be presented and suggested modifications of the treatment package will be proposed.

**Intervention Treatment Package**

The purpose of the intervention treatment package was to increase student engaged time in the student teaching practicum setting. The approach taken in the training program and the rules given by the experimenter were based on a behavioral approach to teaching and teacher training. There were four basic components to the package treatment. First, the student teachers were given rules to follow to increase engaged student time. Second, the student teachers were afforded opportunities to practice following the rules in the training setting. Third, immediate consequences were provided for following the rules. Fourth, delayed consequences were provided for following the rules.

Rules are a special class of discriminative stimulus. A complete rule specifies the response to be made, the conditions present when the
response is to be made, and the reinforcement which has shaped and main-
tained the topography of the response and brought the response under
stimulus control (Skinner, 1969). Rules can be vocal; they can be non-
vocal, as is the case with a demonstration or a model. "A model to be
imitated is a fragmentary rule specifying the topography of the imita-
tive response." (Skinner, 1969, p. 163)

Malott (1981) further drew a distinction between strong rules and
weak rules. A strong rule is one in which the specified outcome is
sizable and highly probable. An example would be instructions on shifting
gears in a car. If the gear stick is manipulated correctly, the car
will immediately go in reverse. While a novice driver will have had
no opportunity to shift previously, he can successfully shift into re-
verse the first time by following the rule. Moreover, the outcome,
the car going in reverse, is a naturally occurring event in the environ-
ment that will most likely reinforce the response. Thus, following strong
rules quickly comes under the control of the contingencies in the en-
vironment. Weak rules, on the other hand, specify delayed, improbable
or small, cumulating outcomes. An example of a weak rule specifying a
delayed outcome would be, "Don't smoke. If you do, you may get lung
cancer." The specified outcome, cancer, does not occur immediately after
inhaling the first lungful of smoke. The outcome is delayed. An ex-
ample of a weak rule with an improbable outcome is, "You can avoid
losing a finger if you use a stick to guide wood through a bench saw."
(Malott, 1981) Even if this rule is not followed, it is not certain that
the person would lose a finger. The outcome is improbable. An example
of a weak rule specifying small cumulating outcomes is, "If you reduce your caloric intake, you will lose weight." In this instance the outcomes are small and cumulate gradually, so they cannot be considered to be reinforcing. Malott noted that weak rules need not fall neatly into one of these three categories, that most weak rules specify a combination of delayed, improbable and/or cumulating outcomes. The point is that the outcomes specified by weak rules do not serve as reinforcing events that strengthen the behavior. Additional consequences must be arranged by the verbal community to strengthen following weak rules.

The rules provided by the experimenter to the student teachers were incomplete weak rules. For example, the rule, "Lecture as little as possible," would be more completely stated as, "If, during direct instruction, you lecture as little as possible, your students may be engaged more. This will result in increased student achievement which, as a teacher, should be reinforcing to you." The specified outcome, student achievement, is both delayed and cumulating. This, then, is an example of a weak rule specifying outcomes that cannot serve as reinforcement to the student teacher. Another example of a weak rule provided to one of the student teachers was, "Ignore inappropriate behavior." This would be more completely stated as, "When a student is emitting inappropriate behavior, ignore it and the behavior will decrease, if your attention to the behavior has been reinforcing to the student." The specified outcome, a decrease in inappropriate behavior, is not only delayed, but the behavior may increase in intensity and in frequency before it decreases. The immediate outcome, increased inappropriate behavior, may actually be punishing to the teacher.
The intention of providing rules to the student teacher was to bring her under stimulus control of the classroom environment. For example, it was hoped that during direct instruction she would limit her lecturing, or in the presence of inappropriate student behavior she would withhold reinforcing attention. Because these were weak rules, though, the outcomes would not reinforce the behavior specified by the rules. Thus, the third and fourth components of the treatment package were incorporated into the intervention in an attempt to provide consequences that were not naturally occurring in the environment but would reinforce the desired teaching behaviors.

The third component of the treatment package consisted of immediate consequences for following the rules. A light bulb was activated when a randomly selected student was engaged with the expectation that it would reinforce the teacher's behavior that evoked student engaged behavior. The rationale behind using the light bulb was the principle of automatic reinforcement. Skinner (1976) noted that one need not be able to identify the response or the contingencies operating in order for the environmental stimuli to be reinforcing. If the light bulb served as a reinforcer, it would have worked automatically, even though neither the student teacher nor the experimenter were able to say exactly which teacher behaviors were evoking student engaged behaviors. Unfortunately, the scope of the study did not include an analysis of the reinforcing properties of the light bulb. It may or may not have had an effect.

The fourth component of the treatment package involved additional contingencies provided by the experimenter in the form of delayed feed-
back that may have functioned as reinforcement. Michael (1981) emphasized that delayed vocal reinforcement may not necessarily reinforce the behavior intended by the speaker. The effect of the vocal statement depends on the rules stated by the listener as he hears the speaker. Michael (1981) explained this complication with the following example: 

A husband and wife fought in the morning before he went to work. The husband felt badly and brought his wife flowers when he came home. When she received the flowers, the wife may have told herself two entirely different rules. She might have said, "Isn't that great. I get flowers when I fight with my husband." Or she may have said to herself, "Isn't he sweet. He cares about me. I shouldn't fight with him." In the first instance the flowers functioned as a delayed reinforcer for fighting. In the second instance they did not.

