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MODIFICATION OF TEACHING BEHAVIORS
IN PHYSICAL EDUCATION

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

By
Carey Hughley, Jr., B.S., M.S.

The Ohio State University
1973

Reading Committee
Dr. Daryl L. Siedentop
Dr. John O. Cooper
Dr. Edward L. Coates

Approved by
Dr. Daryl L. Siedentop
Adviser
Department of Physical Education
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To my mother who guided me in my impressionable years, I say thank you.
VITA

March 25, 1943 .......... Born—Fayetteville, North Carolina

1965 ...................... B.S., Hampton Institute, Hampton, Virginia

1965-1966 ................. Teaching Assistant, University of Massachusetts, Amherst, Massachusetts

1966 ...................... M.S., University of Massachusetts, Amherst, Massachusetts

1966-1967 ................. Instructor, South Carolina State College, Orangeburg, South Carolina

1967-1971 ................. Instructor, Hampton Institute, Hampton, Virginia

1971-1973 ................. Teaching Associate, The Ohio State University, Columbus, Ohio

FIELDS OF STUDY

Major Field: Physical Education. Dr. Daryl Siedentop, Chairman; Dr. Edward Coates.

Minor Fields: Applied Behavioral Analysis. Dr. John O. Cooper
Human Performance. Dr. Harvey Shulman and Dr. George Briggs
Learning Psychology. Dr. Delos Wickens
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CHAPTER I

INTRODUCTION

Society is rapidly changing and as such, changes in its institutions may be necessary. Behavioral sciences are providing input that is greatly influencing the direction of these changes. Education, among other social institutions, is experimenting with behavioral techniques in order to better meet the needs of those it serves.

Behavior modification as a technology of education is not new. Operant practitioners have long known fundamental laws of behavior. Directive teachers have developed principles of applied behavior analysis and tested them in educational settings. Proponents of the behavior approach have suggested that society would benefit if these laws and principles of behavior were applied to educational endeavors (Homme, 1967). Education, however, has been slow to accept the technology of teaching. Nevertheless, application of these principles has moved from the dark corners of mental, correctional, and juvenile institutions into clinics where behavior therapy is a much respected treatment. Furthermore, school systems are beginning to utilize behavioral principles, instructional objectives, and contingency management in the classroom. A natural extension of this trend would be to determine the value
of such procedures in training teachers.

The average student teacher is very eager to put his skills to test and develop effective teaching methods. As a result of his preparation, he has some idea as to what a teacher should do in the gymnasium or on the playing field. However, once he is in the gymnasium it may be difficult for him to determine if his actions are appropriate. Teaching is such a demanding and complex job that the student teacher is often unaware of the specific nature of his behavior. However, once his pattern of behavior is brought to his attention it may be altered. Information feedback is designed to do this. If it can be found to be an effective tactic for generating behavior change, then such a tool can be further employed in teacher supervision by a cooperating teacher, a supervisor, or even another student teacher.

STATEMENT OF THE PROBLEM

What is the effect of directed information feedback on teaching behaviors of student teachers in physical education?

ANALYSIS

It is a purpose of this study to investigate the extent to which a behavioral focus in teacher education is effective in the acquisition of appropriate teacher behaviors. To do this, the study will employ a multiple baseline paradigm (Hall, 1971) to determine the effect of systematic information feed-
back on teacher behaviors.

DELIMITATIONS

The study is delimited by the following factors:

1. The single independent variable of directed information feedback was employed. Its elements included: (1) instructions, (2) graphic feedback, (3) cueing and reinforcement, and (4) goal setting.

2. The target behaviors were observable and measurable with an average inter-observer agreement measure of 80% or greater concerning the occurrence of the selected behaviors.

HYPOTHESIS

There will be no difference in the trends of the base-lines after intervention with feedback.

DEFINITIONS

For the purposes of this study the following terms are defined as follows:

Behavior. Defined actions of the human organism that are observable and measurable.

Operant behavior. Measurable and observable actions that are developed and maintained by the environmental consequences associated with them.

Event recording. Making a tally of discrete events of a certain class. A frequency of events as they occur (Hall, 1971).

Baseline. The level at which behavior is occurring
before attempts are made to modify it (Hall, 1971).

**Ascending baseline.** A situation in which the level of behavior before intervention is increasing.

**Descending baseline.** A situation in which the level of behavior before intervention is decreasing.

**Reliability.** Percent of agreement of observers on what they have observed in the same subject during the same session (Hall, 1971).

**Behavior modification.** Behavior modification, behavior analysis, reinforcement theory, and behavioral techniques are all used to refer to the application of the principles of operant psychology.

**Intervention.** The introduction of an independent variable in an attempt to modify behavior.

**Directed information feedback.** Information from the experimenter about the frequency of the target behaviors in addition to suggested techniques to increase or decrease these frequencies.

**BASIC ASSUMPTIONS**

The following are assumed to be true:

1. **High inter-observer reliability increases the probability that the subject's behavior was altered and not the observer's.**

2. **After repeated interventions with information feedback on different behaviors of the same subject and different subjects, changes occurring immediately after intervention are a result of the intervention.**
RATIONALE

With increasing accusations about the failure of education (Rafferty, 1963; Goodman, 1964; Clark, 1969) the cry for accountability, and the resolution of the problem of enough teachers to meet the demands of the student population, educators are focusing their attention on improving the quality of teacher education: improving the quality of teacher education not in the traditional ideal sense but improving the quality by preparing teachers to deal with the real problems of the school environment. Educators of today are most concerned with developing techniques that get results. Applied behavior analysis is one such technique. It facilitates the development of teacher behaviors that are effective in changing student behaviors.

Teacher training is a subject that has generated extensive unrest among educators. Teachers returning to school for further study have repeatedly expressed dissatisfaction with the limited usefulness of their preparation. They come with the hope of finding ways to improve their teaching. However, they often fail to learn new techniques that are effective in the applied situation. They learn many things but much of the information is such that it does not help them to be more effective teachers. Hendrix, Coates, and Mand (1970) make this point most effectively.

We suggest to an eighteen year old student ... come to the university and become a physical education teacher we'll provide as much breadth and depth of information as is possible to offer. Your task upon
graduation; is to reduce or translate this information to fifth graders, eleventh grade students, girls, boys, perhaps the handicapped youngster, black, white, rich and poor.

Behavior analysis is one innovative technique that is rapidly gaining adherents. It will allow the teacher training program to focus upon the behaviors that the beginning teacher will need. The development of teaching competencies that have an empirical basis is desirable.

Although there exist no one set of behaviors that make for effective teaching (Morsh and Wilder, 1958), we do know that behaviors closely followed by reinforcing events will have an increased probability of occurrence. Consequently, positive reinforcement will increase the probability that a behavior will recur. Punishment will decrease the probability that a behavior will be repeated. A variety of events and situations can serve as reinforcers. Moreover, a variety of different personalities and approaches can be and have been successful. It is for this reason that the student need not adhere to an ideal model of teacher behavior because no model exists. His behavior must be judged ultimately on the basis of its effectiveness in producing change in student behavior. A behavioral focus will allow just this (Siedentop, 1972).

In many contemporary schools, the teacher is asked to write behavioral objectives. Equally as prevalent are teachers who experience great difficulty with this task. It is no small wonder. When an individual spends a lifetime focusing upon the process of teaching, it becomes difficult
to shift that focus to student behavior. If there are going to be behavioral objectives then maybe a behavioral focus is needed not only as a process of teaching students in elementary, junior or senior high but as a process of teaching teachers to teach.

This technique is not without critics, however. Brophy (1971) talks about the emphasis placed on extrinsic motivation. MacMillan and Forness (1970) express their disagreement with the explanation of learning given by behaviorists. They say that it is often oversimplified, and that the theory does not guide the teacher in selecting educational goals. Critics express, in addition, the opinion that the technique is often misused and that such individual attention can not occur in the classroom. Nevertheless, there is no reason why such a seemingly powerful and useful tool should not be tested to its fullest extent. It is necessary to educate people so that they will recognize and understand the limitations. Instruction in the proper use of the techniques is needed, their limitations recognized, and necessary modifications made.

A behavioral approach would appear to offer many advantages as a teaching technique. The extent to which it will be useful in different educational settings remains to be substantiated. Moreover, the extent to which individual types of interventions are effective under varying conditions warrants further exploration. It is within this framework that this study of the effects of directed information feedback on the frequency of teaching behaviors was undertaken.
The systematic application of operant psychology principles to effect behavior change in educational settings has been well documented. Investigators have modified study behavior (Hall, Lund, and Jackson, 1968; Mawhinney, Bostow, Blumenfeld, and Hopkins, 1971), attending and disruptive behavior (Ferritor, Buckholdt, Hamblin, and Smith, 1972), arithmetic response rate and attending behavior (Kirby and Shields, 1972), and writing skill (Salzbery, Wheeler, and Devar, and Hopkins, 1971). Recently researchers have turned their attention to making applications of operant principles to teacher training. This study was designed using the operant model to assess the effects of directed information feedback on teaching behaviors of physical education student teachers. The literature related to this topic is discussed in two major subdivisions: (1) Information Feedback In Learning and (2) Changing Teaching Behaviors.

