INFORMATION TO USERS

This was produced from a copy of a document sent to us for microfilming. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help you understand markings or notations which may appear on this reproduction.

1. The sign or “target” for pages apparently lacking from the document photographed is “Missing Page(s)”. If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure you of complete continuity.

2. When an image on the film is obliterated with a round black mark it is an indication that the film inspector noticed either blurred copy because of movement during exposure, or duplicate copy. Unless we meant to delete copyrighted materials that should not have been filmed, you will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., is part of the material being photographed the photographer has followed a definite method in “sectioning” the material. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.

4. For any illustrations that cannot be reproduced satisfactorily by xerography, photographic prints can be purchased at additional cost and tipped into your xerographic copy. Requests can be made to our Dissertations Customer Services Department.

5. Some pages in any document may have indistinct print. In all cases we have filmed the best available copy.
BIRDWELL, DEBORAH MARIE

THE EFFECTS OF MODIFICATION OF TEACHER BEHAVIOR ON THE ACADEMIC LEARNING TIME OF SELECTED STUDENTS IN PHYSICAL EDUCATION

The Ohio State University

Copyright 1980

by

Birdwell, Deborah Marie

All Rights Reserved
THE EFFECTS OF MODIFICATION OF TEACHER BEHAVIOR ON THE ACADEMIC LEARNING TIME OF SELECTED STUDENTS IN PHYSICAL EDUCATION

DISSERTATION

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

By

Deborah M. Birdwell, B.S., M.A.

The Ohio State University
1980

Reading Committee

Dr. Daryl Siedentop
Dr. John Cooper
Dr. Charles Mand

Approved By

Advisor

Department of Physical Education
For My Parents
ACKNOWLEDGEMENTS

First I would like to thank Dr. Daryl Siedentop for his support and guidance throughout this study and for the impact his influence has had upon my professional development during my work at Ohio State University.

I would also like to thank Dr. John Cooper for his assistance with the design considerations for this project, and Dr. Charles Mand for his reading of and helpful suggestions for the improvement of this study.

The three teachers who so willingly volunteered to be the subjects for this study are owed many thanks.

I owe a special thanks to those friends who helped with the data collection. Without their hard work, this project would not have been possible. Thanks to: Claire Hart, Melissa Parker, Marielle Tousignant, and Kay Port.

My heart-felt thanks go to Marilyn Durrett for her superb typing of this dissertation.

And last, to my parents I owe thanks for their support, though from a distance, both financially and emotionally. Without them this phase of my education and growth would have never been realized.
VITA

July 8, 1952 .......... Born - Newark, Ohio
1974 .................. B.S. In Ed., Kent State University, Kent, Ohio
1974-1977 ............. Teacher, Buckeye Valley Local Schools, Delaware, Ohio
1977-1980 ............. Graduate Teaching Associate, School of Health, Physical Education and Recreation, The Ohio State University, Columbus, Ohio
1978 ................... M.A., The Ohio State University, Columbus, Ohio
1980 ................... Assistant Professor, Wilmington College, Wilmington, Ohio

PUBLICATIONS

"The Ohio State University Physical Education Teacher Education Program," (with Claire L. Hart) in Vendien, L. and Rife, F. Physical Education Teacher Education (Introduction to Teaching), (in press).


FIELDS OF STUDY

Major Field: Physical Education Teacher Education
Advisor: Dr. Daryl Siedentop

Minor Field: Applied Behavior Analysis
Advisor: Dr. John Cooper
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................... iii
VITA ........................................................ iv
LIST OF TABLES ............................................ vii
LIST OF FIGURES ........................................... viii

Chapter

I. INTRODUCTION ........................................ 1
   Statement of the Problem ............................ 4
   Limitations of the Study ............................ 4
   Assumptions of the Study .......................... 5
   Definition of Special Terms ....................... 6
   Summary ............................................. 7

II. REVIEW OF RELATED LITERATURE ...................... 9
   Research on Teacher Effectiveness ................. 9
   Behavior Change Studies in Physical Education .... 13
   Research from the BTES ............................. 15
   Research from the Juniper Gardens Children's Pro­
   ject ............................................. 29
   Summary ........................................... 32

III. SOURCES OF DATA, PROCEDURES, AND METHODS OF DATA
     ANALYSIS ............................................ 34
    Subjects and Setting ................................ 34
    Observation Instrument ............................. 37
    Definitions of Setting ............................. 43
    Definitions of Content-General .................... 43
    Definitions of Content-PE ......................... 44
    Definitions of Learner Moves ..................... 46
    Definitions of Difficulty Level ................... 47
    Definitions of Teacher Behaviors ................. 49
    Description and Training of Observers .......... 58
    Reliability ....................................... 61
    Intervention and Design of the Study ............ 64
    Methods of Data Analysis ........................ 67
    Summary .......................................... 69
IV. ANALYSIS AND DISCUSSION OF THE DATA.......................... 70

Reliability......................................................... 70
Reliability Discussion........................................... 71
Summary of the Data.............................................. 75
Teacher 1............................................................ 75
Teacher 2............................................................ 78
Teacher 3............................................................ 80
Concurrent Baseline Variables - ALT-PE, ALT-PE(M)........ 83
Summary............................................................. 88

V. SUMMATION OF THE STUDY....................................... 94

A Review of the Study............................................ 94
Conclusions.......................................................... 97
Recommendations for Further Study......................... 102

APPENDIXES

APPENDIX A...................................................... 104
APPENDIX B...................................................... 107
APPENDIX C...................................................... 144
APPENDIX D...................................................... 146
APPENDIX E...................................................... 148
APPENDIX F...................................................... 151

BIBLIOGRAPHY...................................................... 156
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Background Data for Subjects of the Study...</td>
<td>36</td>
</tr>
<tr>
<td>2.</td>
<td>Scored-Interval Reliability Agreement Percentages for Teacher 1</td>
<td>72</td>
</tr>
<tr>
<td>3.</td>
<td>Scored-Interval Reliability Agreement Percentages for Teacher 2</td>
<td>73</td>
</tr>
<tr>
<td>4.</td>
<td>Scored-Interval Reliability Agreement Percentages for Teacher 3</td>
<td>74</td>
</tr>
<tr>
<td>5.</td>
<td>Mean Percentage Intervals of Management Time</td>
<td>76</td>
</tr>
<tr>
<td>6.</td>
<td>Mean Percentage of Not-Engaged Intervals of Three Target Students, Teacher 1</td>
<td>77</td>
</tr>
<tr>
<td>7.</td>
<td>Mean Percentage Intervals of Feedback, Teacher 1</td>
<td>78</td>
</tr>
<tr>
<td>8.</td>
<td>Mean Percentage of Intervals of Management Time, Teacher 2</td>
<td>79</td>
</tr>
<tr>
<td>9.</td>
<td>Mean Percentage Intervals of Feedback, Teacher 2</td>
<td>79</td>
</tr>
<tr>
<td>10.</td>
<td>Mean Percentage of Not-Engaged Intervals of Three Target Students, Teacher 2</td>
<td>80</td>
</tr>
<tr>
<td>11.</td>
<td>Baseline and Intervention Mean Percentage Not-Engaged Intervals for Target Students of all Three Teachers</td>
<td>82</td>
</tr>
<tr>
<td>12.</td>
<td>Mean Percentage ALT-PE and ALT-PE(M), Teacher 1</td>
<td>84</td>
</tr>
<tr>
<td>13.</td>
<td>Mean Percentage ALT-PE and ALT-PE(M), Teacher 2</td>
<td>86</td>
</tr>
<tr>
<td>14.</td>
<td>Mean Percentage ALT-PE and ALT-PE(M), Teacher 3</td>
<td>87</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model of Instruction</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>Teacher Behaviors that Influence ALT</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>ALT-PE Teacher Behavior Observation System Recording Instrument</td>
<td>53</td>
</tr>
<tr>
<td>4</td>
<td>Model of Coding Interval and Decision Hierarchy</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>Cassette Tape Recorder Program Format for Observation with the ALT-PE Teacher Behavior Observation System</td>
<td>56</td>
</tr>
<tr>
<td>6</td>
<td>Multiple Baseline Protocol</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Graph of Percentage of Intervals of Management, Student Non-Engagement, Feedback and ALT-PE(M), Teacher 1</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>Graph of Percentage of Intervals of Management, Student Non-Engagement, Feedback and ALT-PE(M), Teacher 2</td>
<td>91</td>
</tr>
<tr>
<td>9</td>
<td>Graph of Percentage of Student Non-Engagement for Teachers 1, 2, and 3, and ALT-PE(M) for Teacher 3</td>
<td>92</td>
</tr>
<tr>
<td>10</td>
<td>Graph of Percentage of Intervals of Feedback and Management, Teacher 3</td>
<td>93</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

In the last few years research on teacher effectiveness has shown marked methodological improvements. (Graham and Siedentop, 1977). Typically, researchers have examined the degree to which process measures of teacher behavior, as the independent variable, have affected the dependent variable, product measures of student achievement in academic subjects. This approach appears to be one of the best current strategies for investigating teacher effectiveness in classrooms.

It seems that this process-product strategy is not a useful model for examining teacher behavior in physical education settings. Students in physical education produce few permanent products as do students in other academic areas. The standardized testing movement in physical education is in its infancy as compared to standardized testing for other academic subjects. The "skills test" movement has not produced measures that are valid, reliable and easy to use.

Measurement in many sports skill areas is further complicated by the fact that the relevant skill performance is interactional. Hence the development of experimental teaching unit in physical education (ETUs), which have been
successfully used in other process-product research (Ward and Tikunoff, 1976), has been difficult to say the least.

Thus, while it is expected that methodological improvements in process-product approaches to teacher effectiveness research will continue to yield important findings (Graham and Siedentop, 1978), another strategy needs to be found to enable physical educators to make judgements about teacher effectiveness without having the relevant achievement data. One such strategy might be a focusing on a time-on-task process variable with the underlying assumption that improvement in this variable is related to student achievement. Berliner (1976) has suggested that the influence exerted on student achievement through teacher behavior is both complex and indirect.

"A fact of classroom reality is that teacher behavior does not influence student achievement directly. A teacher's indirectness, or questioning, or reinforcement does not simply result in greater mathematics, reading or science achievement. The link that must be considered is the behavior of the student in the instructional setting. We are now convinced that the mediating link so necessary to consider is the student's active time on task." (1976, p. 10)

This approach suggests an intervening process variable as the important mediating link between teacher behavior and student achievement. From this aspect, teachers behave so as to influence student time-on-task, and increased time-on-task results in better student performance. And, since achievement is difficult to measure accurately in physical education, time-on-task becomes a legitimate substitute.
In the early 1970's in California a major research project was undertaken to study teacher effectiveness in the teaching of math and reading in elementary classrooms. This research effort was the endeavor of the Far West Lab for Educational Research and Development in San Francisco. The expressed purpose of this project was "to gather information about what teacher behaviors are related to learning outcomes" (Marliave, 1977) and was entitled the Beginning Teacher Evaluation Study (BTES).

At the outset, researchers attempted to identify those teacher behaviors (process variables) that showed promise in regards to achievement gains in reading and math in grades two and five. One of the initial lines of inquiry focused on the amount of engaged time a student accrues in the school day. Coupled with engaged time was the notion of error rate for a given task. The final development was the concept of Academic Learning Time (ALT), defined as the amount of time a student spends in task relevant materials of an easy difficulty level.

It seems that ALT is a variable that can be of great use in viewing the teaching and learning of motor skills in physical education or sports settings. This concept that requires a student to be engaged directly in relevant task materials of a low difficulty would seem to provide a valid means of assessing the impact of teacher performance behaviors in physical education. The results of the first descriptive study of Academic Learning Time in physical
education (ALT-PE) indicate that in the thirty-three classrooms observed at the elementary, junior high and senior high school levels, a mean of 9.1 minutes of ALT-PE per class was recorded. (Metzler, 1979) These results are distressing and indicate that intervention on teacher behaviors so as to increase ALT in physical education is necessary.

Statement of the Problem

The purposes of this study were:

1. To modify the ALT-PE instrument so that teacher behaviors could be recorded simultaneously with student ALT.

2. To intervene on teacher behavior in several physical education contexts in order to increase student academic learning time.

There are two specific questions that this research attempted to answer:

1. Can specific teacher behaviors of inservice physical education teachers be changed significantly through intervention?

2. Will these changes in teacher behavior be associated with increases in student academic learning time in physical education?