To prompt appropriate covert rule statements by the student teachers, the experimenter always specified the behaviors that she was praising. For example, when one student teacher ignored inappropriate student behavior in the VRS, the experimenter reminded the student teacher of the specific inappropriate behavior and praised the teacher's response. Unfortunately, as with the light bulb, the study did not provide a functional analysis of the effect of the delayed reinforcement. The feedback provided by the experimenter after each teaching session in the VRS may or may not have had an effect on following the rules.

In summary, the purpose of the training program was to provide weak rules to the student teachers and arrange reinforcing consequences for following the rules in the VRS. It was hoped that following these rules would generalize from the training setting to the practicum setting.
because of the similar stimulus conditions of the two teaching environments.

Contingencies Operating on the Student Teachers

A comparison of the data collected on student engaged time in the VRS with that collected in the practicum settings provokes speculation about the contingencies operating on the student teachers. Without exception, student engaged time in the VRS was more stable and generally higher than in the practicum settings. An explanation of the higher, more stable engaged time in the training setting might be that the treatment package was effective in this setting. The rules prompted effective teaching behaviors and following the rules was reinforced by the light bulb and by the delayed feedback. Other variables, however, might have accounted for some or all of the differences in engaged time in the two settings. One factor might have been that in the VRS the student teachers were teaching lessons that were designed specifically to maximize student opportunities to respond. These lessons had been prepared and field tested. In the practicum setting the student teachers designed and taught their own lessons. Another variable might have been the technology in the VRS. The equipment in the VRS facilitates active student responses since all students respond to all probes by the teacher and the teacher can easily monitor all students' responses (Heward, 1978). Another factor might have been that the student teacher taught fewer students in the VRS and the fewer the students, the easier it is to evoke engaged student behaviors. Regardless of the explanation, the effective teaching behaviors that evoked student engaged time in the VRS
did not generalize substantially to the practicum settings. As noted before, however, the results of the study did give a slight indication of an effect of treatment. The intervention wasn't successful enough, though, to result in large permanent changes in engaged time.

Subjective observations by the experimenter support speculations about the contingencies that were operating on the student teachers in the practicum settings that resulted in variable and frequently low engaged student time. The experimenter observed each student teacher adopting the teaching style of her cooperating teacher. These subjective observations are supported by research. For example, Copeland (1977) found that skills acquired by student teachers during micro-teaching generalized to the practicum setting only if the cooperating teachers gave the student teachers feedback on these specific skills or if the cooperating teachers modeled these teaching behaviors.

The experimenter observed that Student Teachers 2 and 3 adopted the teaching styles of their cooperating teachers. The cooperating teacher of Student Teacher 3 maintained control of his classroom by threatening and punishing his students. Student Teacher 3 also threatened and punished the students. For example, she would frequently say to a disruptive student, "If you don't stop that I'm going to call your mother. You don't want me to call your mother, do you? You had better behave." Moreover, even though her cooperating teacher would tell her to use fewer threats and to use a more positive approach, he did not model this approach and the student teacher followed the non-vocal rules given through modeling by the cooperating teacher. As might be expected, the
students in this classroom emitted disruptive behaviors that were punished. Much of the low engaged student time can be attributed to sulking, pouting and even being expelled from the small group.

Similarly, Student Teacher 2 adopted the teaching style of her cooperating teacher. Her cooperating teacher was very slow paced, provided few opportunities for the students to make academic responses and relied primarily on lecturing as a teaching method. The vocal rules that she told to the student teacher were that the students shouldn't be asked to do academic work if they didn't want to do it and that the social interaction of the students was as important as academic responses that they might make in school. Consequently, the cooperating teacher felt if was beneficial for the students to simply sit, chat and play tape players during class. This was acceptable to the cooperating teacher because the students were learning to get along with each other. Student Teacher 2 also adopted this approach to teaching. The students in this class were not disruptive, but they did often sit, talk or sleep. Even when opportunities to respond were occasioned by the student teacher, she did not reinforce engaged behaviors consistently.

The model provided by the cooperating teacher in School 1 was unobserved by the experimenter. From the first observation session Student Teacher 1 was instructing her small group while the cooperating teacher taught the rest of the class. It should be noted that the cooperating teacher was a recent graduate from Ohio State University, Department for Exceptional Children. She, more than the other two cooperating teachers, was familiar with the rules provided in the curriculum by the
Department faculty. The vocal and non-vocal rules the cooperating teacher Student Teacher 1 were, most likely, less discrepant from the University rules than those of the other two cooperating teachers. The data indicate that there was less variability in engaged time and that the student engaged time was, on the average, higher in this student teacher's classroom than in the classrooms of the other two student teachers.

**Suggested Modifications of the Intervention Package**

Rules to follow for increasing engaged student time were provided by the experimenter to the student teachers. Because the rules were weak rules, additional consequences were arranged that were hoped would reinforce following the rules. Competing rules, both vocal and non-vocal, were also provided to the student teachers by the cooperating teachers. The data collected in the VRS indicated that student engaged time was generally higher and more stable in the training setting than in the practicum setting. It is speculated that the rules and the contingencies arranged by the experimenter exerted some control over effective teaching behaviors that evoked student engaged time in the VRS. It is further speculated that the effective teaching behaviors did not generalize sufficiently to the practicum setting because of the competing rules provided by the cooperating teachers. This analysis would account for the higher, more stable engaged time in the VRS. It would also account for a slight change in engaged time in the practicum setting.