INFORMATION FEEDBACK IN LEARNING

Many learning theorists feel that rewards used in animal learning may be as valuable in informing as in rewarding (Holding, 1965). This idea has originated as a result of
analyzing the sequence of events in successive approximation. Successive approximation is a behavioral technique used to shape the topography of a behavior not present in the organism's repertoire. Shaping consists of identifying a target behavior and reinforcing the response of the organism that most approximates it. Upon each occasion, the subject is required to make a closer approximation of the target behavior before the reinforcement is given. Eventually the subject's initial behavior has been shaped into a terminal topography. With each reinforcement the subject is given information about the correctness of his behavior. Consequently, the possibility that rewards function to inform has been considered. In fact, there is a good possibility that rewards and knowledge of results have a dual function (Holding, 1965).

Difficulty has been experienced in attempts to single out the difference between the reinforcing and informative aspects of knowledge of results. As a result, there is no conclusive proof that it functions as both. Annett (1969) points out that since there is no evidence of a drive reduction mechanism operating, knowledge of results is for the most part informative. Skinner (1969) supports this as he cautions against using reinforcement and feedback interchangeably. Rushall and Siedentop (1972, p. 205) make this lucid interpretation:

It is tempting to simply suggest that feedback is a secondary reinforcer. There is no doubt that feedback does act as a secondary reinforcer.... However, the two constructs—feedback and reinforcement—have developed
from entirely different theoretical frameworks, and it would be a mistake at this point in time to argue that they are synonyms.... Current levels of investigation allow one to say no more than that events normally described as feedback also possess reinforcing qualities and events normally described as reinforcers also possess informational qualities.

It has been demonstrated as early as 1917 that knowledge of results has a motivating quality. Arps (1917) did so using an ergograph. This instrument required subjects to lift a small weight with the finger. Subjects that were allowed to see a graph of their effort were able to maintain the work effort while not seeing the graph caused a drop off. Elwell and Grindley (1939) demonstrated that knowledge of results improved performance in a two-hand task requiring the subject to move a lighted dot to a bullseye. MacPherson et al. (1948) extended upon Elwell's study by employing such things as drawing a line of a certain length, exerting a given pressure, or pressing a key for a given time. Results similar to those of Elwell were found for all tasks.

In recent years, feedback has also been used in attempts to change behavior. However, the complexity of its different functions remains highly evident. Salzbery et al. (1971) found that while contingent access to play failed to improve accuracy in letter writing, grading and feedback paired with contingent access to play did. This would seem to indicate that reinforcement must also give some information if it is to function properly. Moreover it leads one to think
that it might be the informing aspect of feedback that makes it reinforcing. Smith (1967) supports this point of view. He feels that in the acquisition of a skill it is feedback information that makes the difference, not reinforcement or temporal contiguity of events.

Panyan (1970) and associates have recently demonstrated the power of feedback to improve performance. They increased the daily use of operant training methods by non-professional hall personnel in a state institution for mentally retarded children. The complexity of feedback is also demonstrated by Zahank (1970). He developed an instrument containing statements of classroom dialogue. Teacher solicitation, pupil response, and teacher verbal feedback went to make up each segment. The pupils were asked to identify with the script and then answer questions on the effect of the feedback. Students felt that the feedback most stimulating and informing contained simple praise confirmation. Again the dual function is demonstrated. It has been pointed out that knowledge of results that serves a cueing function can indirectly affect motivation but that reinforcement can not always serve a cueing function (Locke et al., 1968). If such is the case it becomes evident why the situation is confusing. Nevertheless, Ammons (1956) concluded, in addition to other things, that knowledge of performance affects both rate of learning and motivation. It appears that these results remain true today.

In spite of the complexity of the relationship between
the reinforcing, incentive, and informing aspects of feedback, one is justified in using it as an independent variable to change teacher behavior. As previously demonstrated, it most often works. Whether it works because it is rewarding, informing, or both makes little difference here.

CHANGING TEACHING BEHAVIORS

Several independent variables have been tested to determine the extent to which they affect teaching behavior. There are studies evaluating these variables independently and in combination with each other. Among the variables employed have been inservice programs, methods courses, modeling, various types of feedback, and interaction analysis. For the most part, the dependent variable has been the verbal behavior of the teacher. The sources of feedback, however, have been quite varied. Feedback from supervisors, fellow teachers, students, and self-analysis have been tested. As previously pointed out, it has only been within the past few years that the operant model has been used to effect changes in teaching behaviors. Prior to this time, however, the previously mentioned variables were tested through other approaches. This literature merits discussion in addition to a consideration of the literature employing a behavioral model.

Non-operant Attempts to Change Teaching Behaviors

Microteaching. Microteaching, minilesson, and
laboratory teaching are very similar techniques that require a student or intern to learn a set of specific teaching skills, and then make application of these skills in a five to ten minute lesson with four or five pupils. The lesson is videotaped and immediately following the lesson the student is given feedback. He then replans and reteaches the lesson (Borg, Kallenbach, and Friebel, 1969). Borg et al. (1969) have found that subjects that did not receive videotape feedback and did not practice in the microteaching format were not significantly different than subjects that did. Davis (1969) among others, however, has found that microteaching can change teaching behavior. Here a teaching laboratory very similar to the microteaching model was used. Behavior changes that occur during microteaching have been found to be non-persisting by Brashear (1970).

**Modeling.** This technique requires that the student or intern watch either a videotaped or live demonstration of the "model" way to employ a teaching technique. Orme (1966) tested the effects of modeling and feedback variables on the acquisition of a complex teaching strategy. Two types of modeling were considered, verbal and pictorial. The feedback conditions were self feedback (subjects evaluated their own performance during videotape playbacks of their lesson), prompting (experimenter viewed subject's tape with him pointing out cues to which specific behaviors should be attached), and confirmation (reinforcing desired responses while watching subject's tape with him). Results revealed that pictorial
modeling leads to greater gains. However, when verbal modeling is coupled with feedback, differences are obscured.

Rutherford (1971) analyzed the effects of a combined model and feedback tape, modeling only, and feedback only. His results indicate that the combined model plus feedback videotape and the model videotape are effective. This study combines with the modeling technique elements of an operant model. It is an example of some of the types of strategies that will be further employed.

Koran (1970) has found that modeling is as effective for teaching inquiry behavior as a problem solving technique. Modeling seems to get results and has been employed extensively in the past to change teaching behaviors.

Dissonance feedback. This is an area of study that has generated some interesting findings in relation to changing teaching behaviors. It operates on the premise that when feedback from a respected source is in disagreement with a person's concept of his own behavior, his behavior changes in the direction of the feedback. This area is also concerned with the effect of source of feedback.

Gage (1960) is a leader in this area. He has found that feedback from pupils to teachers is effective. He considers the reference group a valid means of changing teaching behavior. Tuckman (1969) has substantiated this finding. Students, however, have significantly different conceptions of an "ideal" teacher (Thomas, 1969). Therefore,
it would seem that the justification for using feedback from students is somewhat questioned. On the other hand it has been shown that teachers receiving feedback from supervisors change more in the opposite direction from the feedback. As a result of these findings, many feel that the "best" sources of feedback, students, are overlooked.

**Interaction analysis.** A large number of studies have been done using Flander's (1970) interaction analysis. Some researchers have used the observation technique to assess other behaviors and others have employed the total method. Jones (1969) utilized the Flander system to determine the effect of systematic feedback to first year intern teachers. The analysis showed that teachers receiving feedback interacted more with their students. The system has also been used as a behavior measure with dissonance feedback (Tuckman, 1969). Bondi (1968) has been successful in modifying student teacher verbal behavior. Doughterty (1971) has adapted the interaction analysis for use in physical education. These among others have all found Flander's Interaction Analysis to be of some success.

The Flander's Model and the operant approach appear to be entirely alike. There are, however, important differences between the two. Interaction analysis directs its attention to the effect of specific teacher behaviors on student behaviors while operant conditioning is concerned with evaluating the effectiveness of reinforcement techniques.
The differences are summed up in this way by Christoplos and Vallelutte (1969, p. 30):

The basic assumption in operant conditioning is the reverse of that in interaction analysis. In operant conditioning, the behavior of the subject is believed to be strengthened or weakened by the events that follow his behavior. If consequent events are controlled, behavior is controlled. In interaction analysis the behavior of the subject is believed to be elicited by antecedent events (somewhat like respondent conditioning). By controlling the teacher's antecedent behavior, the behavior of the subject is controlled.