Limitations of the Study

This study was limited by the following factors:

1. The study was limited to observation of and intervention upon three inservice physical education
teachers at the elementary, junior high and senior high school levels.

2. The study was limited to public schools in the Columbus area--two city, one rural.

3. The study was limited to male inservice teachers--one first year teacher, one first year at his particular level, and one with seven years experience.

4. The study was limited to the observation of selected and precisely defined teacher and student behaviors.

5. The study was limited to observing each inservice teacher no less than 15 and no more than 30 times over a nine week period.

6. The study was limited to observing three target students in each teacher's classroom in order to gain information regarding academic learning time.

Assumptions of the Study

1. The student and teacher behaviors in this study were observable and measurable, and that the observers who recorded those behaviors did so in accordance with the behavioral definitions provided to them.

2. Teacher and student reactivity were satisfactorily reduced so that the observed behaviors were representative of each teacher's and student's actual day-to-day behavior.
3. The interval recording techniques employed in this study constitute a representative sample of student and teacher behaviors to be found in continuous observation of behavior (Hall, 1971).

4. Academic learning time percentages for each student were assumed to be a fair estimate of achievement in physical education settings.

**Definition of Special Terms**

Several terms found in the text of this study will have restricted or special meanings. Included within these terms are the specific teacher and student behavioral definitions used in the observation instrument in the study. The reader is directed to Chapter III (page 43) for those definitions. The following terms are used frequently in the study:

**Academic Learning Time (ALT)** - The amount of time a student spends in directly relevant tasks with a high rate of success.

**Academic Learning Time-Physical Education (ALT-PE)** - The amount of Academic Learning Time accrued by a student while in a physical education class.

**ALT-PE (M)** - The amount of ALT-PE accrued by a student while directly engaged in motor skill tasks only.

**Inservice Teachers** - Refers to the three public school teachers, certified K-12, teaching in the Columbus area, who were the subjects for this Study.
Interval Recording - The observational recording of several student behaviors and one of several predescribed teacher behaviors within a specified period of time.

Management Time - The percentage of intervals in which Content-General categories are recorded (see behavioral definitions in Chapter III).

Reactivity - The potential disturbance of natural behavior patterns due to the interjection of an observer into the natural setting.

Reliability - The percentage of agreement for how often two trained observers watching one subject and equipped with the same definitions of behavior, see it occurring or not occurring at the same standard time (Baer, 1977).

Summary

Within this chapter, the purposes of the Study have been indicated. Questions to be addressed were enumerated, and limitations, assumptions and special terms were delineated. The next chapter will review the related literature appropriate to the conducting of this study.

The literature review will focus on these specific topics:

1. Research on teacher effectiveness and teacher behavior change studies in physical education.

3. Research on student attention and opportunity to respond.
CHAPTER II
REVIEW OF RELATED LITERATURE

This review will commence with a brief introduction to research on teacher effectiveness. The second part will focus on teacher behavior change studies in physical education, conducted in The Ohio State University Physical Education Teacher Education program. The bulk of this review will examine the literature drawn from the Beginning Teacher Evaluation Study (BTES) following an introduction to the research on student attention and time-on-task. A review of the first descriptive study on ALT in physical education (Metzler, 1979) will be made within this section. Finally, the research that was conducted within the Juniper Gardens Children's Project (JGCP) under the direction of R. Vance Hall will be reviewed.

Research on Teacher Effectiveness

During the first half of the 20th Century, efforts to improve education and thus the effectiveness of teachers were directed toward the immediate modification of schools themselves. According to B. O. Smith (1971), little attention was paid to selection, placement, and training of teachers. Teachers were trained in normal schools in which they were to master elementary subjects and a "bag of tricks" to transmit the knowledge (Borrowman, 1965).
The next line of inquiry focused upon teacher personality and characteristics. The work of Barr and his associates (1930, 1935) is prominent in this area. Attempts to relate teacher attitudes, interests, and other demographic variables to student achievement have been a dismal failure. As Gage (1963) has observed, these "studies have yielded disappointing results: the correlations are insignificant, inconsistent... and lacking in educational meaning." This could have resulted from the fact that teachers' values and personalities often do not correspond with what they do in the classroom (Rosenshine, 1971).

In the 1950's, studies began to emerge in which the focus was on the behavior of the teacher and the interaction of teacher and student behavior. Such studies required a systematic counting of specific teacher and student behaviors and the relating of certain behaviors to an increase in student achievement. The work of Flanders (1960), Medley (1977) and Mitzel (1968) has been foremost in this movement.

It might be claimed that a new era of research on teacher effectiveness was born in 1971 when Rosenshine and Furst reported their review of 50 process-product studies in the book Research In Teacher Education (Smith, 1971). Although this review was highly controversial and has been criticized for failing to account for differences in students' IQ, SES, etc., failing to include control or comparison groups, and failing to examine nonlinear relationships between teacher behavior and student achievement, nevertheless,
the identification of eleven variables that were regularly associated with student achievement has had an important impact upon further development of research on teacher effectiveness. Five of these variables had strong research support. These were teacher clarity, variability, enthusiasm, task orientation or "business-like" behavior, and teacher provision of opportunity for students to learn. Opportunity to learn or time spent on task will be discussed at length later in this review. The remaining six variables had some, if weaker, research support. These were teacher acknowledgement and use of student ideas, criticism (negatively related), use of structuring comments, use of a variety of types of questions, probing of student responses, and level of difficulty of instruction.

Along with promoting further research, this work of Rosenshine and Furst (1971) also stimulated other research reviews. In 1974 Dunkin and Biddle published their book *A Study of Teaching* in which they considered groups of studies that had significance in regards to a common aspect of teacher behavior or classroom variables. However, the findings reported in this book are at times confusing and provide no clear picture of what research on teaching has yielded.

In 1976, Cruickshank synthesized a series of studies presented at a National Institute of Education conference. Those studies and his synthesis appeared in a special publication of the *Journal of Teacher Education* in Spring,
1976. The reader is directed to that review for a summary of
the variables associated with improvement in reading, language
arts and math, as well as a description of the effects of
variation in teaching math and ecology.

In an extensive report which appeared in 1977, Medley
examined 289 empirical studies of teacher effectiveness and
applied four stringent criteria to the results of these studies.
To be included in his final analysis, studies were required to:
(1) measure teacher effectiveness only in terms of student
gains; (2) yield accurate and objective descriptions of
teacher behaviors studies; (3) establish generalizability of
findings by demonstrating strong positive evidence that effec­tive
teachers tend to exhibit the behavior(s) more often than
ineffective ones; (4) demonstrate a relationship with a minimum
overlap in variance of 15 percent (Pearson product-moment cor­
relation coefficient of \( \pm 0.387 \)). Only fourteen studies met
all four criteria, yet Medley was able to present 613 findings.
In brief, Medley found that effective teachers of subject mat­
ter are also likely to produce positive attitudes toward school
in their students and enhance student self-concept. He dis­
covered that there may be differential effects of patterns of
teacher behavior on students with low and high socio-economic
status, and he supports the importance of how teachers use
pupil time, relating that it is in the ineffective teacher's
classroom that time spent on academic tasks is lowest.

From many of these studies (Powell, 1977) (Rosenshine
and Berliner, 1978) (Good, 1979) a pattern that has been
termed "direct instruction" emerged. The components of
direct instruction include academic focus, clear goals for
students, sequenced and structured materials, allotment of
sufficient and continuous time for instruction, monitoring
student performance, asking lower level questions that pro-
duce mostly correct responses, providing immediate and task
specific feedback, and teacher controlled instructional goals
and material selection. It is believed that such a pattern
of teacher behavior can be successful in improving student
achievement.

Good, in a more recent review of teacher effectiveness
in the elementary school (1979) presents three conclusions.
First, that elementary teachers do exert differential effects
upon student achievement. Second, that classroom management
skills are extremely important. And third, that a pattern of
teaching called direct instruction seems to be associated
with the teaching behaviors of effective elementary teachers
when the outcome measure is performance on standardized tests.
The reader is directed to this review for a more thorough
examination of the pertinent research.

Behavior Change Studies in Physical Education

The programmatic behavior analysis research program in
physical education at The Ohio State University owes both its
theoretical orientation and its methodology to the research
tradition associated with Skinnerian behaviorism. (Siedentop,
1978). Locke (1979) maintains that the studies which comprise
this programmatic effort have provided "the first absolute confirmation that it is possible to induce any specific behaviors in a group of working physical education teachers."

Many studies outside the field of physical education have made use of feedback as an intervention to change teacher behavior in classrooms. Cooper et al. (1970) utilized written feedback to train two pre-school teachers to attend to appropriate child behavior. McNamara (1971) delivered mild electric shocks to cue an elementary teacher regarding attention to appropriate and inappropriate student behavior. And, Thompson and Cooper (1969) provided feedback to a teacher by means of a hearing aid receiver during the lesson. Typically, however, written and verbal feedback provided after a teaching episode have been the most common methods for facilitating change in teaching behavior.

Feedback providing direct information regarding teaching performance has been an integral part of intervention packages used in The Ohio State University behavioral change programs in physical education. Hughley (1973) provided daily feedback to student teachers as well as instructions, cueing, reinforcement and goal setting. Rife (1973) provided feedback from a twice weekly supervisory format and included modeling in the intervention package. Several studies utilized a competency based framework (Darst, 1974; Hamilton, 1974; Boehm, 1974) to change teacher behaviors and packaged the intervention modules in a self-instructional format. A number of studies demonstrated that feedback and other
intervention procedures could be delivered by persons other than a university supervisor. Dodds (1975) and McMillan (1978) utilized peer feedback systems, Dessecker (1975) experimented with self-change systems, and Cramer (1977) and Hutslar (1976) trained cooperating teachers to assume the feedback function.

In all of the above studies, the subjects were physical education student teachers and the behaviors which were modified included: (1) positive reactions to on-task behavior, (2) positive reactions to on-task behavior with specific information, (3) negative reactions to off-task behavior, (4) general positive skill feedback, (5) specific positive skill feedback, (6) corrective skill feedback, (7) use of students' first names, and (8) classroom management time.

Acknowledging this highly successful research effort, it would seem logical that these intervention technologies, particularly ones so cost-effective as providing instructions and immediate feedback, ought to demonstrate efficacy in changing behavior of in-service teachers of physical education.

Research from the BTES

This section will consist of three parts. The first part will review an area of research that has a long history of study, that of student attention. The second will examine the literature that deals with student time-on-task. These
areas have greatly influenced the development of the research reviewed in the third part, that of the BTES. Within this third part, where appropriate results from the first descriptive study on Academic Learning Time in physical education (Metzler, 1979) will be examined.

In his book *Life in Classrooms* (1968), Phillip Jackson provides an extensive review of the literature pertaining to "the establishment and maintenance of students' absorption in the task at hand," i.e. student attention. Some of the more important findings will be discussed here and the reader is directed to the primary source for further information.

Morrison (1927) was the first researcher to devote a considerable amount of time and effort to the measurement of group and individual attention in classrooms. He maintained that a teacher's ability to secure and hold student attention was a clear indicator of that teacher's effectiveness, and he devised an observation system that would facilitate recording instances of student inattentiveness. Because Morrison's chief objective was to improve teaching and utilize his attention instrument as a diagnostic tool, he failed to collect descriptive data on the distribution of inattention across many classroom settings.

French (1924) attempted to compare observations of both student and teacher behaviors with ratings of the teacher's overall ability. He found a strong relationship (correlation coefficient of .82) between the rating of teacher ability
and measures of group attention during class, however, there was no attempt to make any correlation with actual student achievement. This finding served to lend support to Morrison's contention that a teacher's ability to control student attention had considerable educational significance.

Due to some studies which seriously questioned the validity and reliability of attention measurement (Barr, 1929; Washburne et al., 1926; Shannon, 1941) and the fact that various societal changes made such a focus on attention seem rather anti-progressive, research on this topic came to a halt until after World War II. Two studies which employed observation procedures similar to Morrison's (1927) signaled a renewed interest in attention research. Hudgins (1966) found that outside observers were able to accurately detect inattention in students but were not able to gauge the quality of the student's thinking as determined by students' self reports. Lahaderne (1967) in studying attention rates in four sixth grade classrooms found positive correlations between students' attention in class and their performance on intelligence and achievement tests. The relationships remained positive even when differential intelligence effects were controlled.