While analysis of the measures of central tendency indicate that statistically significant changes in student engaged time may have
occurred as a result of the treatment package, the training program was clearly not successful in producing important changes in student behavior. The training program may have had more impact if it had occurred before the student teaching practicum, before the student teachers were subjected to the competing rules of the cooperating teachers. The purpose of the training program was to reinforce following weak rules and hope that rule-following would generalize to the practicum setting. Had the training occurred earlier in their college curriculum, the student teachers might have been under weak rule control and the competing rules of the cooperating teachers might have had less impact.

Another possible modification of the training program might have been to place stronger contingencies on following the rules both in the training setting and in the practicum setting. For example, if passing the practicum experience had been contingent on the student teachers' producing large stable changes in student engaged time, the results might have been more dramatic.

Another possible modification of the program would be to include feedback on student engaged time and/or teacher behaviors observed in the practicum setting. Birdwell (1980) found that feedback to physical education teachers on specific teaching behaviors resulted in an increase in engaged student time. Her study differs from the present study, though, in that her subjects were teachers employed by school systems. As such, they had no competing rules provided by a cooperating teacher. Her conclusions suggest, however, that feedback to teachers on their behavior can effect changes in student behavior. Whaley (1980) found that feedback to teachers on the Academic Learning Time of their students did not re-
result in an increase in ALT. This type of feedback, coupled with rules for increasing engaged student time or coupled with feedback on specific observed teaching behaviors may result in increased engaged student time. The scope of this study did not include any feedback on either student or teacher behaviors observed in the practicum setting. It was reasoned that as part of a teacher training program, it would be more cost efficient to limit feedback to behaviors observed in the training setting.

If effective teaching behaviors that evoked engaged student time generalized to the practicum setting without such feedback, the training program would be an easy, inexpensive addition to a teacher training curriculum. Since the training program was not successful, feedback based on observations in the practicum settings might be a modification of the training program that would result in a more effective program.

One other modification of the training program might be to make the training setting more similar to the practicum setting to aid in generalization of effective teaching behaviors. For example, prepared lessons might be given to the student teachers to use in both settings. Another possibility might be to have the practicum students come to the VRS for instruction so that the students would be the same in both settings.

The feasibility of all these modifications could be explored with further research. What is apparent is that the student teachers were more effective in evoking engaged time in the VRS than in the practicum setting. These are a few suggestions that might aid in generalization of effective teaching behaviors to the practicum site.
Implications for Teacher Training

The purpose of a teacher training program at a university or college is to provide teachers with skills that will enable them to be effective teachers in the classroom. Robert Glasser (1962) drew a clear distinction between teacher training and teacher education. He wrote:

If the end-products of the learning process can be rather precisely specified, . . . then it can be said that the student is being trained. . . On the other hand, if the behavioral end-products are complex and present knowledge of the behavior makes them difficult to specify, then the individual is educated by providing a foundation of behavior which represents approximations to the behavior it is wished that the student will eventually perform . . . (p. 7)

In the past two decades there has been a strong movement toward the use of behavioral objectives in education. A wealth of literature demonstrates that significant and meaningful changes in student behavior can be effected through the systematic application of behavior principles (Journal of Applied Behavior Analysis, 1968 - 1981). This is strong evidence that there are, indeed, specific skills teachers can learn to be effective in the classroom.

In a behavioral sense the curriculum of a teacher training program consists of rules to follow for effective classroom management, instructional design and instructional implementation. There is a difference, however, between rule-stating and rule-following. Rule-stating doesn't necessarily lead to emitting the behaviors specified by the rules. Since the rules taught in a teacher training program are weak rules, contingencies must be arranged by the university faculty so that rule-following will occur in the absence of their supervision.

Certainly university students are afforded opportunities to practice the skills specified by the rules. Projects are assigned throughout
training. And the student teaching practicum is traditionally the culminating experience in a program. The results of this study raise the question of whether these traditional activities are sufficient to bring future teachers under weak rule control. An examination of these activities would suggest not.

When projects are assigned, students are expected to apply the rules they have learned in the course. At best, however, contingencies arranged by the university faculty and staff reinforce verbal reporting of rule-following. And the verbal reporting may or may not be accurate. The argument is not that no students emit the desired teaching behaviors while conducting the projects. Some students may be very successful at following the rules and report accurately the results of their projects. Others may not be so successful, nor so accurate. Since rule-following is not specifically reinforced, it cannot be assumed that assigning projects strengthens the desired teaching behaviors.

There is a similar problem in reinforcing rule-following during the student teaching practicum. During the practicum, the student teacher is not constantly monitored and reinforced by the university personnel. The consequences for teaching are provided much more consistently by the cooperating teachers. If the student teachers are not sufficiently under weak rule control before the practicum and if the rules provided vocally and non-vocally by the cooperating teacher are discrepant from those taught in the university, then the student teacher may never successfully acquire the desired teaching behaviors.

If the rules specified by the curriculum are deemed important by the teacher trainers, then provisions should be made to reinforce both
rule-stating and rule-following.

This position is supported by previous research investigations. While the studies were conducted with students in elementary and high schools, not university students, the findings may be applicable. The consistent conclusion was that rules alone are not sufficient to produce changes in behavior. In addition to providing rules, contingencies had to be arranged for following the rules. Greenwood, Hops, Delquadri and Guild (1974) found that rules alone produced no effect on levels of inappropriate behavior but when coupled with feedback and reinforcement dramatic changes occurred. O'Leary, Becker, Evans and Saudargas (1969) also found that rules alone did not decrease disruptive classroom behavior but when a token reinforcement program was instituted along with the rules, there was a dramatic decrease in disruptive behavior. Packard (1970) reported that instructions alone did not produce lasting changes in student attention in various classes in an elementary school. In his study Packard did note that the two older classes had significant short-lived changes in behavior, but the changes did not maintain until additional consequences were arranged. Madsen, Becker, and Thomas (1968) also found that rules alone were insufficient in reducing inappropriate behavior.