The operant point of view is compatible with the idea that most behaviors in the human organism are emitted not elicited. This is the accepted view in the psychology of learning.

Operant Attempts to Change Teaching Behavior

Studies assessing the effectiveness of operant techniques in teacher education are not abundant. Among the few that are available is an attempt to increase teacher's use of behavior modification techniques and to determine if teachers spend a greater proportion of their time on teaching activities as a result of using the techniques. A form of feedback, behavioral consultations, was given on the behaviors, and results indicate that there was an increase in the use of the appropriate behaviors of all teachers. This, however, did not cause an increase in the amount of time spent in direct teaching activities (Pollack, 1971).

Holmberg, Thomson and Bear (1972) have demonstrated the ability of graph feedback, observer feedback, on-the-spot
feedback, and self counting to change the priming and reinforcement behaviors of Head Start teachers.

In another study (Thomson and Cooper, 1969) feedback was found to be an effective means of improving the teacher's reinforcing techniques. Feedback was given every ten minutes on the appropriateness of their reinforcing behavior, in addition a hearing-aid type receiver allowed immediate and continual feedback. Further findings indicate that one teacher generalized the lesson learned for a specific target student.

Graubard, Rosenberg, and Miller (1971) have also conducted a series of studies related to changing teaching behaviors. One of which is particularly interesting because children, ages twelve to fifteen, were taught to apply reinforcement theory to teaching behaviors. Such techniques as making eye contact with teachers, asking for extra help, making statements such as "Gee, it makes me feel good and work so much better when you praise me," and the "ah hah" reaction were used as positive reinforcers contingent upon teacher performance. Negative reinforcement was also employed. It consisted of breaking eye contact with the teacher and ignoring. Results indicate that the children could modify teacher behavior. Although most of the behaviors learned by the teachers extinguished after reinforcement was withdrawn, teachers retained a less punitive manner.

Graubard, Rosenberg, and Miller (1971) further point out that, like most people, teachers are backsliders and need a high level of reinforcement to maintain new behaviors. Results
such as these should draw attention to the fact that teaching behaviors are highly related to pupil reactions. As is well known pupils do not always reinforce good teaching behaviors, particularly in physical education. It is not difficult, under these circumstances, to see how a once zealous teacher of physical education develops the behavior of "rolling the ball out." Since experienced teachers have difficulty remaining cognizant of "reverse shaping" (Krumboltz, 1971), teachers in training surely need a high level of feedback from sources other than pupils if they are to develop good teaching behaviors.

In a second study Graubard et al. (1971) demonstrated the ability of a supervisor to change teacher tolerance for noise. They took baseline readings on noise level and then praised each teacher generally for competence and specifically for tolerance of noise and freedom of expression allowed to the children. The teachers were then informed that their classrooms were to be used as a model to provide other teachers the opportunity to see freedom and self expression in a good teacher's class. Decibel recordings were later taken and results indicate that noise level tolerance increased, in addition to freedom in the classroom.

Saudargas (1972) has found that videotape feedback and establishing criterion rates effectively increased or decreased teacher rates of praise. Moreover, he indicates that there was little or no difference between behavior exhibited while videotaping and observing. An interesting aspect of
this study was the author's observation of the behaviors coming under control of reinforcing stimuli other than the videotape feedback. Until this time most studies have reported a decrease or loss of behaviors once reinforcement has been removed.

There have been other successful attempts to change teaching behaviors (Cossairt, Hall, and Hopkins, 1972; Thomas, Beckes, and Armstrong, 1968). Studies exist, however, to show that difficulties have been encountered. One such study was conducted by Rule (1972). She modified the behavior of nine subjects using a multiple baseline design. Three procedures—instruction and experimenter feedback, videotape scoring of one's own behavior, and direct intervention—were used to give feedback on praise, on-task contacts, and off-task contacts. Direct intervention required that the experimenter temporarily replace the subject whose teaching behaviors fell below criterion. This technique produced the most effective behavior changes, smaller changes were exhibited by the video scoring. The difficulty appeared in the third area where there was no predictable change. The author points out, however, that subjects were not interested in changing their behavior. In fact, some were antagonistic to the direction of the suggested changes. The direct intervention appears to be a form of punishment. It is an embarrassing experience for another teacher to take over in the middle of class. Many teachers feel that this causes a "loss of face" with the pupils. This technique caused an immediate behavior change,
but all other negative factors associated with punishment should be appraised before considering long term use of this technique.

**SUMMARY**

The studies reviewed in the above two categories tend to illustrate that although feedback is a good technique for changing teacher behavior, theorists disagree as to whether it works because it is reinforcing or informing.

Attempts to change teaching behaviors were classified as either operant or non-operant. Non-operant attempts include such techniques as microteaching, modeling, dissonance feedback, and interaction analysis. Operant attempts include several studies designed to change reinforcing and attending behaviors of teachers. These techniques differ from the non-operant in that the emphasis is on the events that follow the students behavior as opposed to antecedent events.

It is quite evident throughout the literature that studies treating the effect of feedback on teaching behaviors in physical education are quite sparse. Outside Rushall's (1969) study evaluating the effect of various reinforcers used as motivators for swimming, Daughterty's (1971) adaptation of interaction analysis, and Schwartz's (1972) behavioral effort with Gentile's model, research of the behavioral nature is non-existent.

Descriptive-analytic research (Anderson, 1971; Fishman, 1971) on teaching is a behavioral area with which physical
educators have concerned themselves. Its proponents feel that by producing "...an accurate record of significant real world events" (Fishman and Anderson, 1971, p. 9) data can be obtained to intelligently monitor and guide the process of change. No strategy for change is offered, consequently, at the present time its contribution to the development of good teachers is limited.

Finally, the literature indicates that there are many techniques available to change teacher behavior. This, however, does not lessen the importance of applying one of the most promising techniques of building positive teaching behaviors to physical education.
CHAPTER III

METHOD

This study examined differences between rates of behavior during baseline and intervention periods. Intervention consisted of directed information feedback. The design utilized was a multiple baseline (Hall, 1971; Hall, Cristler, Cranston, and Tucker, 1970; Bear, Wolf, and Risley, 1968). Subjects and setting, observations and behaviors, experimental conditions, and analysis and design are the topics considered in this chapter.

SUBJECTS AND SETTING

Subjects were four students of The Ohio State University enrolled in their student teaching field experience in Columbus public primary schools during the second quarter of the 1972-73 school year. There were two males and two females whose ages ranged from twenty to twenty-four. Subject three had had previous student teaching experiences on the secondary level. Subject two had had some experience with the elementary age group in camp and aquatic situations. Subjects three and four were inexperienced. All subjects were physical education majors assigned to Northtowne Elementary School. Three of the student teachers had previously been exposed to principles
of applied behavior analysis in a physical education course. The fourth student took this course during the same quarter that the study was conducted. None of the students had any actual experience in applying the principles of applied behavior analysis.

Northtowne Elementary is a five year old, relatively small school of thirteen teachers. It is situated in the northeast section of Columbus, approximately eight miles from the university campus. Three hundred and fifty-four students from both single and multi-family dwellings attend the school. The parents of the students are most accurately described as middle class socio-economically. Students leaving this school feed into Woodward Park Junior High and on to Northland High School.

The gymnasium of Northtowne is slightly smaller than basketball regulation size. The tile floor is marked for basketball. In addition there is a large circle in the center of the floor and four bases in the east half of the court. The south wall has numbered targets on it. The north side contains a stage as the facility also serves as an auditorium. The east and west walls support the basketball goals. A single mat covers the wall immediately below each goal.

**OBSERVATIONS AND BEHAVIORS**

Teaching behaviors are those behaviors emitted by teachers while in the process of instructing. Behaviors were recorded during a thirty-five minute period of regular
physical education. The observer located himself at a point in the gymnasium where the behaviors of both the teacher and the students could be observed. This point was as inconspicuous as possible. The side of the gymnasium with the stage was most often used. The observer did event recording for five minutes using a recording sheet (Appendix A). At the end of the five minutes the observer rested for a period of two minutes and then repeated the operation three additional times. The primary focus was upon the teacher but in some categories it was necessary for the observer to see the student's behavior.

During observations the observer made a judgment on the bases of the behavior definitions as to whether a specific target behavior occurred. In order to assure that it was indeed the behavior and not the observer's recording of the behavior which changed, at least one reliability check was made during baseline and one during intervention, a total of six for each subject. During reliability checks the experimenter and another observer situated themselves at points distant enough to assure independency of observations and recorded for a five minute interval. Reliability was calculated by comparing agreements and disagreements.