Jackson (1968) cites three conclusions from a systematic study of attention: (1) although variable from class to class, and minute to minute, the amount of student attention is fairly high; (2) often the amount of attention is overestimated; and (3) attention seems to be significantly
related to other variables such as achievement and estimates of teacher effectiveness.

When the concept of student attention is extended a bit further to include time in which the student is making academic responses, the variable of interest becomes student engagement. Bloom (1976) in reviewing 15 studies of student engagement found strong positive correlations of student engagement with achievement gains. In a study of Follow-Through Classrooms (Stallings and Kaskowitz, 1974) observers coded elementary students every 15 minutes throughout the day. "Attending" was recorded only when students were actively working with academic materials. Strong positive correlations with achievement were discovered when students were coded as spending time attending to reading or math activities rather than any other activity including teacher and student interactions or non-academic tasks.

Rosenshine and Berliner (1978) championed a shift in research focus from process-product studies to a focus on what they term "student variables," namely "Student Engaged Academic Time (SEAT)." SEAT is treated as a dependent variable, and efforts are then made to discover what contributes to it since it, likewise, affects student achievement. Hence, the development of a new concept--academic engaged time--the product of combining the amount of material covered and the time the student is attending or engaged.

Rosenshine and Berliner (1978) support the notion that this student engagement variable appears to be an essential
one for further study, and they maintain that effective teachers are the ones who put students into contact with academic materials and keep them engaged. They claim that this variable may be more important than teacher behaviors such as clarity and enthusiasm.

This concept of academic engaged time has now been refined to become the variable Academic Learning Time (ALT) defined as the time a student is engaged in task relevant material with a high level of success. The development of this variable comes out of the BTES literature and will receive thorough attention below.

The Beginning Teacher Evaluation Study (BTES) was one of the most extensive studies of teaching and student behavior to date. The BTES was initiated in 1972 by the California Commission for Teacher Preparation and Licensing (CCTPL) and funded by the National Institute for Education. CCTPL believed that "sponsorship would lead to findings that might be directly applied to making improvements in teacher training, and hence strengthen day-to-day education for students." (Fisher et al., 1978) The mission of the BTES was to examine various instructional factors that promote student learning from elementary school instruction in basic skills. The BTES was conducted in three separate phases. Phase I was strictly a planning year undertaken in 1972-1973. Phase II (1973-1974) consisted of a large field study, the development of instrumentation, and the generation of various research hypotheses. This phase was carried out by a team of researchers at
Educational Testing Services and headed by Frederick McDonald (1974).

During Phase II the BTES researchers developed another tool to be used in the study of teacher effectiveness, the Experimental Teaching Unit (ETU). Filby (1976) reported on plans to develop ETU's and discussed design considerations related to ETU's in a later paper (1977). An ETU consists of a unit of instruction in usually a novel subject area which provides a teacher with an introduction, rationale, performance objectives keyed to pre-post test items, a wide variety of instructional materials and activities, and pre- and post-tests. (Ward and Tikanoff, 1976) The teacher is to instruct in any way deemed appropriate. Achievement and teacher effectiveness are then determined by pre-post test correlations.

Phase III (1974-1978) consisted of a series of field studies designed and conducted by the Far West Lab for Educational Research and Development in San Francisco. The purpose of these field studies was to identify various classroom conditions and activities in grades two and five that lead to student learning in the basic skills of reading and mathematics.

A model of instruction (see Figure 1) was developed with the idea that for a given student there are certain instructional processes that lead to learning which is then reflected in achievement scores taking aptitude into consideration (Fisher, 1976).
The Academic Learning Time Model, developed during Phase II to incorporate time as the important variable in the learning process (Wiley and Harnischfeger, 1974), is composed of three elements: allocated time, engaged time, and task difficulty in terms of success rate. Allocated time was defined as the time set aside by the teacher for instruction and practice of academic tasks. Engagement was the time that the student was actually involved in making academic responses, whether written, oral or covert. Task difficulty was defined in terms of success rate. High rates of success provide situations in which students make errors due to carelessness. Students having low rates of success simply do not have an understanding of the task at hand and have only a chance rate of success. Medium success rates are all those instances in between high and low. Hence academic learning time (ALT) can occur only when the student is engaged and is defined as the amount of time that a student
spends engaged in a task that produces few student errors and which is directly related to a defined content area (Fisher, 1977).

Along with the development of instrumentation to measure student engagement in specific content categories in reading and mathematics, an effort was made to examine instructional processes, so that it might be ascertained just which teacher behaviors have an impact on student achievement by influencing facets of Academic Learning Time (ALT) (Marliave, 1977). A model for conceptualizing the teacher behaviors that might influence ALT is presented in Figure 2 (Fisher et al., 1978).

![Figure 2. Teacher Behaviors that Influence ALT](image)

The adaptation of Metzler's (1979) ALT-PE coding instrument for the purpose of this study closely mirrors the original BTES instrumentation. The ALT-PE Teacher Behavior Observation System (see Chapter III for a complete description) samples the instructional setting, content of the instruction, student behavior in the form of engagement and difficulty level, and teacher behavior. Teacher Behavior categories in the BTES instrumentation which are similar or identical to
those included in the ALT-PE TB system include substantive behaviors such as presentation (lecture and response to student need), monitoring, asking questions, and academic feedback and procedural behaviors such as giving directions and task engagement feedback (equivalent to behavior praise and nags).

Since the purpose of this study was to intervene on teacher behaviors in order to increase student ALT in physical education, it would seem appropriate to focus on the findings of Phase III of the BTES to determine if there are some significant patterns of teacher behavior associated with gains in student achievement as well as discover the relationship between ALT and student achievement. In conjunction with these findings, descriptive data from Metzler's study will be presented.

There were fourteen major findings from Phase III of the BTES, and these were reported in the Summary report of teaching and learning in the elementary schools (Fisher et al., 1978). Data for this report were collected over a period of one year in 25 grade two and 21 grade five classrooms in the content areas of reading and mathematics. There were two sets of findings. The first set examines the relationship between ALT and student achievement.

1. The amount of time teacher allocated to instruction in a curriculum area is positively associated with learning in that content area.
There were large differences in allocated time observed across all classes, grade levels and subject matter. In second grade math, the range was from 25 minutes to 60 minutes daily. In fifth grade reading, the range was from 60 minutes to 140 minutes daily. Metzler's data indicate that teachers of physical education at all levels designate a large proportion of class time for practice and instruction and that there is not much variability in these estimates. However, there was a mean difference of 12% between what teachers estimated and what was actually observed to occur. Metzler suggests that either teachers of physical education do not plan well or are not fully aware of time involvement.

2. The proportion of allocated time in which students are engaged is positively associated with learning. This rate of attention/engagement varied widely from an average of 50% to an average of 90% in some classes. In physical education, Metzler reported an average of 36% engagement but only 14% average engagement when examining just the engaged-motor response category (see Chapter III definitions).

3. The proportion of time that reading and mathematics tasks provide a high success rate for a student is positively associated with learning.

Easy materials and few errors were found to contribute to high student success rate as well as increased student self-esteem. The average student in the BTES spent about 50% of the time working on tasks at a high success rate.
Metzler reported that when all categories of engagement were considered, students in physical education were engaged in tasks at a high rate of success an average of 78.6% of the time. However, when considering the total number of minutes available in each class, he discovered an average of only nine minutes of ALT-PE and 2.5 minutes of ALT-PE Engaged Motor Response. No data was collected regarding student attitudes in the study.

4. The proportion of time spent in tasks providing low success rate is negatively associated with student learning. Metzler found little evidence of task difficulty in his study but instead faulted problems in the design of the instruction in limiting students' opportunity to respond.

5. Increases in ALT are not associated with decreases in attitudes toward school, math or reading. In fact, there was a slight positive trend in those students that experienced high success rates.

The remaining set of conclusions focus on the instructional processes and classroom environment and serve to answer the question regarding what teaching behaviors and classroom environmental characteristics impact upon student achievement.

6. The teacher's ability to diagnose student skill level is related to student achievement and ALT.

7. The teacher's ability to prescribe appropriate tasks is related to student achievement and success rate.
8. More substantive interaction between the student and the teacher, i.e., presentation of content, practice, feedback, monitoring, is associated with higher levels of student engagement. The converse would certainly indicate that increased managerial time would be negatively associated with student engagement. Once again, as in previous studies, (Powell, 1977; Rosenshine and Berliner, 1978; Good, 1979) the student who spent more time in a direct instruction format had higher rates of engagement.

9. Academic feedback is positively associated with student learning.

10. The structuring of lessons and giving directions on task procedures are positively associated with student success rate.

11. Explanation specifically in response to student need is negatively associated with student success rate.

12. Frequent reprimands for inappropriate behaviors are negatively associated with student learning.

13. A teacher's value system is related to ALT and student achievement. The emphasis on academic goals is positively related to student learning. The teachers who were more businesslike and task-oriented achieved more student gains. Classes concerned with affect as a major objective spent less time on academic goals and hence produced less achievement.
14. A learning environment characterized by student responsibility for academic work and by cooperation on academic tasks is associated with higher student achievement. Those classes which were characterized as having a strong academic focus were also the ones in which students took responsibility for their work, their belongings, helped each other, and shared materials.

The implications of this major research effort and of Metzler's first descriptive study in physical education are vast and important in light of a planned intervention study. It is obvious that the variable, ALT, is of considerable practical importance in terms of its relationship to student achievement. Large differences in ALT are associated with significant changes in predicted achievement levels. Marliave (1978) reported that this ALT variable accounted for an average of 11% residual variance in second and fifth grade math and reading skills after pre-achievement effects were removed. In physical education, given the fact that there are, as yet, no useful standardized achievement tests by which student performance might be judged, utilizing student academic learning time might be a method to predict student achievement and thus judge teacher effectiveness.

Metzler's descriptive study provides evidence that there is a need for improvements in the way physical educators manage their classes. The findings, in general, indicated that teachers must plan better so as to increase the actual
amount of time allocated for instruction and practice; decrease the amount of managerial time; provide more engaged time for students; emphasize the motor response aspect to ensure that the goal of skill acquisition is realized.

The BTES Phase III final results also provide a picture of what the actively involved, "learning student" is like (Fisher et al., 1978). This student works on tasks designed to increase skill, is attentive, spends a large proportion of time in practice and review, and, quite conceivably develops positive attitudes towards work. Many of these behaviors can be controlled directly by teachers. The results also clearly delineate certain teaching behaviors that tend to be associated with effective teaching, i.e. producing achievement in students. Effective teachers in the BTES study were skillful diagnosticians, were able to deliver the instruction clearly, monitored their classes, and provided feedback for learners' academic responses. Clearly there are implications for designing an intervention program for physical education teachers.

While the major work of the BTES was descriptive in nature, one smaller intervention study was conducted simultaneously with the larger investigation (Berliner et al., 1978). Four second grade classes were selected for clinical interventions. The variables of interest included wait time, transition time, total allocated time in reading and math, percent engaged time in reading and math, and ALT in reading and math. The interventions consisted of attempts to impact
upon the five teaching functions (refer to Figure 2) that had been demonstrated to influence ALT. Conferences were held with the teachers and were directed toward teaching behaviors necessary to carry out those functions. Although the interventions followed no set pattern, attention was given to time-on-task, management systems, teacher language behavior such as increasing feedback, provision for starting assignments (i.e. initial activity control; Siedentop, 1976), contingency management procedures, and various spatial considerations.

Results showed that teachers could modify their teaching behaviors and subsequently show an increase in ALT in both reading and mathematics.

Another interesting facet of this study was that in addition to the intervention classrooms, a group of seven teachers attended two half-day workshops on the importance of engaged time and other related variables. These teachers were able to increase ALT in their classrooms even more dramatically than the intervention group. This finding has important implications for training large numbers of teachers to be more effective by using such a series of brief, inexpensive workshops that also requires little in the way of teacher response-cost.

Research from the Juniper Gardens Children's Project

At the same time that Far West Lab was conducting Phase III of the BTES, a research project was being carried out
under the direction of R. Vance Hall. This project, the Juniper Gardens Children's Project (JGCP) was a community-based research program sponsored by the Bureau of Child Research, the Department of Human Development and Family Life, and the Department of Special Education of the University of Kansas, and its research has direct relevance to the BTES as well as the development of the ALT-PE model.