An interesting discussion point of this study was that the two elementary teachers who implemented the study had difficulty ignoring inappropriate behavior. One teacher only reduced critical comments from one a minute to three in four minutes. In training the teachers during the different phases of the experiment, the authors simply provided instructions for the teachers to follow. They did not arrange consequences
for following the instructions, and the teachers had difficulty in doing so. While training the teachers was not part of the investigation, the discussion point substantiated the findings of the study, that rules alone are insufficient to change behavior.

The training program in this study provided rules and attempted to reinforce following the rules in the training setting. The training program was not effective in bringing the student teachers under weak rule control. It may be suggested that small changes occurred in the practicum setting, but the changes were much too slight for the training program to be considered successful.

If the students in a teacher training program are to be brought under weak rule control, it should occur earlier in the training program, before they are subjected to competing rules of the cooperating teacher. Faculty and staff should consider arranging practicums that include daily supervision and immediate reinforcement. If it would be too costly to commit faculty and staff resources to such continuous on-going supervision, peers could be trained to observe each other and provide reinforcement.

The contentions of this study are supported by related research. The literature on microteaching supports the notion that students should practice teaching under close supervision. A microteaching program consists of providing rules for effective teaching, allowing the student to practice specific teaching behaviors, giving the student feedback on his performance and allowing the student to teach again. Research on microteaching has indicated that it is an effective method for training teachers. Students who are trained in a microteaching program use the specific skills more frequently and more successfully than control students.

While the research on microteaching is not analyzed and discussed in terms of rules, the principles are the same. Skills are more effectively acquired if they are practiced and reinforced.

Limitations of the Study

One serious limitation of the study was the lack of reliability on teacher behaviors. It would have been interesting to see if any changes in teacher behavior corresponded to changes in student behavior. For example, would an increase in engaged student time correspond with a decrease in Teacher Behavior? An explanation for the lack of reliability might have been the observational system employed. When the system was first designed, the intention was to use momentary time sampling for observing teacher behavior. Originally the cue on the tape was simply, "Observe teacher." The observer was to observe the student teacher immediately after the tape finished the word "teacher". Then the observer would have the remainder of the five-second pause to record the behavior. In working with this system, however, the experimenter had very low reliability with another trained observer who was as familiar with the coding system and the definitions as the experimenter. Upon discussing the low reliability, it was decided that too frequently the teacher was caught in the middle of a breath. One observer would code Monitoring (having assumed that the teacher was monitoring the students' work) and the other would code whatever behavior came after the pause for breath.

It was then decided that a two second interval would alleviate this problem. Two seconds would be enough time to observe the teacher to make
a sound decision about the behavior being emitted. After changing the system to a two second interval, the observer and the experimenter had high interobserver agreement. This high level of agreement, however, was not attained in the field by the observers.

There are two possible flaws in the design of this system of observation. First, in two seconds several teacher behaviors can be emitted. No provisions were made for recording more than one teacher behavior per interval. Second, the list of teacher behaviors may have been too complex. The behaviors were defined so as to try to account for any conceivable teacher behavior, so that regardless of what the teacher was doing at the moment of observation, the behavior could be coded. An alternative might be to pinpoint a few key teacher behaviors and at the moment of observation the observer could simply note whether any of those few key behaviors had occurred.

Another limitation of the study was the time of year in which the study was conducted. The investigation started at the end of April and continued until the end of the school year. The end of school year is traditionally a busy time. Field trips are planned, students attend assemblies, there are class parties, and absences increase. In this sense several observation sessions were missed due to the fact that there was no small group direct instruction that day. If the study had been conducted during the fall or winter, daily measures might have been more consistently obtained.
Suggestions for Future Research

The training program instituted in this study was ineffective in producing clinically significant stable changes in student engaged time. Future research might be directed toward clarifying the variables that are operating on students during a student teaching practicum. Research might also investigate ways of bringing students under weak rule control prior to the student teaching. Suggestions for future research include:

1. Replication of this training program conducted prior to the student teaching practicum.

2. A study designed to analyze the effect of the component parts of the treatment package. One of the most fascinating aspects of the study was that the engaged time in the VRS was consistently higher and more stable. Several factors might have contributed to this. The technology of the VRS might have accounted for the higher, more stable engaged time. The prepared lessons, the reinforcing effect of the light bulb, the delayed feedback provided by the experimenter after each teaching session, the rules given to the student teachers prior to each teaching session all might have impacted on the engaged time in the VRS. An analysis of the component parts of the investigation might isolate key factors that contribute to increased engaged student time.

3. Replication of this training program that would be modified to include prepared lessons for the student teachers to use in the practicum setting as well as in the training setting.

4. Replication of the training package to include feedback on student
engaged time and/or specific teacher behaviors in the practicum setting.

5. Descriptive data obtained on the student engaged time of the cooperating teacher and the student engaged time of the student teacher to determine how their times covary.

6. Research needs to be conducted on establishing weak rule control. Since one function of a teacher training program is to provide weak rules to follow for effective teaching, studies might be initiated to determine how many rules a person can learn to emit vocally before he needs to emit the behavior specified by the rules. Should the rules be taught one at a time or in clusters before opportunities to follow the rules are provided? Will following weak rules eventually become a generalized response class? How might following weak rules under close supervision generalize to a setting where there is no supervision?