A teacher behavior scale was developed. The scale was partially based on the Behavior Observation Schedule for Pupils and Teachers (Breyer and Calchera, 1971) and Pollack's (1971) behavior categories. The eight behavior categories are defined as follows.

Input teaching acts. This includes all teacher behaviors
that provide a discriminative stimulus function directly related to learning. This includes questioning (teacher asks a question), explaining (teacher elaborates or summarizes previous material or clarifies a problem for better understanding), informing (answering a question), and providing guidance (including verbal guidance, demonstration, forced-responding, and physical restriction, Rushall and Siedentop, 1972).

Managerial. Teacher behaviors that provide a discriminative stimulus function indirectly related to learning. This includes establishing and maintaining order, directing the class to change activities, and giving directions for equipment, etc. Also includes role taking, marking down performance scores, and other forms of record keeping directly related to current behavior of students. These behaviors are primarily teacher initiated (discriminative function) and are not teacher reactions to student behavior (consequential function).

Monitoring. The act of watching the class as a whole, a subset of the class, or an individual student. No verbal or non-verbal interaction occurs. One tally should be scored for each uninterrupted five second period that the teacher engages in this behavior.

No activity. Teacher behaviors in which visual contact is broken and no verbal or non-verbal interaction occurs.
Includes looking out the window, being out of the room, talking to another teacher, and record keeping not directly related to immediate behavior of students.

**Skill attempt positive IF.** All positive verbal and non-verbal teacher reactions to an appropriate skill attempt by a student. Includes teacher feedback for student answers about skills. Examples include a teacher's reinforcing behaviors (see Appendix B) such as a pat on the back or expressions like "beautiful job" and "excellent" following a student's efforts to perform a skill.

**Skill attempt negative IF.** All negative verbal and non-verbal teacher reactions to an appropriate skill attempt by a student, including corrective feedback. This does not necessarily imply a punishing or menacing tone. An example is a teacher's reaction such as "No, that is not it" or "You can do better than that" following a student's efforts to execute a skill. Corrective feedback refers to statements such as "Your hands were too high" or "Your knees were bent."

**Positive reaction to on-task behavior.** All positive verbal and non-verbal teacher reactions to student behaviors, other than skill attempts, that are essential to the orderly conduct of the class as defined by the teacher. An example would be a statement such as "Thank you for your attention" following a student's attentive behavior.

**Negative reaction to off-task behavior.** All negative
verbal and non-verbal teacher reactions to student behaviors that interfere, as defined by the teacher, with orderly conduct of class. An example is a statement such as "Stay in line" following a student's being out of line. Teacher silence following students' disruptive behavior is a non-verbal example.

EXPERIMENTAL CONDITIONS

In an effort to modify the subject's behaviors directed information feedback was given by the experimenter as soon after each session as was feasible. Most often this was immediately following the lesson but in some instances there were two classes in succession and time did not permit. Intervention was instituted starting with subject one. Direct information feedback consisted of instructions, graphic feedback, cueing and reinforcement, and goal setting.

Instructions

1. Subjects were given a copy of the rating sheet with definitions of parameters of behavior categories. Further explanation was given for each behavior category.

2. Subjects were informed that the frequencies of behaviors by category would be given each session. In addition, they were told that special attention would be given to increase categories five and seven. Specific examples of how this could be done and the difference between categories five and six, and seven and eight were also given.
3. Subjects were further instructed to state gymnasium rules clearly (put up a poster or hand out sheet). At the beginning focus on positive behavior (rule following) and ignore rule breaking. They were also told to ignore tattling as much as possible.

4. The use of modeling was recommended. That is, when compliments were given to children for following rules the subjects were asked to make sure that the other students see the interchange. Examples were to pat the student on the back, shake his hand, or give some verbal compliment. Examples of such statements were given. (Appendix B) Modeling was also recommended for proper skill execution.

5. Subjects were also instructed to reduce situations where misbehavior can occur.

6. Time out as a punishment was suggested. Subjects were reminded to make their punishment stick. The stage area was suggested.

7. The experimenter requested that subjects make an attempt to build a positive skill reaction strategy. That is try to focus on things students do well rather than always correcting errors.

8. Finally, the experimenter suggested that students be taught how to get organized. For example, they should be taught what it means to get in four lines of seven, then allowed to try it.
Graphic Feedback

This consisted of the subject looking at his behavior frequencies for each category and making comparisons with previous sessions.

Cueing and Reinforcement

Specific examples of the use of good techniques were pointed out and subjects were complimented for their efforts. In addition, specific instances that indicate when the techniques could be employed were identified.

Goal Setting

Goal setting was employed for categories five and seven. The experimenter would inform the subject of a specific number of behaviors to emit during a given session. At present there is no evidence of a specific number of behaviors that good teachers emit, consequently, the experimenter arbitrarily gave the subject a number that was realistically in reach as demonstrated by previous sessions.

ANALYSIS AND DESIGN

The office of the superintendent of the Columbus Public Schools afforded the opportunity for this study to be conducted in an applied setting (Appendix C). A multiple baseline design (Hall, 1971; Hall, Cristler, Cranston, and Tucker, 1970; Bear, Wolf, and Risley, 1968) was employed in data analysis. The data were recorded as discrete events and converted to number of events per minute (rate) for purposes of analysis.
Figure 1 illustrates the plot of a multiple baseline for a single behavior across four subjects. Eight teaching behaviors in four subjects were observed under two conditions. These, also illustrated in Figure 1, were baseline and directed information feedback (Intervention).

![Graph showing baseline and intervention for four subjects](image)

**Figure 1**

**Example of a Multiple Baseline**

Under the baseline condition no feedback was given to any of subjects on any of the behaviors. The behaviors were recorded as they occurred at their operant level. Subjects did not know the specific nature of the study at this time. They were told that they would be involved in a study testing two observation techniques (see instructions Appendix D). The baseline was considered established (1)
once there was no trend evident or (2) after five days and the behavior was moving in the direction opposite to the desired results.

Once the baseline was established, the second condition, directed information feedback, was instituted for each subject in turn. Subject one received feedback after the 5th session while all other subjects continued under baseline conditions. Subjects in baseline conditions were not allowed to observe those for whom intervention had already started. Subjects receiving information feedback were asked not to discuss this information with the other subjects (see instructions Appendix D). Subject two received feedback after the 8th session, subject three after the 11th session, and subject four after the 13th session.

Pilot observation sessions for the purpose of pre-training observer skills were made during the last part of the first quarter of the 1972-73 school year. Prior to the practice sessions each observer was given a set of behavior definitions. They observed independently following the directions for observation previously discussed. These training sessions resulted in inter-observer agreement of over 80%.

Once the behavior categories were set and the study was under way, periodic reliability checks were made. A total of six checks were made for each individual.

The data collected consisted of tallies of events occurring in five minute intervals. Frequencies were plotted for each behavior in each subject. For purposes of analysis
the data were converted to rate. Mean rate during baseline, mean rate during intervention, amount or rate increase or decrease, and the percent of increase or decrease were calculated for each subject.

Reliability of observations for each subject was analyzed by considering the agreement of independent observers on the total number of events observed and accuracy of classifying events. In addition, category reliability by subject and category reliability for all subjects were determined.

Bear et al. (1968) suggests that applied and non-applied research do not differ between that which "discovers" and that which "applies." Both are attempting to find out what controls behavior. The differences are that applied research is likely to look at behaviors and variables that are of interest to society, whereas non-applied research will look at any behavior or any variable or interest to the researcher. Behaviors and variables that occur in a social setting do not usually allow themselves to be manipulated repeatedly as do those that lend themselves to study in laboratories.

The factors of reliability, causality, significance, and generality are of utmost importance in any research study. The behavior scientist takes the following points of view on these topics. Reliability is established in very much the same way that it is using parametric analysis. Repeated observations with independent observers allows the establishment of an index of inter-observer agreement as previously
discussed.

The multiple baseline design is designed for the purpose of showing causality. Repeated modification of behaviors of the same class in different people or behaviors of different classes in the same person does show causation. For example, the same behavior of two different individuals is measured at the same time. Intervention with the experimental variable is implemented on the behavior of one subject. Change in the level of behavior is compared with the continuing baseline measure of the second subject. If the level of behavior in the second subject remains relatively constant, it is assumed that the experimental procedure was responsible for the change. When the same experimental variable is implemented in the second subject, causality is evident if the behavior changes in the same direction as for subject one. Moreover, evidence for causality increases as this is repeated.