This research program focused on motivation to learn in preschool (Risley and Hart, 1968; Hart and Risley, 1974), special classrooms (Wolf, Giles and Hall, 1968; Clark, Lachowicz and Wolf, 1968; Broden, Hall, Dunlap and Clark, 1970), regular classrooms (Hall, Lund and Jackson, 1968; Harris, Harris and Hall, 1972), and homes (Hall et al., 1972; Hall, Copeland and Clark, 1975). Using the research methodology of applied behavior analysis, various achievement behaviors were intervened on directly through reinforcement of academic responses and also indirectly through decreased disruptions and increased time on task. As the program continued, it became evident that not only would increased systematic reinforcement contribute to achievement, but simply the provision of additional opportunity for academic response was an important element in increasing student learning. Hall et al. concluded:

"The realization we have come to at Juniper Gardens is that perhaps the basic element which has been lacking in the homes and classrooms of the inner-city is not motivation, per se, nor does it seem to necessarily be curriculum materials. Rather it seems quite possible that the major factor may be a lack of opportunity to make active learning responses." (1977, p. 13)
Hall and his colleagues then speculated upon the reasons for the lack of opportunity to respond in classrooms. They include: (1) it may not be obvious to teachers that students need to spend more time responding if they are to learn, (2) the curriculum training of the teaching systems operating in the classroom may work against providing opportunities for students to make responses, (3) having pupils increase their rates of responding may be punishing to teachers, parents and students themselves, and (4) school policy and/or classrooms are not engineered to maximize responding.

In an update of their initial research venture, Delquadri, Greenwood and Hall (1978) gave recognition to the relationship between "opportunity to respond," the BTES notion of "academic engaged time," the concept of "direct instruction" and academic achievement. A descriptive field study was conducted with twelve elementary school students utilizing an interval recording system with rate of responding as the unit of measurement. Results closely paralleled those of the BTES and Metzler (1979) in that the amount of actual response in academic areas was very low. Though it was discovered that over half of the day was spent in math and reading, only a small proportion of that time was spent in active Academic Responding. In an average six hour day, the category Reading Aloud accounted for only 2.9 minutes. A follow up study is in progress during this academic year (1979-80) in which descriptive data are being
collected on 100 students and relationships to achievement are being assessed.

Given the assumption that student ALT and opportunity to respond are two different ways to view the same phenomenon, the strong research findings from both the BTES and Juniper Gardens project represent substantial convergent validity (Johnson and Bolstad, 1973) for the concept of ALT.

Another important aspect of the research findings from Juniper Gardens is the emphasis on providing opportunities for students to increase academic response without subsequently increasing the workload for the teacher. This feature of low response cost for teachers is extremely important as interventions are developed for increasing student ALT in physical education.

Summary

This chapter has reviewed the literature relevant to the scope and conduct of this study. The first part consisted of a brief introduction and historical outline of research on teaching effectiveness. Often the reader was referred to larger, more extensive reviews for further information.

The second part focused on the teacher behavior change studies in physical education which were a part of The Ohio State University Physical Education Teacher Education programmatic research effort. These studies provided a strong basis for the development of effective intervention procedures.
The third part of this chapter examined the literature from the Beginning Teacher Evaluation Study. A brief introduction to the research on student attention and time-on-task was included at the beginning. A thorough description of the major findings of the Phase III of the BTES and their relationship to student achievement and teacher behavior was made. It was also from these findings that formulation of an intervention for this Study was influenced.

A review of the major findings of the first descriptive Study of ALT in physical education (Metzler, 1979) was included in the third section and was interspersed with BTES data where appropriate.

The final part reviewed the literature from the Juniper Gardens Children's Project and included an emphasis on the variable "opportunity to respond." The relationship of this variable to Academic Learning Time was firmly established.

The following chapters of this study will describe the methods used to collect data for analysis, the intervention procedures, the results of the intervention, and a discussion of the findings.
CHAPTER III

SOURCES OF DATA, PROCEDURES
AND METHODS OF DATA ANALYSIS

The first section of this chapter will describe how subjects for this study were selected and the settings in which the subjects were observed. In the second part of the chapter a description of the observation instrument and procedures utilized to train observers to use the instrument are discussed. Included in this discussion is a short description of the establishment of interobserver reliability. The third section will describe the intervention phase of the study, and the final portion of this chapter will delineate the methods of data analysis to be used in Chapter IV.

Subjects and Setting

The subjects of this study were three inservice physical education teachers in public schools in the greater Columbus area. Since it is sometimes difficult to secure participation in research from persons who have no association with the investigator, these subjects were acquainted with the investigator before they were asked to participate in this study.

Subject one was a 25 year old male and a first year teacher in an urban junior high school. A 1979 graduate of Ohio State University, this teacher had been a supervisee of
the investigator during his student teaching. The school in which this subject taught can be characterized as low-middle to middle SES, with a racial balance of approximately 50% white, 50% black.

One class was selected for observation in this school. This class was composed of ninth grade male and female students and was designated as an advanced physical education class. Total class size numbered eighteen and from this total, three target students were selected at random to be observed throughout the duration of the study. These target students included two males and one female.

Subject two was a 30 year old male and a veteran teacher of eight years experience. This subject was teaching in a rural high school characterized as middle SES, 100% white. The class selected for observation contained approximately 35 male and female tenth grade students. These students had elected this class based upon the activities offered during the instructional period: gymnastics and badminton and table tennis. Three target students were randomly selected from a list provided by the teacher containing names of students who had 95% or better attendance in physical education classes. Two males and one female were chosen.

Subject three was 31 year old male teaching at the elementary level for the first time. This teacher had several years of teaching experience at both the secondary and college level and was a Ph.D. candidate in physical
education, however, was completing his first year as teacher of grades K-2.

This school might be characterized as urban, low-middle SES, and approximately 50% white, 50% black. The class chosen for observation was a second grade class containing 31 boys and girls. Target students were selected randomly from a list provided by the classroom teacher that included names of those who had 95% or better attendance in school. From this list, two boys and one girl were chosen.

In conclusion, these subjects were selected based solely on their willingness to allow observers to come into their classrooms and to submit to a series of interventions designed to change various teaching behaviors. Each subject signed a human subjects consent form (see Appendix A). Table 1 summarizes the background data for each subject including age, sex, location of school, grade level, number in class, and activities taught.

Table 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age/Sex</th>
<th>Location</th>
<th>Grade</th>
<th>Class Size</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25/M</td>
<td>Urban</td>
<td>9</td>
<td>18</td>
<td>basketball, volleyball</td>
</tr>
<tr>
<td>2</td>
<td>30/M</td>
<td>Rural</td>
<td>10</td>
<td>32</td>
<td>gymnastics, badminton and table tennis</td>
</tr>
<tr>
<td>3</td>
<td>31/M</td>
<td>Urban</td>
<td>2</td>
<td>31</td>
<td>ball skills, movement skills</td>
</tr>
</tbody>
</table>
Subject one was observed during an afternoon class every day for a period of seven weeks for a total of 28 observations.

Subject two was observed four days a week during an afternoon class for a period of seven weeks for a total of 28 observations.

Subject three was observed once a week during an afternoon class for a period of 15 weeks for a total of 15 observations.

Observation Instrument

The first ALT-PE (Academic Learning Time-Physical Education) recording instrument was developed and field-tested in physical education classrooms during the 1978-79 school year (Siedentop, Birdwell, Metzler, 1978). In accordance with one of the purposes of this study, this instrument, an adaptation of the original BTES instrumentation, will be modified to include a measure of teacher behavior.

The ALT-PE Teacher Behavior Observation System is based on an interval recording system. In interval recording, behavior is observed for short, specified periods of time and recorded for each particular interval. These intervals are repeated continuously throughout the entire duration of the observation session. The interval duration in the ALT-PE Teacher Behavior instrument is twelve seconds—six seconds allotted for observing and six allotted for recording. This
instrument is designed to be used for on-site observation of student and teacher behaviors.

In the ALT-PE-TB instrument, the behavior of one student and the teacher is observed and recorded within the twelve second duration. Within each interval the observer will make five decisions about what was observed within that interval. These decisions include: (1) setting; (2) content; (3) learner moves; (4) level of difficulty; and (5) teacher behavior. Each decision will take place at a different level within the interval, and each interval contains a set of behavioral definitions to describe what was seen to occur in the separate categories during a given interval.

The setting category presently contains six definitions to describe the overall manner in which the instruction is being mediated. These definitions closely resemble the range of teaching styles in Mosston's Spectrum of Teaching (1966). They are: Direct Instruction; Task; Reciprocal; Group; Guided Discovery; and Problem Solving. The corresponding definitions are given at the end of this section.

The content category presently contains twelve definitions to describe the content of the activities observed in a particular interval. This category is divided into two groups: Content General and Content PE. The five Content-General definitions reflect a non-academic or managerial focus. These are: Wait; Transitions; Management; Break; and Non-Academic Instruction. The corresponding definitions are given at the end of this section.
The seven Content-PE categories reflect an instructional content focus on relevant physical education activity engagement by the target student. These include: Skill Practice; Scrimmage; Game; Fitness; Other Motor Activity; Knowledge; and Social Behavior. These definitions are also given at the conclusion of this section.

The Learner Moves Category currently contains six definitions which describe further the nature of student engagement. This category is also subdivided into two groups: Engaged and Not Engaged. The three Engaged definitions reflect a direct relevant involvement on the part of the student in the subject matter of the class. These are Engaged-Motor Response, Engaged Indirect, and Engaged-Cognitive.

Two of the three Not-Engaged definitions reflect appropriate but not directly engaged and/or relevant behaviors emitted by the student. These are Not-Engaged Interim and Not-Engaged waiting. One of the Not-Engaged definitions reflects behaviors which are not appropriate at the observed interval time. This is Not-Engaged Off-Task. The corresponding definitions for this entire Learner Moves Category are given at the end of the section.

The Level of Difficulty category contains three definitions which reflect the observed student's ability to perform the task of the moment. These are Easy, Medium, and Hard. The corresponding definitions for the Level of Difficulty category are included at the end of this section.
In the Level of Difficulty category, the BTES team used highly inferential definitions to determine the observed student's level of difficulty in the observed task. The least inferential method was to evaluate level of difficulty based on the permanent product of the task observed, such as a corrected set of math problems, or by counting the number of errors made in an oral reading exercise. When these methods were not used, the BTES observer would then observe the target student while he or she was engaged and make decisions about the level of difficulty based on the student's mannerism which may have reflected difficulty with the assigned task.

In this study, the level of difficulty was determined during each interval and not in retrospect, unless the student was engaged in written test-taking. The Level of Difficulty decisions were based on the number of errors made by the student while performing a given task. These decisions must also be made within the context of the observed activity and the skill level of the student. This took into account the fact that many physical education activities have differing criteria for performance evaluation. That is to say that making five of ten field goals in a basketball game is not to be interpreted as an equivalent level of performance as five of ten good serves in a volleyball game or five home runs in ten at-bats in a softball game.
It then becomes very important that each observer be familiar with the observed activities before him/her, as well as the general criterion levels of performance based on the age and skill of the observed student. For this reason, only observers who were familiar with the content area of physical education were chosen for this study.

Up to this point, an observer is required to make four decisions about the observed student in each interval. These decisions are to be made for: (1) setting, (2) content, (3) learner moves, and (4) level of difficulty.

The ALT-PE-TB instrument is based on a hierarchy of decisions within each interval of observation. Decisions are made in every interval for the setting and content categories. On the content level, if one of the Content-General codes is written, no further decisions are made for that interval. Assuming a Content-PE code is written on that level, the observer then proceeds to code the Learner Moves category. If one of the Not Engaged codes is written on the Learner Moves level, no further decisions for the student are made for that interval. If one of the Engaged codes is written on the Learner Moves level, the observer then proceeds to the fourth level of difficulty code for that interval.

During any given interval, an observed student must be seen in a physical education content activity, be engaged, and be engaged in a task of low difficulty in order to be considered an instance of ALT-PE. The hierarchical feature
of the ALT-PE-TB recording system simplifies the observer's task by eliminating the recording of nonessential data.

The fifth level of the interval, the teacher behavior category, was always recorded. This category has been added to the original ALT-PE instrument to enable the investigator to get a picture of what the teacher is doing while the students are engaged in physical activities. Such information was essential in planning a behavioral intervention designed to increase student academic learning time.

This fifth level of the instrument is a slight modification of a similar observation system designed by Freedman (1978) entitled Teacher Observation System. Freedman modified his system based on instruments developed by Stewart (1977) and Moore (1977). The same format has also been used to observe coaching behaviors (Siedentop and Crossman, 1978) and teacher enthusiasm behaviors (Rolider, 1979).