**Summary of the Study**

The purpose of the study was to examine the effects of a 5-day laboratory training program for student teachers on the amount of engaged time of their students in the student teaching practicum setting. Three undergraduates who were currently participating in a student teaching practicum supervised by the Faculty for Exceptional Children at The Ohio State University served as subjects during the investigation. The training program was conducted in a Visual Response System (VRS) classroom. The VRS has been demonstrated to be a successful teaching environment that is designed to maximize active student response. As such, it was reasoned
to be an effective teacher training environment.

The 5-day training program was a package treatment that consisted of four components. First, the student teachers were given rules to follow to maximize engaged student time. Second, the student teachers were provided opportunities to practice the behaviors specified by the rules while teaching in the VRS. Third, immediate automatic feedback on student engaged time was given to the student teachers. Fourth, vocal feedback was given by the experimenter after each VRS teaching session. It was expected that the immediate automatic feedback and the delayed vocal feedback would reinforce effective teaching behaviors that evoked student engaged behaviors.

The student teachers participated in the 5-day training program at different points in time. A multiple baseline design across subjects was used to determine if changes in student engaged time occurred as a function of the intervention.

Observational measures were obtained on students in the VRS and on three students in each of the three student teaching practicum settings. In addition, observational measures were taken on student teacher behavior in both settings.

Results indicated that the training program was not successful in effecting large, stable changes in student engaged time in the practicum settings. While analysis of measures of central tendency indicate that there may have been small positive changes in student engaged time that were statistically significant, the changes were clearly not clinically significant.

Reliability was not obtained on measures taken on the student teachers'
behavior. Consequently, no conclusions about changes in teacher behavior can be drawn.

The observational measures obtained on students in the VRS indicate that engaged time in the VRS was consistently higher and more stable than in the practicum setting either before or after intervention. Contingencies operating on the student teachers in the two settings were obviously different. It is suggested that the student teachers were successful in following the rules provided by the experimenter while teaching in the VRS, but that competing rules provided by the cooperating teachers and contingencies for following these competing rules precluded the student teachers from following the rules that were part of the training program.

Future research might isolate the factors that contributed to higher student engaged time in the VRS. Modifications of the training program might include strengthening the contingencies for following the rules in the practicum setting or providing the training before the student teachers are subjected to the competing rules of the cooperating teachers. Modifications of the training program might result in changes in student engaged time that are clinically, as well as statistically, significant.
APPENDIX A: OBSERVATION TRAINING MANUAL
INTRODUCTION

This is a training manual for the recording system to be used for the Student Teacher VRS Inservice Training project. The purpose of the system is to catalogue student behavior and teacher behavior in small group settings during direct instruction. The coding system is based on interval recording. Student and teacher behavior will be observed for short periods of time and recorded onto a coding sheet. This manual is intended to take you through the training program quickly and painlessly.

Directions

1. Read through the definitions for student behavior and teacher behavior that follow on the next pages. Become familiar with these definitions. In addition, read the Decision Log that follows the definitions.

2. After becoming familiar with the definitions, do Tasks 1 and 2.

3. The experimenter will arrange a time for the first training meeting. Bring this manual and the completed Tasks 1 and 2 with you to the meeting.
**STUDENT BEHAVIOR:** Assign a student behavior for every interval.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Engaged, verbal</td>
<td>The student is making a verbal response. He may be asking a question, answering a question, reading orally. This includes verbal behavior related to academic content, but does not include asking questions about directions or management tasks. &quot;What page are we on?&quot; or &quot;Can I go to the bathroom?&quot; is coded as no engaged management (NM).</td>
</tr>
<tr>
<td>WR</td>
<td>Engaged, writing</td>
<td>The student is writing or erasing.</td>
</tr>
<tr>
<td>R</td>
<td>Engaged, reading</td>
<td>The student is reading silently.</td>
</tr>
<tr>
<td>O</td>
<td>Engaged, other</td>
<td>The student is engaged in another academic behavior, like sorting, holding up cards, pointing.</td>
</tr>
<tr>
<td>NOT</td>
<td>Not engaged, off-task</td>
<td>The student is off-task, either verbally or motorically. He may be chatting with another student, with the teacher, looking out the window, shooting rubber bands.</td>
</tr>
<tr>
<td>NWA</td>
<td>Not engaged, waiting</td>
<td>The student is waiting for the next assignment or for his turn or for the teacher to help him. The student does not have an opportunity to make an academic response, but is not off-task. If the student is day-dreaming, but is also waiting (i.e., doesn't have the opportunity to respond) code the behavior NWA.</td>
</tr>
<tr>
<td>NM</td>
<td>Not engaged, management</td>
<td>The student is on-task, but not academically. He may be sharpening a pencil or getting out his books. Or he may be asking a non-academic question.</td>
</tr>
<tr>
<td>NL</td>
<td>Not engaged, listening</td>
<td>The student is listening to the teacher or another student. This includes listening to a lecture, to directions, to another student make an academic response. It does not include listening to the teacher give feedback to another student. If the student is supposed to be making an academic response, but is listening to the teacher, code the behavior NOT. If the student is waiting and incidentally listening, code NWA. Code NL only if the student is supposed to be listening.</td>
</tr>
</tbody>
</table>
TEACHER BEHAVIOR: Assign a teacher behavior for every interval.

TR  Teacher Behavior
This is teacher behavior that does not require a student response. It includes lecturing (giving academic information), giving directions (e.g., "Turn to page 56." or "After you are finished, go back to your seat and do the worksheet.") and management tasks (taking attendance, finding the place in the teacher's manual, cleaning transparencies, handing out papers). This category also includes transition behaviors emitted while switching from one activity to another.