Significance in behavior modification refers to a comparison between the accomplished behavior change and the level necessary for social usefulness (Risley, 1969). Large changes in a few or even one subject can be significant when this criterion is used. Social usefulness is likely to be determined by individuals that deal directly with the behavior. Baer et al. (1968, p. 96) makes this point very clearly when he says:
In evaluating whether a given application has produced enough of a behavioral change to deserve the label (significant), a pertinent question can be, how much did that behavior need to be changed? Obviously, that is not a scientific question, but a practical one. Its answer is likely to be supplied by people who must deal with the behavior.

To illustrate, teachers who say a student that has learned to remain attentive for five minutes is doing no more to create an environment conducive to learning than before, but the student that learns to remain attentive ten minutes is doing a great deal to create a conducive environment are expressing significance level. In such a case the opinions of the teachers may be more important than those of anyone else or any statistic.

Generality should not be considered as a part of significance. It is important of course but behavior scientists are concerned with more than the ability of an experimental variable to generalize to the behavior of others. In behavioral research, one works first with a few subjects intensely in order to discover procedures which produce significant changes. Then the procedures are applied to other subjects. In this way the range of variations of the procedure required to produce significant changes in all subjects can be determined.

Further, individual behavior is said to have generality if:

...it proves durable over time, if it appears in a wide variety of possible environments, or if it spreads to a wide variety of related behaviors (Baer, 1968).
Thus, the problem of generality is one of the reasons that this study was necessary. It was upon these bases that this procedure and analysis was used.
CHAPTER IV

ANALYSIS AND DISCUSSION OF THE DATA

The basic datum of this study was teacher behavior. Eight categories of teacher behavior were defined and event recording was used as the basic data recording system. Behavior events tallied during four five-minute intervals of event recording per teaching session were converted to rates per minute. Difference between rates of behavior during baseline and intervention periods were plotted. The data were further analyzed by considering the behavior profile of each subject, rate increase or decrease, and percentages of increase or decrease by category for each subject.

RELIABILITY

As a check on the experimenter's tally, an independent observer tallied behaviors during a five minute interval of six of each subject's observation sessions. Reliability checks were made frequently during early sessions and gradually became less frequent as the observations progressed. Reliability was calculated by two different methods. The first method gives the percent of agreement of the total number of events observed per session. The observations of the independent observers during each session were summed across all categories.
and the larger total divided into the smaller (Hall, 1971). The second method yields the reliability of classifying events during each session. It was determined by computing the number of agreements and disagreements in each category and inserting the sums across all categories into the following formula (Hall, 1971, p. 18).

\[
\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100
\]

Table 1 shows the percent agreement of the total number of events recorded between experimenter and independent observer for each subject during the six reliability checks.

### Table 1
Reliability of Total Number of Events Observed for Each Subject

<table>
<thead>
<tr>
<th>Subject</th>
<th>Reliability Checks</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>S_1</td>
<td>84</td>
<td>86</td>
<td>82</td>
<td>100</td>
<td>94</td>
<td>86</td>
<td>88</td>
</tr>
<tr>
<td>S_2</td>
<td>95</td>
<td>94</td>
<td>90</td>
<td>89</td>
<td>89</td>
<td>90</td>
<td>91</td>
</tr>
<tr>
<td>S_3</td>
<td>82</td>
<td>97</td>
<td>96</td>
<td>92</td>
<td>93</td>
<td>90</td>
<td>91</td>
</tr>
<tr>
<td>S_4</td>
<td>95</td>
<td>91</td>
<td>99</td>
<td>94</td>
<td>89</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>Mean</td>
<td>89</td>
<td>92</td>
<td>91</td>
<td>93</td>
<td>91</td>
<td>91</td>
<td>91</td>
</tr>
</tbody>
</table>

Agreement was well over the predetermined eighty percent for each reliability session of each subject. The average agreements for each subject across all sessions were close to 90%.

Table 2 presents the percent of agreement in classify-
ing events for each subject. Essentially, these figures represent the reliability of the accuracy of the observer in classifying discrete events in the eight category scale. Though the mean reliability for each subject is higher for the previous type, these mean percent agreements are also well over the predetermined 80%. The task of placing the teaching behaviors into the proper category was more difficult than merely selecting teaching behaviors of any category.

Table 2
Reliability of Classifying Events for Each Subject

<table>
<thead>
<tr>
<th>Subject</th>
<th>Reliability Checks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>$S_1$</td>
<td>84</td>
</tr>
<tr>
<td>$S_2$</td>
<td>86</td>
</tr>
<tr>
<td>$S_3$</td>
<td>82</td>
</tr>
<tr>
<td>$S_4$</td>
<td>80</td>
</tr>
<tr>
<td>Mean</td>
<td>83</td>
</tr>
</tbody>
</table>

Originally, it was suspected that the two types of reliability would be quite similar. However, this did not prove to be the case. Though reliability was identical for some checks, a comparison of Tables 1 and 2 indicates, particularly in subject three ($S_3$) and subject four ($S_4$), that the two problems are not necessarily related. The difference in the mean reliability of the total number of
events observed and mean reliability of classifying events is only four points in $S_3$ while there is an eight point difference in $S_4$. Such differences do not support the original suspicion.

Percent of agreement between independent observers was calculated for each category. The larger total number of events observed in a given category by one observer was divided into the smaller total number of events tallied for the same category by the second observer. These percentages are found in Table 3.

Table 3

<table>
<thead>
<tr>
<th>Category Reliability for Each Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Categories</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>$S_1$</td>
</tr>
<tr>
<td>$S_2$</td>
</tr>
<tr>
<td>$S_3$</td>
</tr>
<tr>
<td>$S_4$</td>
</tr>
<tr>
<td>Mean</td>
</tr>
</tbody>
</table>

With the exception of category four (no activity) in subject one ($S_1$) and category two (managerial) in subject two ($S_2$), all categories for each subject were over eighty percent. The difficulty experienced by the independent observer and the experimenter in recording the no activity category was not
readily apparent. This behavior rarely occurred; consequently, a small amount of disagreement would drastically lower the percentage. The difficulty with the managerial category was the result of a deficiency in the definition. It only shows in subject two because of her individual teaching style. She emitted several behaviors while in the process of changing from one activity to another. This caused some confusion as to whether these behaviors should be tallied as one or several.

Differences in individual teaching style are again made apparent in category reliabilities of S₃ and S₄. S₃ averaged 82 percent agreement for category eight and S₄ averaged 83 percent for category six. The individual nature of S₃'s off-task negative reactions and S₄'s negative feedback to skill attempts made it more difficult to classify these events.

Mean reliability for each category is eighty percent or better despite the difficulty experienced in the above categories. Moreover, all but two categories, two and six, are ninety percent or better.

BEHAVIOR PROFILES OF SUBJECTS

The behavior rates of the student teachers presents a profile of teaching behaviors. It illustrates the way in which each utilized his time. The plot of behavior rates reveals the individual style during baseline and after intervention. Following are the profiles of each subject.
Subject 1.  $S_1$ started her student teaching experience unsure and quite apprehensive about her ability to relate to students in the elementary school age group. The behaviors that she emitted during the initial stage of the experience support this statement. Figure 2 presents the plot of each of the eight categories for subject one. Operant level behaviors were primarily inputting, managerial, and monitoring. Some time was spent giving corrective feedback and reacting to student off-task behaviors. Baseline mean rates show, however, that inputting, 2.5 per minute, monitoring, 1.2 per minute consumed a great deal of time while other behaviors were emitted at very low rates. This is illustrated by the fact that skill attempt negative feedbacks averaged .33 per minute and off-task negative reactions were .30 per minute. Positive reactions to on-task behavior were non-existent and positive feedbacks to skill attempts .25 per minute. Both positive and negative feedback are important teaching behaviors. This low level of total feedback only allows an average of eight feedbacks per session, all negative.

After intervention with directed information feedback the subject started to balance the proportion of time spent in the various teaching behaviors. She started to emit more behaviors that directly affect learning. Skill attempt positive feedbacks increased substantially. On-task positive reactions increased while off-task negative reactions remained about the same. Time for these behaviors was made available as inputting, monitoring, and managerial behaviors decreased.
Fig. 2.—Profile of Behavior Rates for Subject 1
Subject 2. S2 had had experience with the elementary school age group. Consequently, she immediately demonstrated the ability to emit many of the behaviors that directly affect learning. However, Figure 3 illustrates that gains were still made after intervention. Average baseline input, 2.95 per minute, was higher than S1's. Monitoring was extremely low, .55 per minute. S2 gave negative feedback, .37 per minute, however, positive feedbacks to skill attempts were greater, .43 per minute. Off-task negative reactions were .60 per minute and on-task positive reactions were emitted at a low rate of .10 per minute.

After intervention input decreased, along with managerial and off-task negative reactions. Both on-task positive and skill attempt positive increased. Skill attempt negative feedback also showed an increased rate.