The coding format requires that the observer find the target student and observe his/her behavior before checking on the teacher's behavior. Hence the observation of the teacher's behavior can be deemed a time sampling procedure (Cooper, 1974) due to its occurrence at the end of each interval only.

There are sixteen teacher behaviors contained in this system. These behaviors include: Lecturing, Giving Directions, Listening, Asking Questions, Answering Questions, Non-Functional Behavior, Monitoring, Hustles, Spotting, Maintenance, Modeling, Feedback, Behavior Praise, Nags,
Punishments, Teacher Participation, and Officiating. Definitions of these behaviors are included at the end of this section.

**Definitions of Settings**

**Direct Instruction (D)** - Teacher controls the instruction, focus and pacing of instruction.

**Task (T)** - Instruction is defined by the task—multiple station and/or multiple task. Students are free to make decisions regarding where they go to practice and how they pace themselves.

**Reciprocal (R)** - Students are arranged in pairs for instruction and feedback.

**Group (G)** - Students are arranged in groups of three or more for instruction and feedback.

**Guided Discovery (GD)** - Teacher leads student toward a predetermined goal through a series of sequenced prompts.

**Problem Solving (P)** - Teacher controls the instruction through sequenced problems in which alternative solutions are possible.

**Definitions of Content-General**

**Wait (W)** - Periods of no activity and no movement between activities.

example: Students have moved from roll call to a formation for warmup exercises and are waiting for the cue to begin activity.
Transition (T) - Periods of change from one activity to another that are related to instructional activity.
   examples: Lining up for next activity;
             Moving from station to station;
             Selecting equipment for a game
Management (M) - Time devoted to class business that is unrelated to instructional activity.
   examples: Taking attendance;
             Class business;
             Assigning lockers
Break (B) - Intentional periods of no activity to rest students, drink water, etc.
Non-Academic Instruction (NI) - Activities which fall outside the narrow domain of focused instruction.
   examples: Rapport building;
             Recognition of birthdays

Definitions of Content-PE
Skill Practice (P) - Participation in drills and other activities in which the primary goal is individual skill development.
   examples: Setting volleyball against a wall;
             Performing a headstand on the mat
Scrimmage (S) - Controlled group practice in which instruction and feedback are frequent.
   example: 3-on-3 half court basketball game in which the teacher stops the action often to instruct
Game (G) - Practice under game or performance conditions.
examples: Volleyball game;
Performing a floor exercise to music while being judged by the teacher or other designated person

Fitness (F) - Conditioning activities related to appropriate participation or repetitive activities for fitness development.
examples: Group stretching exercises;
Mile run for endurance conditioning

Other Motor Activity (O) - Motor activity unrelated to the specific goals of the day's instruction.
example: A student is practicing walk-overs and hand-springs before a class in volleyball is officially begun

Knowledge Focus (K) - Activities which have knowledge about skills, fitness, etc. as the major focus.
examples: Listening to a lecture on scoring in bowling Watching a film about golf etiquette

Social Behavior (S) - Activities in which social behavior, attitudes, etc. are the major focus.
example: Demonstrating and verbalizing to the teacher examples of proper etiquette on the tennis court
Definitions of Learner Moves

Engaged Motor Response (M) - Student is performing a skill or is involved in a supportive role.
examples: Bumping a volleyball to oneself; Chaise' on the balance beam; Moving to receive a pass in a basketball game; Covering second base although play is at first

Engaged Indirect (I) - Student is involved in an activity but is not directly involved in the action or in an active supportive role.
examples: A right fielder between pitches; A basketball player who stays at one end of the court while his/her team fastbreaks; Spotting another student on the uneven bars when spotting is not the main focus of instruction

Engaged Cognitive (C) - Any motor, oral or covert response that involves the directions to an activity, verbal instructions, and demonstrations regardless of whether focus of the instruction is skill, a game, history, fitness, or rules.
examples: Student asks a question; Student listens to a discussion of game strategy; Student is reading or thinking about the instruction
Not Engaged Interim (NI) - Any non-instructional interim activity that is part of the physical education activity. Such an interruption should be a natural part of the activity.
examples: Changing sides of the court;
Changing equipment;
Retrieving the ball before the next service

Not Engaged Waiting (NW) - Time during an activity when a student is waiting for help or waiting to participate again.
examples: Student is waiting for his turn to tumble on the mat;
Student is waiting (as a substitute) to rotate into the volleyball game

Non Engaged Off-Task (NO) - Periods when a student is appropriately disengaged from the lesson.
examples: Student is talking to another student while the teacher is demonstrating;
Student is pushing or using equipment inappropriately while in skill practice;
Student has the opportunity to practice a skill but does not

Definitions of Difficulty Level

Easy (E) - Few errors are made and little effort is required to perform successfully. This includes review work. Errors are made only through student carelessness.
examples: A student is able to serve 70% of his/her serves into the opponents court during a volleyball game. 70% is the criterion set by the teacher for successful performance;
In an elementary class the student is able to balance on one foot for 3 seconds as required by the teacher;
In a modified basketball game, the student is able to move smoothly without the ball so that a teammate can complete a successful pass to him/her

Medium (M) - Any performance that is other than hard or easy.
examples: The student serves the volleyball which clears the net but barely touches the top thus making the serve illegal;
A student in attempting to balance on one foot wobbles slightly and is unable to hold the position for a full 3 seconds

Hard (H) - Any performance in which many errors are made, and the student appears to be unable to perform appropriately. The student's chances of performing the task appear to be no greater than succeeding by luck.
examples: On receiving a served ball, the student consistently misses making a pass or hits the ball out of control towards the ceiling; on the parallel bars the student cannot support his weight in a straight arm support
Definitions of Teacher Behaviors

Lecturing (LE) - Refers to the times that the teacher gives facts or opinions about content or procedures. It is a time when the teacher could be expressing his/her ideas or the ideas of someone else. The teacher may lecture to one or many students.

Giving Directions (G) - Refers to the times the teacher directs a student or groups of students to perform a task. The direction may be either verbal or nonverbal. If a teacher gives a verbal and nonverbal direction (e.g., go to the stairs and points at the same time), the verbal direction takes priority in coding.

Listening (L) - Refers to the times in which a teacher listens to a student's question or response. The teacher may be listening to one student or a group of students. The teacher must be silent for the full interval.

Asking Questions (AQ) - Refers to the times that a teacher asks questions about content or procedures with the intent of obtaining a response. Rhetorical questions should not be coded in this category.

Answering Questions (Q) - Refers to the times that a teacher answers a student or group of students' questions.

Nonfunctional (NF) - Refers to the times that the teacher is engaged in behavior that is unrelated to the content or procedures of the class. Talking to a visitor or an observer are prime examples.
Monitoring (M) - Refers to the times that a teacher observes a class without reacting verbally to the behaviors of individuals in the class. The teacher must have eye contact with the class or individual(s) in the class to code this category. Watching the class play a game is an example.

Maintenance (MT) - Refers to the times in which the teacher is engaged in activities that are indirectly related to the class objectives. These include such behaviors as roll call, writing a hall pass, putting away or handing out equipment, grading papers, or administering first aid.

Spotting (S) - Refers to the times that the teacher is assisting a student in the performance of a motor task with the intent of providing safe conditions for the student. If the teacher engages in verbal behavior while spotting, the verbal behavior should receive priority for coding purposes.

Hustles (H) - Refers to the times that the teacher uses verbal statements or gestures to activate or intensify the motor performance of the student(s). Examples include such statements as RUN! RUN! RUN!; MOVE!; GO! GO! GO! Encouraging clapping of the hands would also be considered a hustle. The tone of the voice and general level of enthusiasm are extremely important in this category. Don't mistake these gestures as negative or corrective skill feedback statements.
Modeling (MO) - Refers to the times the teacher demonstrates a skill behavior for one or many students. If verbal instruction accompanies a modeling behavior, prioritize the modeling for coding purposes. Showing a student how to sit quietly would be a modeling behavior.

Behavior Praise (B) - Refers to the times a teacher provides positive or supportive statements or gestures to a behavior episode unrelated to motor skill performance. The statement may be general or contain more exact information. Examples include "Good," or "I like the way you lined up so quietly."

Nags (N) - Refers to the times the teacher verbally or nonverbally scolds a student or group of students for undesirable behavior in a low intensity manner. Nags also include pleas to the class that they return to on-task behavior that go unheeded by the students. Examples of Nags are: "I told you to get on the line," "listen up, listen up," "quit it, didn't I say stop chattering."

Punishment (P) - Refers to specific penalties imposed by the teacher to a student or group of students who exhibit disruptive behavior or deviant behavior. Examples include assigning a student to "time-out," paddling a student, or having a student apologize to another student or the teacher.

Teacher Participation (TP) - Refers to the period of time that the teacher actively participates in a game or
sport with the students. Any verbal behavior on the part of the teacher would take priority over this behavior.

**Officiating (O)** - Refers to the time in which the teacher is actively refereeing a sport or game. Verbal behavior which entails rules, regulations or judgements about the sport or game should be coded officiating.

**Feedback (F)** - Refers to the times that the teacher provides verbal or non-verbal information to a student during or following a performance. Such information can be positive or negative, general or specific or corrective. Examples: "Keep your toes pointed."

- "Great job!" making a "thumbs up" gesture;
- "Really lousy!"
- "Super, you followed through that time."
- "Good, but next time bend a little more at your knees."

The recording instrument that was used in this study is shown in Figure 3. A total of 108 coding intervals appear on each sheet and can be used to collect data on from one to three students and one teacher for a total of 21 minutes 36 seconds per sheet.

A six second interval for observing and recording was chosen because five second observation intervals are typical of other interval systems found in physical education teacher behavior and coaching research, particularly those using a four-tiered system for observation (McHattie, 1978).
<table>
<thead>
<tr>
<th>DATE</th>
<th>SCHOOL AND GRADE</th>
<th>RELIABILITY OBSERVER</th>
<th>CLASS ACTIVITY</th>
<th>TIME</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLASS ACTIVITY**

<table>
<thead>
<tr>
<th>S</th>
<th>C</th>
<th>M</th>
<th>D</th>
<th>TS</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

|      |      |      |      |      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |

**Figure 3 - ALT-PE Teacher Behavior Observation System**
(Crossman, 1979)(Freedman, 1978). The addition of one second to both the observation and recording period was added when the original four-tiered ALT-PE instrument was utilized for the first descriptive study in physical education (Metzler, 1979). With the addition of this fifth tier to the instrument, it seemed desirable to attempt to maintain the original interval time even though observers had to observe and record an additional behavior.

Each interval has five cells to record each of the coding levels. An enlarged model of the interval and the hierarchical decision process is shown in Figure 4.

<table>
<thead>
<tr>
<th>Setting</th>
<th>S</th>
<th>...Decision made for each interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>C</td>
<td>...Decision made for each interval</td>
</tr>
<tr>
<td>Learner Move</td>
<td>M</td>
<td>...Decision made in each interval in which content-PE is recorded</td>
</tr>
<tr>
<td>Difficulty</td>
<td>D</td>
<td>...Decision made in each interval in which content-PE and learner engagement is coded</td>
</tr>
<tr>
<td>Teacher Behavior</td>
<td>TB</td>
<td>...Decision made for each interval</td>
</tr>
</tbody>
</table>

Figure 4: Model of Coding Interval and Decision Hierarchy

Since the ALT-PE-TB recording instrument is designed for on-site observations, this required some consideration of observer placement in the class environment and the cuing of recording intervals.
Because some of the coding involved verbal behavior, the observer needed to be close to the teacher and the target students. This required that the observer be mobile enough to change observation positions without actually tracking the teacher. It was felt that observers ought to remain as inconspicuous as possible and not be a cause of disruption to the normal class setting.

To allow for this mobility and to ensure accurate timing for each interval, a portable cassette tape player was used to cue the observer for observation and recording. Figure 5 illustrates the cuing sequence.

The observer will first hear the number of the target student and then the interval number so as to facilitate proper observation and recording. No rests are programmed into the sequence, however, coders may take a break as they rewind the tape to being a new coding sheet.

The observers used ear jacks for listening to the cuing tape so that the audio tape did not interfere with the class. When two observers were employed simultaneously for a reliability check, a spliced ear jack was used to ensure that both observers were recording in identical intervals in the sequence.