In addition, code TB if the teacher is monitoring on-task behavior instead of monitoring actual academic responses made by the student.

MO  Modeling
The teacher models a response, with or without accompanying verbal behavior. Examples are spelling a word for a student, providing an answer for an academic question. There is a strict point to point correspondence between the teacher's response and the student's response. If the teacher is modeling a math problem (but not the same identical problem), code the teacher behavior TB (lecturing).

M  Monitoring
The teacher watches the student but does not give feedback. This would include listening to a student's answer or listening to a student's question concerning academic content only. Listening to non-academic questions (e.g., "What page are we on?") would be coded TB.

Q  Questioning (Probing)
The teacher sets the occasion for an academic response. Teacher verbal behavior could be in the form of a statement as well as a question.

  e.g., "What is 2 + 5?"
  "Do problem #72."
  "How much does this cost?"
  "Draw an equilateral triangle."

This does not include statements like "Turn to page 29 and do problems 4 through 17." This is considered giving directions and coded TB.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
</table>
| NF | Non-functional | The teacher is engaged in an activity not related to academic content or management of the class.  
e.g., hanging up her coat  
talking to the principal  
chatting with a student |
| PI | Individual Praise | The teacher praises an individual. |
| PG | Group Praise | The teacher praises the group.  
e.g., "You all did a nice job." |
| P | Punishment | The teacher punishes a student verbally or physically for an academic or non-academic response. This would include any attention to off-task behavior.  
e.g., "John, pay attention."  
"Sally, you never remember to raise your hand."  
"We are waiting for you to finish, Mark."  
This would not include an attention-getting statement like "All eyes up here, please, class." That would be coded as TB. |
| PT | Points | The teacher delivers points or tokens without pairing the delivery with verbal praise. |
| F | Feedback | The teacher provides academic feedback to the student. She may or may not require the student to make the correct academic response. This is different from praise. Praise occurs when the student makes the correct response and the teacher acknowledges or praises it. Feedback occurs when the student's response is incomplete or wrong and the teacher provides information for the student to correct or extend the response. Punishment occurs when the student response is wrong and the teacher provides no information for the student to remediate his response.  
Examples of feedback:  
"No, carry the two."  
"That's good, but you need to remember your periods."  
"It needs to be neater, Jeff." |
The teacher works with students who are not part of the small group involved in direct instruction. The teacher may be answering a question from a student who comes to the teacher during group. She may be monitoring the rest of the class. She may even leave the group to work with other class members. If the teacher does leave the group, the behavior would be coded either W or NF.
DIFFICULTY LEVEL: Assign a difficulty level each interval an engaged student behavior is coded.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Too easy</td>
</tr>
<tr>
<td>A</td>
<td>Appropriate</td>
</tr>
<tr>
<td>H</td>
<td>Too hard</td>
</tr>
</tbody>
</table>
DECISION LOG

1. If the student is listening to or watching another student who is off-task, code the student off-task (NOT).

2. If a student is proofing his writing, code the behavior (WR) writing even though he is reading. Proofing is considered part of the writing process.

3. Redirection is a teacher behavior (TB). If the teacher says, "Look up here, please, class." code the behavior TB. Some statements, however, could be either TB or P (punishment), depending on the tone of voice. If the teacher says, "Eyes up here!", and her tone of voice indicates her statement is a reprimand, code it P. If her tone indicates that she is just redirecting their attention, code the behavior TB.

4. If you observe teacher behavior that may be praise and/or feedback (e.g., "It's great that you remembered periods, Mark, but don't forget the capital letters, too."), record both praise and feedback (PIF).
**Task 1**

In the left column you will find definitions essentially as they appear on the list you have studied. Read each definition and write the corresponding coding symbol in the space provided in the column on the right. The criterion level of acceptance for this task of 18 or 20 items correct.

<table>
<thead>
<tr>
<th>Definition</th>
<th>Coding Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The student is reading silently.</td>
<td></td>
</tr>
<tr>
<td>2. The teacher praises an individual.</td>
<td></td>
</tr>
<tr>
<td>3. The teacher watches the students but does not give feedback.</td>
<td></td>
</tr>
<tr>
<td>4. The student is waiting for the next assignment or for his turn or for the teacher to help him. The student does not have an opportunity to make an academic response.</td>
<td></td>
</tr>
<tr>
<td>5. The teacher is engaged in an activity not related to academic content or management of the class.</td>
<td></td>
</tr>
<tr>
<td>6. The student is making a verbal response. He may be asking a question, answering a question, reading orally. This includes verbal behavior related to academic content, but does not include asking questions about directions or management tasks.</td>
<td></td>
</tr>
<tr>
<td>7. The teacher sets the occasion for an academic response.</td>
<td></td>
</tr>
<tr>
<td>8. The teacher models a response, with or without accompanying verbal behavior.</td>
<td></td>
</tr>
<tr>
<td>9. The student is on-task, but not academically. He may be sharpening a pencil or getting out his books. He may be asking a non-academic question.</td>
<td></td>
</tr>
</tbody>
</table>
Task 1 (cont.)

10. Few errors are made and the student performs appropriately with little effort, experiencing success frequently.

11. The student is writing or erasing.

12. The teacher praises the group.

13. The student is engaged in another academic behavior, like sorting, holding up cards, pointing.

14. The teacher delivers points or tokens without pairing the delivery with verbal praise.

15. This is teacher behavior that does not require a student response. It includes lecturing, giving directions and management tasks.