Subject 3. S3 was also unable to become involved with the students initially. Figure 4 illustrates the baseline levels and the directions of change. Initially his time was spent inputting, managing, and monitoring. He emitted .96 negative reaction to off-task behavior per minute. Skill attempt positive feedbacks were only .33 per minute and on-task positive reactions were non-existent.

After intervention S3 was able to increase instances of positive feedback to skill attempts in addition to on-task positive reactions. He made a slight decrease in negative feedbacks to skill attempts and reduced off-task negative reactions to .21 per minute. Input and managerial behaviors
Fig. 3—Profile of Behavior Rates for Subject 2
Fig. 4—Profile of Behavior Rates for Subject 3
also decreased.

Subject 4. S₄ was more involved with the students initially and emitted a large number of behaviors. He was active most of the time. Figure 5 illustrates the high mean rate of behavior under baseline conditions and changes after intervention. Though input was 2.93 and managerial was .70 per minute, S₄ still emitted some of the behaviors that directly affect learning. Monitoring was only .46 per minute. S₄ emitted slightly more than one off-task negative reaction per minute and gave no positive reactions to on-task behaviors. He did manage to emit a few, .32 per minute, positive feedbacks to skill attempts. There were, however, more negative skill attempt feedbacks than positive.

After intervention S₄ was able to increase on-task positive reactions. He decreased off-task negative reactions to .23 per minute. Skill attempt positive reactions were increased to more than one and one-half per minute while negative reactions to skill attempts decreased to .20 per minute. In addition, input, managerial, and monitoring all decreased.

RATE AND PERCENTAGE CHANGE BY CATEGORY

Mean baseline rate, mean intervention rate, rate increase or decrease and percent increase or decrease were calculated by category for each subject. These are presented and discussed by category in the following paragraphs.
Fig. 5—Profile of Behavior Rates for Subject 4
Input

Little is known about this category except that some input is necessary. Consequently, the experimenter only used instructions and graphic feedback as the directed information feedback. Emphasis was to focus on other categories to see if a decrease in input would occur.

Table 4 shows a decrease in mean input behavior rates for all subjects. S1's mean baseline rate was 2.57 events per minute. During intervention the mean rate was only 1.65. This constitutes a decrease of almost one event per minute, .92. Subject two had a mean input rate decrease of .96 event per minute, while subject three exhibited a rate decrease of .56 event per minute and subject four showed a .65 event per minute decrease.

Table 4
Rate of Input and Percentage Change for Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>2.57</td>
<td>1.65</td>
<td>-.92</td>
</tr>
<tr>
<td>S2</td>
<td>2.95</td>
<td>1.99</td>
<td>-.96</td>
</tr>
<tr>
<td>S3</td>
<td>2.17</td>
<td>1.61</td>
<td>-.56</td>
</tr>
<tr>
<td>S4</td>
<td>2.93</td>
<td>2.28</td>
<td>-.65</td>
</tr>
</tbody>
</table>

- Percentage or rate decrease.

The percentage changes are not extremely large. More-
over, the multiple baseline in Figure 6 offers little evidence that it was the graphic feedback that caused the change. The loss is gradual from the first session, especially in subjects one and three.

**Managerial**

Managerial behaviors are necessary teaching acts. They directly affect the efficiency of the learning environment. Obviously the fewer of these the teacher emits the more time there will be for more important instructional behaviors. As a result of this fact initial instructions directed the subjects to teach self-management. Graphic feedback was given for this category after each session in addition to cues and reinforcement.

Table 5 illustrates that managerial rates decreased. \( S_2 \) and \( S_4 \) produced the largest rate decreases. These were .39 and .34 event per minute respectively. Subjects one and three had smaller rate decreases of .10 and .25 event per minute. The rate decrease for subject one yields only about a 13 percent drop. The percentage change for \( S_2 \), \( S_3 \), and \( S_4 \) are somewhat larger.
Figure 6

Rate of Input Teaching Behaviors for Four Student Teachers
Table 5
Rate of Managerial and Percentage Change
for Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Intervention</td>
<td></td>
</tr>
<tr>
<td>S₁</td>
<td>.73</td>
<td>.63</td>
<td>-.10</td>
</tr>
<tr>
<td>S₂</td>
<td>.94</td>
<td>.55</td>
<td>-.39</td>
</tr>
<tr>
<td>S₃</td>
<td>.73</td>
<td>.48</td>
<td>-.25</td>
</tr>
<tr>
<td>S₄</td>
<td>.70</td>
<td>.36</td>
<td>-.34</td>
</tr>
</tbody>
</table>

- Percentage or rate decrease.

The multiple baseline in Figure 7 gives little or no evidence that it was the intervention that caused the changes. Though the control baselines for subject one remained consistently high upon intervention, control baselines for all other subjects had started to decrease. Moreover, there were no obvious decreases in any of the subjects after intervention. Contrary to the expected, subject one's rate increased. S₄'s behavior was obviously influenced by variables other than the information feedback because the rate declined and stabilized after the third session. Student teachers could readily see when students were not getting organized. As a result intrinsic feedback was probably more influential than the directed information feedback.

There was a sharp dip immediately following intervention with S₄ but the rate increased again on the next
Figure 7

Rate of Managerial Behaviors for Four Student Teachers
session and remained near the baseline rate until the last three sessions. Managerial behaviors for all subjects were decreasing when feedback terminated.

**Monitoring**

It is necessary for a physical education teacher to closely watch skill attempts so that the proper feedback and guidance can be given to the student. Excessive monitoring, however, takes valuable time that could be spent emitting behaviors that directly influence learning. Subjects were instructed to keep monitoring to a minimum.

Table 6 shows the effect of information feedback on monitoring. $S_1$ exhibited an average rate decrease of .66 events per minute. Subject two's rate decrease was only .12 events per minute. She, however, had a relatively low baseline rate. Subject three managed a rate decrease of .66 events per minute while subject four cut his rate by .23 events per minute.

The multiple baseline in Figure 8 shows that information feedback caused the rate decrease.
Rate of Monitoring Behaviors for Four Student Teachers

Figure 8
Table 6  
Rate of Monitoring and Percentage Change for Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Intervention</td>
<td></td>
</tr>
<tr>
<td>S₁</td>
<td>1.20</td>
<td>.54</td>
<td>-.66</td>
</tr>
<tr>
<td>S₂</td>
<td>.55</td>
<td>.43</td>
<td>-.12</td>
</tr>
<tr>
<td>S₃</td>
<td>.75</td>
<td>.40</td>
<td>-.35</td>
</tr>
<tr>
<td>S₄</td>
<td>.46</td>
<td>.22</td>
<td>-.24</td>
</tr>
</tbody>
</table>

- Percentage or rate decrease.

Instructions and graphic feedback were the types of feedback. When they were introduced after session five in subject one, baseline rates in S₂ and S₄ remained high. On the first session after intervention S₁'s monitoring behavior decreased sharply and remained at a relatively stable lower rate than that during baseline. Likewise, when intervention occurred with subject two, S₄'s baseline rate remained high. Immediately following intervention subject two made a sharp decrease in monitoring rate. It, too, remained lower than baseline.

Subject three's monitoring rate had started to decrease prior to intervention with subject one. Consequently, it is assumed that factors other than the feedback caused the change. It is possible that he received some premature feedback either from the cooperating teacher or the experimenter. His baseline rate in this category was very high and it was
difficult to refrain from saying anything at all in this type of setting.

**No Activity**

This class of behaviors contributes nothing to the learning situation and, as seen in Figure 9 occurred infrequently. The student teachers did watch each other teach and during this time subjects one and two started to emit these behaviors. Immediately following intervention these no longer occurred. Table 7 shows the low baseline rate that did occur and the percentage decreases.

**Table 7**

*Rate of No Activity and Percentage Change for Four Student Teachers*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_1$</td>
<td>.09</td>
<td>-.09</td>
<td>-100</td>
</tr>
<tr>
<td>$S_2$</td>
<td>.05</td>
<td>-.05</td>
<td>-100</td>
</tr>
<tr>
<td>$S_3$</td>
<td>.009</td>
<td>-.009</td>
<td>-100</td>
</tr>
<tr>
<td>$S_4$</td>
<td>.007</td>
<td>-.007</td>
<td>-100</td>
</tr>
</tbody>
</table>

- Percentage or rate decrease.

**Skill Attempt Positive IF**

There is strong evidence to suggest that positive information feedback often serves as positive reinforcement (Rushall and Siedentop, 1972) and positive reinforcement has demonstrated the ability to increase the probability of
Figure 9
Rate of No Activity Behaviors for Four Student Teachers
occurrence of a behavior (Skinner, 1953; Homme, 1970). Consequently, positive information feedback is considered one of the most important teaching behaviors. Subjects were informed that this was one of the major categories and that an increase in the behavior rate was desired.