In this study, each tier of each interval was limited to the coding of one symbol. When such is the case, priority coding needs to be established (Johnson and Bolstad, 1974).
(Target Student) (Interval)

"Observe One - One" "Record One - One" ... "Observe One - Thirty-Six" "Record One - Thirty-Six"

"Observe Two - One" "Record Two - One" ... "Observe Two - Thirty-Six" "Record Two - Thirty-Six"

"Observe Three - One" Record Three - One" ... "Observe Three - Thirty-Six" "Record Three - Thirty-Six"

Figure 5

Cassette Tape Recorder Program Format
for Observation with ALT-PE-TB Observation System
In the setting level, the definitions are not prioritized, therefore the observer was instructed to code that setting which had the longest duration.

In the content level, all Content-PE behaviors take priority over Content-General behaviors. Within Content-PE, the categories Skill Practice, Scrimmage, Game, Fitness and Other Motor receive priority over Knowledge and Social Behavior.

In the Learner Moves level, student engagement is prioritized over non-engagement. Within the Engaged category, motor response was prioritized over indirect or cognitive response.

In the Difficulty Level, responses of an easy level are prioritized over those of a medium or hard level.

In the Teacher Behavior level, the priorities were as follows:

1. Feedback and Hustles
2. Behavior Feedback
   a. Behavior Praise
   b. Punishment - Nags
3. Teacher Modeling
4. Teacher Talk and Listening
   a. Lecturing
   b. Giving Directions
   c. Listening
   d. Asking Questions
   e. Answering Questions
5. Teacher Oriented Activities
   a. Monitoring
   b. Maintenance
   c. Non-functional
   d. Officiating
   e. Spotting
   f. Teacher Participation

If two behaviors of the same priority level occurred in the same interval, the observer was instructed to determine which behavior had the longer duration.

Description and Training of Observers

Five individuals collected data for this study. Three of these persons were doctoral students in physical education, one was a lecturer in physical education, and one was a senior undergraduate student in physical education. This investigator functioned primarily as a reliability checker, however, she did collect some solo data due to the inability to secure enough observers to fully cover all observation sessions.

All of the observers were female, and four had had previous experience in observational recording. For the one undergraduate student, this was a beginning experience. One observer was a foreign student who had had extensive experience in using recording systems in her native language, but for whom this was the initial experience using English.

Training procedures commenced three weeks prior to the collection of data in the field for three of the observers.
Two observers were already trained in the ALT-PE-TB observation system. The following list describes the steps followed during the training of the observers.

1. Each observer was provided with a manual explaining the ALT-PE-TB observation system including the definitions of all categories and behaviors, and a copy of a decision log that had been compiled during field testing to date (see Appendix B). Observers were given five days to familiarize themselves with the contents of the manual.

2. Observers were provided with written behavioral definitions that appeared in the manual they studied. Beside each definition, observers were required to write the name of each behavior category and its corresponding code. Criterion for acceptance was 18 of 20 items correct (see Appendix B).

3. Observers were provided with written descriptions of settings, content, learner moves, difficulty levels and teacher behaviors. Beside each description, observers were required to write the correct coding symbol. Criterion for acceptance was 27 of 30 items correct.

4. Once each observer was able to attain criteria on the tasks described in #2 and #3 (all did so on the first attempt), training sessions were begun in
the Physical Education Teaching Learning Center (TLC) at Ohio State. During the first session, in order to enable each observer to feel comfortable with the ALT-PE-TB observation system and the interval recording sequence, observers and the investigator practiced coding a videotape and focusing on only one subject and the teacher. The tape would be stopped frequently to clear up questions regarding appropriate coding.

5. Once observers were comfortable with the format, each would code one student and one teacher on videotape. The coding sheet would then be compared to that of the investigator.

6. After coding one student and one teacher, observers would code two students and one teacher. Coding sheets would likewise be compared to that of the investigator.

7. Next, observers began practicing coding three subjects and one teacher. At this time formal reliability calculations were made against the investigator's coding sheet. In order to be eligible to begin the final check-off in a live setting, observers had to obtain reliability agreements of .80 for behavioral categories in each tier of the system. Observers were encouraged to practice on their own in both live and videotaped setting in order to increase their proficiency.
8. When observers were able to obtain criterion in the videotaped setting, they were then required to demonstrate acceptable reliability of .80 two times consecutively in a live setting. Observations were made at the Ohio State University in physical education classes in both the basic and major instructional programs. These criterion levels are similar to those employed by Stewart (1977) and Metzler (1979) and suggested by Johnson and Bolstad (1974).

No observer was allowed to begin data collection in the field until this final objective was reached on two successive sessions. It was intended that such a stringent training procedure would guard against a learning effect during the early stages of data collection.

Following training, each observer was given a weekly schedule (see Appendix C) indicating the schools, subjects to be observed, dates and times of the observations. After each observation, coders returned all coding sheets to the investigator.

Procedures for obtaining inter-observer agreement are discussed in the following section.

Reliability

Much has been written in the recent literature regarding determination of the reliability of data collected with interval recording instruments (Johnson and Bolstad, 1973;
Hawkins and Dotson, 1975). The consensus of these reviews is that no single reliability method can be used adequately to estimate interobserver agreement in all interval recording instruments (Hawkins and Dotson, 1975). It is apparent that each of the several methods identified has obvious assets and liabilities, most of which depend on the amount of behavior occurring.

For this study, reliability was reported for the student variables of major interest: ALT-PE, ALT-PE Motor Response, and the combined Non-Engaged categories for each target student. Reliability was also reported for all 19 teacher behaviors and for the category Content-General.

The procedure for obtaining interobserver reliability in both the training phase and data collection phase was as follows:

1. A split ear jack was connected to the cassette deck so both observers could hear the cues at the same interval.

2. Reliability estimates were obtained by comparing codes for each observer using a Scored-Interval procedure (Hawkins and Dotson, 1975; Metzler, 1979).

3. In this Scored-Interval method, only those intervals in which both observers coded the same behavior are considered agreements. All other intervals in which both observers coded other behaviors are not included in the calculations.
4. Percent agreement was obtained by using the following formula:

\[
\frac{\text{number of intervals in agreement}}{\text{number of intervals in agreement} + \text{number of intervals in disagreement}} \times 100
\]

The results of the reliability checks in training and in the field observations are reported in Chapter IV.

The following steps were observed during the course of this study to aid in ensuring accurate and reliable data collection.

1. **Comprehensive observer training** (as has been outlined previously.

2. **Rotation of observers**: Observers were rotated into each observation classroom in an attempt to safeguard against bias and expectancy effects. One observer was unable to observe in the third classroom due to schedule conflicts.

3. **Reliability estimates across the observation schedule**: Reliability was checked across the entire length of the observation schedule both during baseline and intervention phases.

4. **Periodic retraining**: Each observer received a brief retraining session during the course of the study which simply consisted of an individual meeting with the investigator and an updating of the current decision log being used (see Appendix D).
**Intervention and Design of the Study**

Given the assumption that changes in student academic learning time (ALT-PE) will be a function of changes in teacher behavior, this intervention was designed to change certain teacher behaviors using baseline data from the observational instrument to guide the intervention.

Before collecting baseline data, it was hypothesized that low ALT-PE, particularly in the Engaged Motor category might be associated with some of the following teaching characteristics:

1. Frequent and prolonged managerial and transitional episodes
2. Instructional time exceeding allocated practice time
3. High rates of student non-engagement consisting of waiting in line or off-task behavior
4. Low rates of feedback from the teacher.

At the beginning it was determined that any technique utilized to increase student ALT-PE would have to have a low response cost for teachers, otherwise the behaviors would not be maintained in the teaching environment (Siedentop, Birdwell and Metzler, 1978). In view of this fact, a series of brief, inexpensive mini-clinics were conducted at the school sites during each phase of the intervention.

Subjects one and two were involved in a replication of one study in which three behavioral interventions were utilized. A multiple baseline design across behaviors was utilized to investigate functional relationships.
The protocol for these two replications appears in Figure 6.

Subject One                                                                 Subject Two
Intervention
#1 - Management time                                           #1 - Management time
#2 - Student non-engagement                                      #2 - Feedback
#3 - Feedback                                                   #3 - Student non-engagement

Figure 6. Multiple Baseline Protocol

Management time was retrieved from the coding instrument by counting the number of intervals in which Content-General was recorded and dividing by the total number of intervals to arrive at a percentage of intervals.

Student non-engagement was determined by counting the intervals in which any of the Not-Engaged categories were coded. This number was then divided by the total number of intervals for each target student to arrive at a percentage of Non-Engaged for each student.

Feedback was determined by counting the number of intervals in which teacher feedback was recorded and dividing by the total number of intervals to arrive at a percentage of Feedback.

A second study was undertaken with subject three because it was apparent that a multiple baseline across behaviors would not be possible due to the limited number of observations. Therefore, baseline data collection was started
earlier for this subject and only one intervention was made on student non-engagement. Data during this intervention for subject three was then used as the top tier in a multiple baseline across subjects as subsequent interventions were made on this behavior for subject one and subject two.

Results of these studies and graphic presentations will be included in the next chapter.

Therefore, the major dependent variables in this study were management time, student non-engagement, and teacher feedback. Two other variables, ALT-PE (includes all ALT categories: Motor, Indirect and Cognitive), and ALT-PE-Motor were examined via a concurrent baseline but were not directly intervened upon.

The independent variable or intervention consisted of a short clinic in which each subject was initially presented with the learning packet in Appendix F. After allowing the subject to read the packet and ask questions, the first behavior targeted for change was introduced. This behavior change was presented to the teaching using the form in Appendix F.

As an example, when intervening on management time for both subjects one and two, two suggestions for change were made: roll call innovation and an initial class activity (Siedentop, 1976). Instruction was given regarding implementation of the two procedures.

An important facet of the intervention called for feedback regarding performance and the graphing of progress.
Before the next teaching session, subjects were provided with feedback, in the form of a percentage, which they would then graph on a form provided by the investigator.

As each new intervention phase began, the investigator would repeat the procedure of meeting with the subject and presenting a new behavior for change. Again the graphing procedure was stressed and subjects contained to graph all previous behaviors that had been subject to prior intervention.

Subjects were given no feedback on the ALT variables.

**Methods of Data Analysis**

Typically operant researchers have relied heavily on visual inspection of their data when making conclusions regarding the effectiveness of their experimental manipulation. This researcher will attempt to draw some conclusions about the various changes from phase to phase in this study utilizing this method.

An additional procedure of data analysis, namely a time series analysis, was considered as a supplement to the visual analysis. The purpose of a time series analysis is to examine trends in data and changes in the level of the data across various phases of an experiment. The time series analysis evaluates such changes by considering the serial dependency of the data, in other words, determining the exact nature of the dependency. Autocorrelations are utilized to
determine how much the individual data points are influenced by past observations, the purpose being to separate chance fluctuations from interventions effects.

The analysis is accomplished by applying one of several statistical models to the data in order to transform the data to remove the serial dependency. Once the transformation has been made, t tests for changes in level and slope are performed in the time series analysis.

Time series analyses have not been commonly reported in the literature of applied behavior analysis and are not intended to replace visual inspection of the data, particularly if the effects of intervention are marked.

Some of the limitations of utilizing a time series analysis were instrumental in influencing the decision to not employ this technique in this particular study.

Typically, time series models require a relatively large number of data points to determine the model most appropriate for use. For example, many authors have recommended that at least 50 (Glass, Willson and Gottman, 1974) and preferably 100 (Box and Jenkins, 1970) data points be required, with at least 10 data points in each phase (Jones, Vaught and Reid, 1975). Reliable results may be difficult to obtain with phases of shorter duration.

Since this study was of relatively short duration, ranging from a total of 15-26 data points with less than 10 data points in most phases, this form of analysis is deemed inappropriate for the analysis of the data.
The basic analytic procedure for the observational data will be frequency of occurrence as expressed in the percent of total intervals for teacher behaviors; Content-General; and the student behaviors: Not Engaged, ALT-PE, and ALT-PE(M). Percent of total intervals was obtained by counting the number of intervals for each behavior and then dividing that figure by the total number of coded intervals in that category. (Data recording forms may be found in Appendix E.)