16. The teacher provides academic feedback to the student. She may or may not require the student to make the correct academic response.

17. Many errors are made and student appears to be unable to perform appropriately, experiencing lack of success frequently. Chances of success are not much better than luck.

18. The student is off-task, either verbally or motorically.

19. The student is listening to the teacher or another student. This is coded only when the student is supposed to be listening.

20. The teacher punishes a student verbally or physically for an academic or non-academic behavior. This would include any attention to off-task behavior.
Task 2

Once you have an understanding of each of the definitions, complete the test below. The column on the left will describe teacher or student behavior. On the line in the column on the right write the coding symbol for the behavior listed on the left. The criterion is 27 or 30 items.

<table>
<thead>
<tr>
<th>Teacher Behavior</th>
<th>Coding Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The teacher says, &quot;Very good, Mary.&quot;</td>
<td></td>
</tr>
<tr>
<td>2. The teacher says, &quot;Point to the animal that lives on a farm.&quot;</td>
<td></td>
</tr>
<tr>
<td>3. The teacher files her nails while watching to make sure the students are working hard.</td>
<td></td>
</tr>
<tr>
<td>4. The teacher says, &quot;Get to work, Marvin.&quot;</td>
<td></td>
</tr>
<tr>
<td>5. The teacher says, &quot;That's a pretty good start, Louise, but you forgot to indent the first line.&quot;</td>
<td></td>
</tr>
<tr>
<td>6. The teacher says, &quot;OK, let's open our workbooks to page 21.&quot;</td>
<td></td>
</tr>
<tr>
<td>7. The teacher writes a word on the board so Mardell can spell it correctly.</td>
<td></td>
</tr>
<tr>
<td>8. The teacher says, &quot;I'm really proud of you all. You worked very hard during reading group today.&quot;</td>
<td></td>
</tr>
<tr>
<td>9. The teacher gives tokens to everyone but Towanda and says, &quot;Towanda, you haven't done any of the problems yet.&quot;</td>
<td></td>
</tr>
<tr>
<td>10. The teacher listens as Clemus recites the Bettysburg Address.</td>
<td></td>
</tr>
<tr>
<td>11. The teacher delivers points while saying, &quot;Nice job, class.&quot;</td>
<td></td>
</tr>
</tbody>
</table>
12. The teacher says, "Look up here, class."

13. The teacher demonstrates how to divide words into syllables according to the VCCV rule. The students then work on a list of words with the VCCV pattern.

14. Before beginning to read a story about the circus, the teacher says, "Crystal, what is your favorite thing at the circus?"

15. Bill finishes reading. The teacher says, "OK, Cheryl, you read the next paragraph."

16. The teacher says, "Maria, I hear your mother is having a baby."

17. The teacher listens while Patty asks, "What page are we on?"

**Student Behavior**

18. The student looks out the window as a fire truck rushes past.

19. The student works on a math worksheet.

20. The student holds up a file card with a question mark on it when the teacher reads, "How are the ducks doing?"

21. The student raises his hand.

22. The student goes to his box at the front of the room to get his next assignment.

23. The student asks, "When is recess?"

24. The student takes his paper to the teacher and asks, "Is this OK?"

25. The student listens as another student reads.

26. The student shoots a paper wad into the wastepaper basket.

27. After finishing his assignment the student ties his shoes.

28. The student walks to the board.
29. After the teacher asks, "Who was the first President of the United States?", the student says, "Thomas Jefferson."

30. The student sits while the teacher explains the VCCV rule.

Task 3

Review the coding sheet that has been provided. There will be opportunities to have questions answered concerning the use of the coding sheet.

With the experimenter present for immediate feedback, and to answer any questions, you will view a video tape and verbally code the tape each time the experimenter stops it. Whenever a wrong answer is given, the tape will remain stopped and the experimenter will clarify the reasoning for the correct code.

Task 4

A video tape will be shown and coded. The experimenter will code the video tape concurrently.

For the first three minutes, observe one student and code the student behavior only. For the next three minutes, observe the teacher and code teacher behavior only. For the next three minutes code both student and teacher behavior while observing only one student.

Ninety percent reliability with the experimenter must be obtained.
Task 5

A fifteen minute video tape shall be coded along with the experimenter. Three students will be observed sequentially. You will code student behavior, difficulty level and teacher behavior. Eighty percent reliability must be obtained on all levels.

Task 6

Each observer shall arrange with the experimenter to observe and code a small group reading or math lesson in a school. Three randomly selected students shall be chosen to be observed during the lesson. The observation session shall be approximately one half hour. Eighty percent agreement with the experimenter must be obtained.
APPENDIX B: CODING SHEET
<table>
<thead>
<tr>
<th>School</th>
<th>Teacher</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer</td>
<td>Reliability</td>
<td>Time start</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>S</td>
<td>D</td>
<td>T</td>
</tr>
</tbody>
</table>

**STUDENT BEHAVIOR**

Engaged: Verbal (V) Not Engaged: Off-task (NOT)
Writing (WR) Waiting (WA)
Reading (R) Management (MH)
Other (O) Listening (NL)

**TEACHER BEHAVIOR**

Teacher behavior (TS)
Individual praise (PI)
Modeling (MO)
Group praise (PG)
Monitoring (M)
Punishment (P)
Questioning (Q)
Points (PT)
Non-functional (NF)
Feedback (F)
Working with other students (W)
APPENDIX C: VRS LESSON PLAN
Lesson Name: Alphabetizing Using the Second and Third Letter

Objectives: Following this lesson students will be able to:

Write a list of 10 words in ABC order using the first, second or third letter.