Feedback consisted of instructions, graphic feedback, cueing and reinforcement, and goal setting. Table 8 shows that all subjects demonstrated rate increases for this category.

Table 8
Rate of Skill Attempt Positive Feedback and Percentage Change in Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Intervention</td>
<td></td>
</tr>
<tr>
<td>S₁</td>
<td>.25</td>
<td>1.02</td>
<td>+.77</td>
</tr>
<tr>
<td>S₂</td>
<td>.43</td>
<td>.91</td>
<td>+.48</td>
</tr>
<tr>
<td>S₃</td>
<td>.33</td>
<td>1.68</td>
<td>+1.35</td>
</tr>
<tr>
<td>S₄</td>
<td>.32</td>
<td>1.56</td>
<td>+1.24</td>
</tr>
</tbody>
</table>

+ Rate or percentage increase.

Subject one had a mean rate increase from .25 during baseline to 1.02 events per minute during intervention. This represents a .77 event per minute rate increase. The second subject made a mean rate increase of .48. The jump represents a 111 percent increase. Subject three's 406 percent increase was largest. He jumped from .22 to 1.68 events per minute for a 1.35 events per minute increase. S₄ similarly had a high
percentage increase. He increased his rate from .32 to 1.56 events per minute for a 1.24 events per minute increase. His 387 percent increase was second highest in this category.

These increases, .77, .48, 1.35, and 1.24 feedbacks per minute, may appear to be relatively small; but when it is considered that the smallest represents an increase of 17 feedback per 35 minute session, they appear quite large. There was a 47 feedbacks per 35 minute session increase for the largest.

Figure 10 shows the multiple baseline for this category. It gives strong support to feedback intervention causation. Upon intervention with $S_1$, the increased rate started and all other subjects still under baseline conditions maintained their low rates. Likewise, operant levels remained constant for $S_1$ and $S_4$ when intervention occurred for subject two. Intervention initiated sharp increases in all subjects.

Skill Attempt Negative IF

Subjects were informed in the first feedback session that negative information feedback, especially in the form of corrective information does play an important role in learning. Adams (1971) talks about its importance in his Closed-loop Theory. Nonetheless, subjects were told that the desired direction for this category was down, as it is better to be primarily positive. Rates and percentages for this category are found in Table 9.

Subjects one and two exhibited small rate increases
Figure 10
Rate of Skill Attempt Positive IF for Four Student Teachers
of .03 and .07 events per minute respectively. \( S_3 \) and \( S_4 \) exhibited decreases. The decrease in subject three was a relatively small .11 event per minute rate drop. This is a 63 percent decrease. Changes in subjects one, two, and three appear to be relatively small. The change in subject four, however, is somewhat larger. Figure 11 shows the subject's baseline to be constantly increasing until just before intervention. On session 11 baseline dropped sharply. Intervention occurred after session 12 where another sharp drop took place. The behavior then stabilized at this lower level. Other than this trend in subject four the multiple baseline gives no support to causation.

Table 9
Rate of Skill Attempt Negative Feedback and Percentage Change in Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_1 )</td>
<td>.33 Baseline .36 Intervention</td>
<td>+.03</td>
<td>+ 9</td>
</tr>
<tr>
<td>( S_2 )</td>
<td>.37 Baseline .44 Intervention</td>
<td>+.07</td>
<td>+18.9</td>
</tr>
<tr>
<td>( S_3 )</td>
<td>.46 Baseline .35 Intervention</td>
<td>-.11</td>
<td>-23.9</td>
</tr>
<tr>
<td>( S_4 )</td>
<td>.55 Baseline .20 Intervention</td>
<td>-.35</td>
<td>-63.2</td>
</tr>
</tbody>
</table>

+ Rate or percentage increase.
- Rate or percentage decrease.

On-task Positive Reaction

Just as contingent positive reinforcement is considered
Figure 11
Rate of Skill Attempt Negative IF for Four Student Teachers
one of the best means of increasing the probability of correct skill occurrence. It is considered the best means of increasing and maintaining appropriate behavior in the gymnasium. Subjects were instructed to increase their rates of positive reinforcement for appropriate gymnasium behavior. In addition to initial instructions all subjects were given graphic feedback, cueing and reinforcement, and goals as part of their directed information feedback.

Subjects found this class of behaviors to be the most difficult to emit. Efforts to increase the rates in this category caused some frustration and one subject informed the experimenter that she was no longer going to attempt to emit the behavior. Nonetheless, all subjects were able to increase their rates.

Table 10 shows that subject two ended with the highest mean rate.

Table 10
Rate of On-task Positive and Percentage Change in Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Baseline Mean Rate Per Minute</th>
<th>Intervention Mean Rate Increase or Decrease</th>
<th>% Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>S₁</td>
<td>.08</td>
<td>.36</td>
<td>+ .28</td>
</tr>
<tr>
<td>S₂</td>
<td>.10</td>
<td>.54</td>
<td>+ .44</td>
</tr>
<tr>
<td>S₃</td>
<td>.004</td>
<td>.35</td>
<td>+ .34</td>
</tr>
<tr>
<td>S₄</td>
<td>.003</td>
<td>.48</td>
<td>+ .47</td>
</tr>
</tbody>
</table>

+ Rate or percentage increase.
It was not, however, the greatest rate increase, as she had the highest baseline rate. She increased from a .10 to a .54 event per minute for a .44 rate increase. Subject three displayed the largest rate increase, .47 event per minute. He managed it by moving from a mean baseline of .003 to a mean intervention rate of .48. This represents one of the largest percentage increases of all categories. Subjects one and three had mean rate increases of .28 and .34 event per minute respectively. The lowest rate increase, .28, represents an event increase of almost ten per session.

The multiple baseline in Figure 12 shows that the feedback was the cause of the behavior changes as all control operant rates remained low while intervention rates increased sharply.

Off-task Negative Reaction

Attention often serves as a positive reinforcer. Consequently, subjects were informed to ignore minor disruptions and show students that they could receive attention for emitting appropriate behaviors. Punishment was to be used only when necessary and when it was used subjects were instructed to make sure that it was effective. Further, it was pointed out that though it would be difficult to completely eliminate behaviors in this class, they should make an effort to decrease the rates of these behaviors.

Table 11 shows that all subjects managed a mean rate decrease with the exception of subject one. Her rate remained
Figure 12
Rate of On-task Positive Reactions for Four Student Teachers
virtually the same with a .01 event per minute increase. Subject two's rate dropped from .60 to .63 for a .24 mean rate decrease. This represents a 40% decrease. Subjects three and four exhibited the largest rate decreases. Subject three emitted .96 event per minute during baseline. This was almost one off-task negative reaction every minute. He was able to reduce this to .21 event per minute for a .75 rate decrease. Subject four did equally as well. He dropped from 1.03 events per minute to .23. This is a 77% decrease or a rate drop of .80 event per minute. Subjects three and four were in most need of the decreases as their baseline rates were extremely high.

Table 11
Rate of Off-task Negative and Percentage Change in Four Student Teachers

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Rate Per Minute</th>
<th>Mean Rate Increase or Decrease</th>
<th>%Increase or Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Baseline</td>
<td>.30</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>.60</td>
<td>.36</td>
<td>-.24</td>
</tr>
<tr>
<td>S3</td>
<td>.96</td>
<td>.21</td>
<td>-.75</td>
</tr>
<tr>
<td>S4</td>
<td>1.03</td>
<td>.23</td>
<td>-.80</td>
</tr>
</tbody>
</table>

+ Rate or percentage increase.
- Rate or percentage decrease.

The multiple baseline in Figure 13 demonstrates causality in this category also, as control operant levels
Figure 13
Rate of Off-task Negative Reactions for Four Student Teachers
remained constant while sharp decreases occurred upon intervention with three of the subjects.

SUMMARY

The data strongly substantiated the fact that behavior changes observed in the subjects did indeed occur. The probability of changing observational behaviors on the part of the experimenter are reduced by high interobserver agreement in all categories. Overall reliability of the total number of events observed, .91, and reliability of classifying events .85 are both over the predetermined eighty percent.

Behavior profiles for each subject are overall pictures of each subject's baseline and intervention rates. Categories three, five and seven all changed in the desired directions. The resulting effect for categories six and eight was mixed. Subjects three and four had decreases while subject one exhibited little or no change in either category. Subject two had an increase in negative feedback while cutting off-task negative reactions by about 40 percent.

Baselines for the major categories show causation as control baselines were stable upon intervention with the target subject. Causation was exhibited in some of the other categories while not in others.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

In an effort to determine the extent to which a behavior focus in physical education teacher training is effective in the acquisition of appropriate teaching behaviors, this study examined differences between rates of student teacher behavior during baseline and intervention with directed information feedback.