Summary

This chapter described the subjects and the setting in which those subjects were observed. Next a thorough discussion of the ALT-PE-TB observation system was presented, which included the precise student and teacher behavioral definitions employed in the instrument. A description of the training of observers and inter-observer reliability methods for observers were also presented. The intervention and design of the study were described, and the major variables of interest carefully indicated. The chapter concluded with a brief discussion of the methods of data analysis. Chapter IV will present the results of this study.
CHAPTER IV
ANALYSIS AND DISCUSSION OF THE DATA

This chapter will report the results of the interventions on the teaching and student behaviors of the three teachers who were subjects for this study. Visual inspection of graphic data and the reporting of mean change between baseline and intervention will aid this analysis. Results of the two replications of the multiple baseline across three behaviors will be presented. Results of the multiple baseline across one behavior of three teachers will also be presented.

The first section of this chapter will present the results of the ALT-PE-TB observation system inter-observer reliability calculations. A short discussion of the reliability of the data collected for analysis will follow.

Reliability

Reliability was checked for each subject teacher at least once per condition for a total of four times for each teacher. Each observer was checked for reliability once in each setting. A total of twelve reliability checks were made which included 33 individual checks on target students.

Tables 2 through 4 present the scored-interval agreement percentages for the dependent variables, student non-engagement.
and management; for the concurrent variables ALT-PE and ALT-PE(M); and for thirteen categories of teacher behaviors (some of which have been combined). The reader is directed to Chapter III (p. 43) for the names of the behavioral categories that correspond to the coding symbols displayed in the tables. An agreement percentage which a (*) denotes a category that did not meet the acceptable criterion level of S-I agreement established in the study. A category marked (-) denotes that the behavior was not observed during that particular reliability session.

Reliability Discussion

Based upon the results of the scored-interval inter­observer reliability agreement percentages, it appears that the ALT-PE-TB observation system and data collection procedures were reliable sources of data. It was calculated that 90.2 percent of all individual behavior category S-I agreement percentages were at or above the criterion level of acceptance established previously.
Table 2

Scored-Interval Reliability Agreement
Percentages for Teacher 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Reliability Checks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Management</td>
<td>89</td>
<td>100</td>
</tr>
<tr>
<td>Not-Engaged Student 1</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Not-Engaged Student 2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Not-Engaged Student 3</td>
<td></td>
<td>93</td>
</tr>
<tr>
<td>ALT-PE</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>ALT-PE(M) S#1</td>
<td>96</td>
<td>81</td>
</tr>
<tr>
<td>ALT-PE</td>
<td>82</td>
<td>100</td>
</tr>
<tr>
<td>ALT-PE(M) S#2</td>
<td>86</td>
<td>100</td>
</tr>
<tr>
<td>ALT-PE</td>
<td>81</td>
<td>84</td>
</tr>
<tr>
<td>ALT-PE(M) S#3</td>
<td>85</td>
<td>81</td>
</tr>
<tr>
<td>LE/G</td>
<td>79</td>
<td>75</td>
</tr>
<tr>
<td>M</td>
<td>100</td>
<td>62*</td>
</tr>
<tr>
<td>F</td>
<td>62*</td>
<td>74*</td>
</tr>
<tr>
<td>MO</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>MT/NF</td>
<td>95</td>
<td>89</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td>-</td>
<td>41*</td>
</tr>
<tr>
<td>AQ/Q</td>
<td>80</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(*) Denotes a percentage below criterion level.
(-) Denotes the behavior was not recorded by either observer.
Table 3

Scored-Interval Reliability Agreement Percentages for Teacher 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Reliability Checks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Management</td>
<td>94</td>
</tr>
<tr>
<td>Not-Engaged</td>
<td>92</td>
</tr>
<tr>
<td>Student 1</td>
<td></td>
</tr>
<tr>
<td>Not-Engaged</td>
<td>-</td>
</tr>
<tr>
<td>Student 2</td>
<td></td>
</tr>
<tr>
<td>Not-Engaged</td>
<td>98</td>
</tr>
<tr>
<td>Student 3</td>
<td></td>
</tr>
<tr>
<td>ALT-PE</td>
<td>83</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>82</td>
</tr>
<tr>
<td>ALT-PE</td>
<td>-</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>-</td>
</tr>
<tr>
<td>ALT-PE</td>
<td>91</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>100</td>
</tr>
<tr>
<td>LE/G</td>
<td>82</td>
</tr>
<tr>
<td>M</td>
<td>76</td>
</tr>
<tr>
<td>F</td>
<td>81</td>
</tr>
<tr>
<td>MO</td>
<td>85</td>
</tr>
<tr>
<td>MT/NF</td>
<td>81</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
</tr>
<tr>
<td>TP</td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td>-</td>
</tr>
<tr>
<td>AQ/Q</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>-</td>
</tr>
<tr>
<td>S</td>
<td>91</td>
</tr>
</tbody>
</table>

(*) Denotes a percentage below criterion level.
(-) Denotes the behavior was not recorded by either observer.
Table 4

Scored-Interval Reliability Agreement
Percentages for Teacher 3

<table>
<thead>
<tr>
<th>Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>81</td>
<td>90</td>
<td>86</td>
<td>100</td>
<td>89.25</td>
</tr>
<tr>
<td>Not-Engaged Student 1</td>
<td>92</td>
<td>87</td>
<td>100</td>
<td>100</td>
<td>94.75</td>
</tr>
<tr>
<td>Not-Engaged Student 2</td>
<td>100</td>
<td>-</td>
<td>85</td>
<td>100</td>
<td>95.00</td>
</tr>
<tr>
<td>Not-Engaged Student 3</td>
<td>86</td>
<td>100</td>
<td>-</td>
<td>93</td>
<td>93.00</td>
</tr>
<tr>
<td>ALT-PE S#1</td>
<td>80</td>
<td>84</td>
<td>100</td>
<td>100</td>
<td>91.00</td>
</tr>
<tr>
<td>ALT-PE(M) S#1</td>
<td>76*</td>
<td>100</td>
<td>91</td>
<td>100</td>
<td>91.75</td>
</tr>
<tr>
<td>ALT-PE S#2</td>
<td>92</td>
<td>-</td>
<td>83</td>
<td>100</td>
<td>91.66</td>
</tr>
<tr>
<td>ALT-PE(M) S#2</td>
<td>84</td>
<td>-</td>
<td>78*</td>
<td>87</td>
<td>83.00</td>
</tr>
<tr>
<td>ALT-PE S#3</td>
<td>93</td>
<td>88</td>
<td>-</td>
<td>100</td>
<td>93.66</td>
</tr>
<tr>
<td>ALT-PE(M) S#3</td>
<td>86</td>
<td>91</td>
<td>-</td>
<td>83</td>
<td>86.66</td>
</tr>
<tr>
<td>LE/G</td>
<td>98</td>
<td>83</td>
<td>88</td>
<td>94</td>
<td>90.75</td>
</tr>
<tr>
<td>M</td>
<td>100</td>
<td>100</td>
<td>82</td>
<td>89</td>
<td>92.75</td>
</tr>
<tr>
<td>F</td>
<td>67*</td>
<td>81</td>
<td>83</td>
<td>86</td>
<td>79.25*</td>
</tr>
<tr>
<td>MO</td>
<td>100</td>
<td>0*</td>
<td>91</td>
<td>75*</td>
<td>67.25*</td>
</tr>
<tr>
<td>MT/NF</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>98.33</td>
</tr>
<tr>
<td>N</td>
<td>100</td>
<td>67*</td>
<td>-</td>
<td>100</td>
<td>89.00</td>
</tr>
<tr>
<td>TP</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AQ/Q</td>
<td>-</td>
<td>85</td>
<td>-</td>
<td>-</td>
<td>85.00</td>
</tr>
<tr>
<td>O</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>-</td>
<td>80.00</td>
</tr>
<tr>
<td>H</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>100.00</td>
</tr>
<tr>
<td>B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>100.00</td>
</tr>
<tr>
<td>S</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>76*</td>
<td>76.00*</td>
</tr>
<tr>
<td>P</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(* Denotes a percentage below criterion level.
(-) Denotes the behavior was not recorded by either observer.)
Summary of the Data

As cited previously in Chapter III, the major portion of this study consisted of two replications of the intervention across several behaviors in the classrooms of two teachers. A multiple baseline design across behaviors was utilized to show the functionality of the intervention by demonstrating that the intervention produced the same kind of behavior change across three behaviors of the same subject in the same setting (Cooper, 1974).

Teacher 1

Teacher one, as described in Chapter III, taught for seven weeks in a junior high school setting to a class of highly skilled ninth graders. Two units were covered throughout the duration of the study, both of them being team sports—basketball and volleyball.

After eight days of baseline observation, the first behavior was targeted for intervention. Table 5 shows the change from a baseline mean percentage of 26.1 intervals of management to an intervention mean of 6.3. This is a significant reduction in management behavior as can be readily observed on the graph in Figure 7. Baseline data indicated that this teacher accumulated most of his management time at the beginning of his class. Instruction about and implementation of a sign-in roll-call procedure and the posting of an initial activity, as well as feedback after every observation session were successful in decreasing managerial episodes in this class.
The second behavior targeted for change was a student behavior—the percentage of intervals in which the student was not engaged (whether waiting, interim or off-task). Again the same intervention strategy was used whereby the teacher was provided with instructions as to how student non-engagement might be reduced and then was given feedback about each target student's not-engaged percentage after each observation session. Table 6 shows the mean percentage of non-engagement for all three target students during baseline and intervention. It is interesting to note that the baseline percent of not-engaged intervals of 21.2 is considerably lower than the percent non-engagement reported by Metzler (1979). Metzler reported 36.7 percent total intervals not-engaged in junior high school settings in his descriptive study. Such a low baseline figure may be attributed to several factors in this classroom. First, the class size was small (18) and there was ample opportunity to make responses; second there was enough equipment for all students; third, this was a class of highly skilled students who
obviously enjoyed physical activity. Hence, it is not surprising to note only a small change after intervention in this behavior. Visual inspection of the second tier of the graph in Figure 7 is showing a downward trend in non-engagement toward the end of the study. The range of scores for the three target students (indicated by the vertical lines) is also decreasing in size.

Table 6. Mean Percentage of Not-Engaged Intervals of Three Target Students - Teacher 1

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Baseline $\bar{X}$</th>
<th>Intervention $\bar{X}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{X}$ percent of not-engaged intervals of 3 target students</td>
<td>21.2</td>
<td>16.0</td>
</tr>
</tbody>
</table>

The third behavior targeted for intervention was that of teacher feedback to students. The teacher was simply instructed to try to increase all types of verbal feedback to students, not necessarily just to the target students, and was given feedback on this behavior after each observation session. Table 7 displays the mean increase in percentage of intervals in which feedback was observed from baseline to the intervention phase. The third tier of the graph in Figure 7 clearly demonstrates a significant increase from baseline to intervention.
Table 7. Mean Percentage Intervals of Feedback - Teacher 1

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Baseline $\bar{X}$</th>
<th>Intervention $\bar{X}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{X}$ percentage intervals of feedback</td>
<td>12.1</td>
<td>26.2</td>
</tr>
</tbody>
</table>

Teacher 2

Teacher 2 taught for seven weeks to a class of tenth graders covering units in gymnastics and badminton and table tennis.

After five days of baseline observation, having observed a counter-therapeutic trend in the percentage of intervals of management, intervention began. (See Tier 1 on graph in Figure 8.) Although a mean percentage of management time of 11.7 (see Table 8) would normally be considered an acceptable percent, it was felt that the figure could be substantially reduced. Like Teacher 1, this teacher accumulated most of his managerial episodes at the beginning of his class during attendance-taking and by not providing an initial activity for students. Instructions about and the implementation of an attendance system that required no class time, and the use of posted activity cards at the beginning of the period were successful in substantially reducing classroom management. Likewise, this teacher continued to receive feedback on his managerial percentage after each observation session, and he recorded these on a graph (as described in Chapter III).
The second behavior targeted for intervention was teacher feedback to students. Table 9 indicates that instructions, feedback and graphing were successful in changing the baseline percentage of 13.3 to an intervention percentage of 38.7. The second tier of the graph in Figure 8 clearly demonstrates a significant change between phases.

The third behavior targeted for change was the student behavior percentage of not-engaged intervals (including wait, interim, and off task). The baseline mean percent intervals not-engaged for the three target students was 45.4 (see Table 10) which is a bit higher than the mean not-engaged
percent of 40.7 reported by Metzler for high school settings. This high baseline percent may have been influenced by the activity conducted during the first 10 sessions of the study. There seemed to be a higher incidence of not-engaged intervals for students in gymnastics due to the fact that they often had to wait in line to respond (such as on the vault or balance beam), and there tended to be more standing around even though there were opportunities to respond (i.e. open spaces on the mats for tumbling). Table 10 indicates the change after intervention which consisted of instructions regarding improving student engagement and feedback on student non-engagement. The third tier of the graph in Figure 8 displays a significant decrease in not-engaged categories between phases of the study.