Time to teach:

Prerequisite Skills: Students must be able to write five words in ABC order using the first letter.

<table>
<thead>
<tr>
<th>Teacher Procedure</th>
<th>Student Response</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Show LNRT as T-1.</td>
<td>1. Place LNRT on stage.</td>
<td>1. None.</td>
</tr>
<tr>
<td>2. Show T-2. Read top part, direct students to write the first word, then complete the list. When finished show answers.</td>
<td>2. Students place first word on line 1 of LNRT. Then continue with other 4 words.</td>
<td>2. Praise. If students do not know how to place words in ABC order they are not ready for this lesson.</td>
</tr>
<tr>
<td>3. Show T-3, read. Show envelope (with red dot) of slides. Model placing r.s.'s in order on (T-3).</td>
<td>3. Place response slides in ABC order.</td>
<td>3. Praise.</td>
</tr>
<tr>
<td>4. Direct students to put away slides and take out r.s.'s from envelope with the blue dot.</td>
<td>4. Place r.s. in ABC order.</td>
<td>4. Show slides in order. Praise and points. If problems have students scramble and put in order again.</td>
</tr>
<tr>
<td>5. Direct students to put away slides and take out r.s.'s from envelope with green dot.</td>
<td>5. Place r.s. in ABC order.</td>
<td>5. Show slides in order. Praise and points. If problems have students scramble and put in order again.</td>
</tr>
<tr>
<td>6. Show T-4, locate first box. Model numbering words in ABC order for box 1. Suggest underlining second letter in each word.</td>
<td>6. Place T-4 on stage. Locate first box. Imitate numbering words in box 1. Continue with boxes 2, 3, and 4 in ABC order.</td>
<td>6. Show correct numbering, then give points and praise following each box.</td>
</tr>
<tr>
<td>7. Show T-5. Model writing first word and crossing it off list.</td>
<td>7. Place T-5 on stage. Write words in ABC order, crossing out words as they go.</td>
<td>7. Overlay answers. Praise and points for each word in order. Give feedback after each list.</td>
</tr>
</tbody>
</table>

127
<table>
<thead>
<tr>
<th>Teacher Procedure</th>
<th>Student Response</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Direct students to continue with boxes 2-6.</td>
<td>10. Number words in ABC order</td>
<td>10. Show answers and give praise and points after each list.</td>
</tr>
<tr>
<td>11. Show T-8. Model writing first 2 words and crossing off list.</td>
<td>11. Write words in ABC order crossing out words as they go.</td>
<td>11. Overlay answers, praise and points for each word in order. Give feedback after each list.</td>
</tr>
<tr>
<td>13. Show T-10. Model placing word list a on column I.</td>
<td>13. Place T-10 and word list on stage.</td>
<td>13. Praise.</td>
</tr>
<tr>
<td>14. Model writing the words in list a in alphabetical order to first letter only (e.g., apple, ax, ape) in column II of T-10.</td>
<td>14. Alphabetize list a to 1st letter only in column II.</td>
<td>14. Praise.</td>
</tr>
<tr>
<td>15. Model alphabetizing list from column II to second and third letter writing the re-organized list in column III.</td>
<td>15. Realphabetize list a from column II to column III, reorganizing list so it is alphabetized to second and third letter.</td>
<td>15. Praise and points.</td>
</tr>
<tr>
<td>16. Direct students to do steps 13-15 with list b-f, providing continuous feedback to students as they work when SOHP's on.</td>
<td>16. Repeat steps 13-15 with lists b-f.</td>
<td>16. Praise and points.</td>
</tr>
<tr>
<td>17. Show T-11. Model writing first word and crossing it out.</td>
<td>17. Write words in ABC order, crossing out words as they go.</td>
<td>17. Overlay answers. Praise and points for each word in order.</td>
</tr>
<tr>
<td>18. Show T-12. Direct students to write words in ABC order.</td>
<td>18. Write words in ABC order, crossing out words as they go.</td>
<td>18. Overlay answers. Praise and points for each word in order.</td>
</tr>
</tbody>
</table>
APPENDIX D: PERCENTAGES OF TEACHER BEHAVIORS
FOR STUDENT TEACHERS 1, 2 AND 3
<table>
<thead>
<tr>
<th>Session</th>
<th>TB</th>
<th>Q</th>
<th>M</th>
<th>IP</th>
<th>P</th>
<th>Mo</th>
<th>W</th>
<th>NF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53</td>
<td>18</td>
<td>26</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
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<tr>
<td></td>
<td>(53)</td>
<td>(18)</td>
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<tr>
<td>2</td>
<td>45</td>
<td>13</td>
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<td>1</td>
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<td>12</td>
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<td>15</td>
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<tr>
<td>17</td>
<td>62</td>
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<td>21</td>
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<td>1</td>
<td>10</td>
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**Note.** TB represents Teacher Behavior; Q represents Questioning; M represents Monitoring; IP represents Individual Praise; Mo represents Modeling; P represents Punishment; W represents Working with other Students; and NF represents Non-functional.

**Note.** Numbers in parentheses indicate the percentages obtained by the second observer.
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TABLE 10 (cont.)

Note. TB represents Teacher Behavior; Q represents Questioning;
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Kissock, C. A study to test the value of MT in a programme of video and modelling instruction in the development of higher order question asking on the part of pre-service teachers. Unpublished doctoral dissertation, University of Minnesota, 1971.


Rosenshine, B. Recent research on teaching behaviors and student achievement. Journal of Teacher Education, 1976, 27, 61-64.