The literature indicates that feedback possesses qualities that effect change in behaviors. There is some disagreement as to whether the qualities are reinforcing or informing. Nonetheless, the motivational effects are substantiated. Most attempts to change teaching behaviors to date have concentrated on antecedent events. Modeling, microteaching, and interaction analysis are included in this category. A few studies have, however, employed consequential events. These for the most part have concerned themselves with areas of education other than physical education. Though Daughterty (1971), Schwartz (1972), and Anderson (1971) have all concerned themselves with teaching behaviors in physical education, the effect of the operant model in such setting has not been considered.
Subjects were four students of The Ohio State University enrolled in their student teaching experience in the Columbus Public primary schools. They were assigned to Northtowne Elementary School.

Subjects were observed and behaviors tallied during five minute intervals of a thirty-five minute class period. Behavior rates were taken both prior to and after intervention with directed information feedback.

Feedback consisted of instructions, cueing and reinforcement, graphic feedback, and goal setting strategies. Periodic reliability checks yielded 91% agreement for the total number of events observed and 85% agreement for classifying events.

By means of the multiple baseline behavior rates during baseline and intervention were compared.

CONCLUSIONS

Within the delimits of this study and as a result of analyzing the multiple baselines the following conclusions were drawn.

1. Skill attempt positive feedbacks and on-task positive reactions were the major categories in this study. The primary effort was upon increasing these behavior rates. Though some graphic feedback and reinforcement was given on the other categories it was minimal. Feedback on the input category was graphic only. There
is some indication that the concentrated effort to increase positive feedback to skill attempts and positive reactions to on-task behaviors contributed to a corresponding decrease in the other categories, especially input and monitoring.

2. Relatively large increases occurred in the rates of the two main categories. Consequently, it was concluded that directed information feedback, consisting of graphic information, instructions, cueing and reinforcement, and goal setting is effective in producing teaching behavior changes in physical education student teachers.

3. During baseline conditions it was obvious that the student teachers' primary control techniques were negative. Subjects constantly informed students of what they were not to do as opposed to what they should or did do. It was, consequently, concluded that these beginning teachers are primarily negative.

4. It was expected that by increasing skill attempt positive and on-task positive rates, decreases would occur in rates of negative feedback to skill attempts and rates of negative reactions to off-task behaviors. Such was the case for only two of the subjects, $S_3$ and $S_4$. Subjects one and two maintained just about the same rates in these negative categories. Consequently, it was concluded that negative behaviors do not automatically decrease as a result of increases in positive behaviors.
5. During baseline conditions behavior rates of both positive and negative information feedbacks to skill attempts and both on-task positive and off-task negative reactions were low. By looking at these as one group it became apparent that for the most part feedback rates were initially very low. It was, therefore, concluded that physical education student teachers are likely to emit very low rates of feedback either positive or negative.

6. Three of the four subjects had been exposed to principles of applied behavior analysis in a physical education course. The fourth subject took the course during the same quarter that the study was conducted. Yet, all subjects emitted very low baseline rates of skill attempt positive and on-task positive behaviors. It was, therefore, concluded that the course contributed very little toward effecting the teaching behavior of these student teachers.

In general it can be concluded that directed information feedback when given on specific behaviors can effect behavior changes in physical education.

Further findings indicate that the practice of rewarding on-task positive reactions is most difficult. Subjects referred to these as behaviors expected of students and expressed an uncomfortable feeling associated with emitting on-task positive reactions. Moreover, results show that it was most difficult for student teachers to ignore minor disruptions
on the part of their students. Positive feedback to skill attempts are relatively easy behaviors for student teachers to emit though they were primarily negative initially. Positive statements tended to fall in the category of the "global good" in spite of the fact that they were given a variety of suggestions and constantly reminded to put variety into their feedbacks and reactions. Although baseline rates indicated that the course in principles of applied behavior analysis had little effect on behavior rates, it did appear to make it easier to directly modify behaviors as a result of the fact that subjects were familiar with the terminology.

In addition two of the four student teachers found the regular presences of the observer to be inhibiting. They felt that videotape or peer observers would have eased the pressure placed upon them by the presence of the observer.

RECOMMENDATIONS

This study offers no evidence as to whether the changes in teaching behaviors affect student behaviors. Since the ultimate measure of a successful teacher is his ability to change pupil behaviors, it would be interesting to see just what effect these changes had upon students.

The persistence of these newly acquired behaviors into the students' first and succeeding years of teaching is an interesting question related to this topic. The literature gives some evidence that these behaviors are non-persisting; however, there is room for further study of this
area. Moreover, if these behaviors are non-persisting we need to know exactly how long they do persist and what frequency of feedback is necessary to sustain them.

The experimenter was unable to find recommended rates of behaviors for good teachers. A study compiling mean rates of teaching behaviors for experienced teachers who have proven to be successful by our present standards would be of great interest.

Two of the four subjects in this study found observer presences in the form of the college supervisor to be offensive. They indicated that a peer observer would eliminate this problem. If a peer observer is to be used, it is necessary to determine the effect of peer feedback on teaching behaviors. Videotape analysis has been employed in other areas of education. However, such an analysis appears to offer special problems in physical education settings. Efforts to solve these are necessary.
APPENDIX A

RECORDING SHEET FOR THE O. S. U. TEACHER BEHAVIOR RATING SCALE
## O. S. U. Teacher Behavior Rating Scale

Teacher _______________________ Date ____________ Time __________

<table>
<thead>
<tr>
<th>Behavior Category</th>
<th>Event recording by 5-minute intervals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Input teaching acts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Managerial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. No Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Skill attempt positive IF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Skill attempt negative IF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. On-task positive reaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Off-task negative reaction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

EXAMPLES OF REINFORCING VERBAL STATEMENTS
EXAMPLES OF REINFORCING VERBAL STATEMENTS

1. You look like you are really having fun.
2. That was a nifty jump John.
3. David you are really helping your team.
4. I am impressed with your ability to get into three lines of.....
5. I like the way that you crawl under the stick. That is really neat.
6. How impressive Jane you are really doing well.
7. That was a beatiful kick, dribble, etc. Where did you learn that.
8. I admire it when you perform like that.
9. I appreciate your attention.
10. You are a talented little guy aren't you?
11. You demonstrate fine ability.
12. You should be very proud of that....
13. That's a good job....the other children can look up to you.
14. My, you have a nice attitude today....
15. You make teaching a pleasure.
16. You are improving.
17. You perform very well, ....
18. I'm so proud of you.
19. You are doing fine.
20. That's very good, ....
21. You are doing better.
22. That shows a great deal of practice....
23. Now that is the one you should show your parents.
24. Beautiful job.
25. Excellent
26. OK
27. Great
28. All right
29. Nifty
30. Good
31. Correct
32. Keep going
33. Beautiful
34. Fantastic
35. Terrific
36. Marvelous
37. Fabulous
38. Splendid
39. Cool
40. Perfect
41. Clever
APPENDIX C

LETTER FROM COLUMBUS PUBLIC SCHOOLS APPROVING PROPOSED STUDY
Mr. Carey Hughley
676 Harley Drive, Apt. 4
Columbus, Ohio 43202

Dear Mr. Hughley:

The Department of Evaluation, Research and Planning of the Columbus Public Schools has completed its customary examination of your research proposal. Based on the report I have received from this department, I find that I am in position to give central-office approval to your proposed study.

Central-office approval attests to the fact that your proposal meets certain standards insofar as the research design, instrumentation, and methodology are concerned. It still will be necessary for you to secure the approval of the principals of the schools from which you wish to draw your pupil-subjects before proceeding to carry out your study. In approaching principals to secure their approval, I suggest that you show them a copy of this letter.

I am pleased that you have worked cooperatively with the Department of Evaluation, Research and Planning in providing materials that did enable this department to complete the analysis of your proposal.

Sincerely yours,

Joseph L. Davis
Assistant Superintendent
Special Services

cc: Mr. Bruce Barlow
    Mr. Robert Rodosky
    Mr. Leo McGee
APPENDIX D

PRE-EXPERIMENTAL INSTRUCTIONS TO THE SUBJECTS
PRE-EXPERIMENTAL INSTRUCTIONS TO THE SUBJECTS

1. You will be involved in a study testing two different techniques of observing student teachers.

2. This in no way will affect your grade in your student teaching experience.

3. I can not tell you the specific nature of the study at this moment, however, upon the completion of it I hope to discuss it in detail with you.

4. I will be observing you more often than is usual and upon occasion others may also observe you. Don't allow this to interfere with your teaching.

5. After a few weeks we will start to interact with you individually. It will be very important that you do not discuss the elements of this interaction with each other. This does not mean that you can not talk or help each other; just don't talk about the things that are discussed in the individual sessions. Hopefully during this interaction we will make some suggestions on ways to improve your teaching.
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