<table>
<thead>
<tr>
<th>Teacher 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
</tr>
<tr>
<td>mean percent not-engaged intervals of three target students</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher 3</th>
</tr>
</thead>
</table>
While two separate replications of this study were being conducted on Teachers 1 and 2, a third study was being conducted with Teacher 3. Due to the fact that this teacher
taught at the elementary level and, therefore, did not meet his class as many times as the secondary level teachers, only one intervention was made on this teacher.

Baseline data collection was begun for Teacher 3 well before collection in the other two settings. A multiple baseline across one behavior in the three teaching settings was utilized to show a functional relationship between the intervention and the observed change in behavior.

The behavior targeted for change was the mean percent intervals of not-engaged for the three target students in each teacher's classroom. The graph in Figure 9 presents the multiple baseline across this one behavior. Table 11 shows the baseline mean percent intervals not-engaged for teacher 3 to be 33.3. This figure is extremely close to that reported by Metzler (1979) for not-engaged intervals at the elementary level. The subject matter in this classroom changed very little and consisted of movement and ball handling skills throughout the study. Instructions to the teacher regarding decreasing student not-engaged intervals and the graphing of daily feedback for all three target students resulted in a mean percent not-engaged for intervention of 10.4. Table 11 reports the baseline and intervention mean percent not-engaged intervals for students of all three teachers.
Table 11
Baseline and Intervention Mean Percentage Not-Engaged Intervals for Target Students of all Three Teachers

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 3</td>
<td>33.3</td>
<td>10.4</td>
</tr>
<tr>
<td>mean percent not-engaged intervals for three target students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 1</td>
<td>21.2</td>
<td>16.0</td>
</tr>
<tr>
<td>mean percent not-engaged intervals for three target students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 2</td>
<td>45.2</td>
<td>13.8</td>
</tr>
<tr>
<td>mean percent not-engaged intervals for three target students</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
No feedback was given to Teacher 3 regarding management time or feedback. Figure 10 shows the graphs of both behaviors which seem to improve steadily throughout the study without intervention.

**Concurrent Baseline Variables - ALT-PE, ALT-PE(M)**

The variables ALT-PE and ALT-PE(M) were examined for significant changes from baseline through the various phases of intervention by use of a concurrent baseline. This concurrent baseline was added as a fourth tier to the multiple baseline intervention design so that changes might be more easily observed. Since these variables were in no way directly manipulated in this study, no statements of causality will be made. However, significant changes in the dependent variables in this study will be discussed as they might relate to significant changes in the concurrent baseline variables.

Data will be presented as a mean percentage for each of the experimental phases. The means and ranges of the ALT-PE(M) variable for the three target students in each teacher's class are graphically presented in Figures 7, 8 and 9. This variable was chosen for graphing instead of the ALT-PE variable because it seems to be a better indicator of students' opportunity to learn motor skills in physical education. Data for ALT-PE will be presented in forthcoming tables.
These variables will be discussed in the context of each individual teacher's classroom.

**Teacher 1**

Table 12 shows the mean ALT-PE and ALT-PE(M) variables across the phases of this study for teacher 1.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>Total Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-PE</td>
<td>41.16</td>
<td>58.95</td>
<td>50.30</td>
<td>70.88</td>
<td>60.04</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>17.25</td>
<td>43.65</td>
<td>33.08</td>
<td>40.96</td>
<td>39.26</td>
</tr>
</tbody>
</table>

Table 12 shows a substantial increase in both ALT-PE and ALT-PE(M) from baseline to the first intervention. Visual inspection of the graph in Figure 7 shows a significant change in level in the ALT-PE(M) variable. This increase in ALT-PE and ALT-PE(M) occurred along with a significant decrease in management time from a mean of 26.1 to a mean of 6.3.

Phase II intervention on student not-engaged categories showed a decrease in ALT-PE from 58.95 to 50.3, and a decrease in ALT-PE(M) from 43.65 to 33.08. This decrease corresponded to an increase in student not-engaged percentage as can be seen on the second tier of the graph in Figure 7. This increase in non-engagement and the subsequent decrease
in ALT appeared to be a result of an increase in student not-engaged waiting. This waiting occurred as students rotated in and out of volleyball games. Such a strategy resulted from the teacher's failure to plan games that would keep all players active as much of the time as possible.

At the time of the third intervention, the teacher was instructed to increase his feedback to students, continue to keep management time low and work on some strategies to keep student not-engaged categories low. The teacher was able to move to modified volleyball games in which students had more opportunity to respond and did not have to wait to substitute into the game. The not-engaged category slowly began to decrease as can be noted on the second tier of the graph in Figure 7, and the feedback mean increased from a baseline figure of 12.1 to 26.2. In correspondence with these dependent variables, the ALT-PE variable increased to a mean of 70.88, and ALT-PE(M) increased to 40.96.

The total intervention means, which include data from all three intervention phases, were 60.04 for the ALT-PE and 39.26 for ALT-PE(M).

Teacher 2

Table 13 presents the mean percentage ALT-PE and ALT-PE(M) variables across all phases of this study for Teacher 2.
Table 13. Mean Percentage ALT-PE and ALT-PE(M) - Teacher 2

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>Total Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-PE</td>
<td>19.86</td>
<td>29.53</td>
<td>51.09</td>
<td>67.40</td>
<td>49.34</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>12.18</td>
<td>18.83</td>
<td>35.15</td>
<td>58.06</td>
<td>37.34</td>
</tr>
</tbody>
</table>

The first ten data points on the graph in Figure 8 reflect a gymnastics unit. The remainder of the study was a badminton/table tennis unit.

Table 13 shows a slight increase in both ALT-PE and ALT-PE(M) from baseline to intervention one. The first intervention on management time was successful in decreasing this percentage from a baseline mean of 11.7 to an intervention mean of 4.1. However, the large amount of student not-engaged categories (mean of 52.0 for the first ten days) most likely had a significant role in holding down ALT.

With the second intervention of increasing feedback to students came a substantial increase in ALT-PE to 51.09 and in ALT-PE(M) to 35.15. However, a change in activity from gymnastics to badminton and table tennis was most likely responsible for not only the increase in the ALT variables but also a drop in student not-engaged categories without intervention (see Figure 8, tier 3). In badminton and table tennis, students had more of an opportunity to respond, they each had their own implement, and there was
no waiting in line to get onto a piece of equipment as in gymnastics.

With the third intervention on the not-engaged categories as well as a continuation of the decrease in managerial time and an increase in feedback to students, a significant increase in ALT-PE to 67.4 and in ALT-PE(M) to 58.06 was observed. Intervention was successful in decreasing student non-engagement from a baseline mean of 45.4 to an intervention mean of 13.8. This intervention was not confounded by a switch of activities since the unit remained the same throughout all of interventions 2 and 3.

A total intervention mean of 49.34 was reported for ALT-PE and 37.34 for ALT-PE(M) in Teacher 2's classroom.

**Teacher 3**

Table 14 presents the mean percentage ALT-PE and ALT-PE(M) variables across the one intervention phase of the study on Teacher 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-PE</td>
<td>43.32</td>
<td>62.80</td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td>23.44</td>
<td>42.46</td>
</tr>
</tbody>
</table>

Teacher 3 taught content to a class of second graders that was relatively consistent in focus throughout the study.
The unit consisted of movement activities, throwing and catching skills with bean bags, and ball handling skills.

Intervention on student not-engaged categories was successful in decreasing this behavior from a baseline mean of 33.3 to an intervention mean of 10.4. This intervention was also successful in subsequently changing student not-engaged percentages across the other two teachers in this study (see Figure 9).

Upon examining the baseline ALT means for this teacher, it is obvious that they were much higher than the baseline means for the other two teachers. However, with just one intervention, a corresponding increase was observed for ALT-PE from a baseline mean of 43.32 to an intervention mean of 62.8 and for ALT-PE(M) from a baseline mean of 23.44 to an intervention mean of 42.46.

**Summary**

The results of the data collection and intervention study were presented in Chapter IV. Descriptive statistical analysis were conducted upon the teacher behavior data and the ALT-PE data from live observation of in-class behavior.

Mean percentages of occurrence were reported for baseline and intervention phases on the main dependent variables of interest: management time, feedback and student not-engaged combined categories. The not-engaged category was expressed as a mean percentage of the three target students in each teacher's classroom. The ranges of the not-engaged
category were graphically presented as well. The results of the reliability determinations were presented.

Mean percentages of occurrence for the combined data from the three target students in each class were reported for the concurrent baseline variables ALT-PE and ALT-PE(M). Data were presented in baseline and all three baseline phases as well as a total intervention mean.

A discussion of the data for each separate classroom followed presentation of the data analysis.

Chapter V will summarize the study, present conclusions drawn from the results, and suggest future research directions involving Academic Learning Time in Physical Education.
Figure 7. Graph of percentage of Intervals of Management, Student Non-Engagement, Feedback and ALT-FE(M) - Teacher 1
Figure 8. Graph of percentage of Intervals of Management, Student Non-Engagement, Feedback and ALT-PE(%) - Teacher 2.
Figure 9. Graph of Percentage of Student Non-Engagement for Teachers 1, 2, 3, and ALT-PE(%) for Teacher 3.
Figure 10, Graph of Percentage of intervals of Feedback and Management - Teacher 3
CHAPTER V

SUMMATION OF THE STUDY

This chapter will present conclusions based upon the results of the intervention studies on in-service teachers in physical education. The chapter concludes with recommendations for further study of ALT-PE as a teaching process variable.

A Review of the Study

The two purposes of this study were:

1. To modify the original ALT-PE instrument so that teacher behaviors can be recorded simultaneously with student ALT.

2. To intervene on teacher behaviors in several physical education contexts in order to increase student academic learning time.

Academic Learning Time, conceptualized as a measure of teaching effectiveness within the Beginning Teacher Evaluation Study (BTES), can be viewed as an intervening process variable or link between teacher behavior and student achievement. Hence, teachers will try to influence students' time-on-task, or Academic Learning Time, and a subsequent increase will result in increased student achievement. Due to the fact that in Physical Education it is quite difficult to accurately assess student achievement, this Academic
Learning Time variable becomes a viable method of determining student performance as well as teaching effectiveness.

From the BTES findings come the identification of several teaching behaviors that appear to be consistently associated with student achievement. Some of these include feedback skills, diagnostic skills, and the ability to keep students engaged with academic materials.

The review of the BTES literature indicated that the ALT variables hold promise as measures of teacher effectiveness and student achievement in physical education. The review also showed that there might be several ways to increase ALT either through direct intervention or through changing various teaching behaviors.

The first phase of this study involved the modification of the original ALT-PE instrumentation to include a measure of teacher behavior. This phase included adding another level to the existing instrument, designing a training manual for observers and establishing reliability parameters for inter-observer agreement.

The second phase of the study involved the collection of data in three physical education settings at the elementary, junior high, and senior high school levels. Three teachers, one at each level, served as subjects for the study. Three target students in each teacher's classroom were selected at random, from a group of students having high attendance, for observation. Interventions consisting of short instructional clinics and daily feedback
were conducted on several teacher and student behaviors. A total of 28 observations and three interventions were made on Teacher 1. A total of 26 observations and three interventions were made on Teacher 2. A total of 13 observations and one intervention were made on Teacher 3.

A multiple baseline across behaviors was utilized to show a functional relationship between the intervention and the behaviors for Teachers 1 and 2. The variables ALT-PE and ALT-PE(M) were examined via a concurrent baseline but were never subject to intervention. A multiple baseline across one behavior of three different subjects was utilized to show a functional relationship between intervention and the dependent variable of Teacher 3. The variables ALT-PE and ALT-PE(M) likewise were examined by means of a concurrent baseline and were not directly intervened upon.

Observers were trained in a sequential task program to learn the ALT-PE Teacher Behavior Observation System. Reliability was checked four times in each setting, at least once per condition. Ninety percent of all individual category scored-interval agreement percentages met or exceeded criterion levels established prior to data collection.

The data were subjected to descriptive statistical analysis for each phase of the study. Mean percentages of occurrence were presented for baseline, each intervention phase, and the total intervention period for all three dependent variables as well as the two concurrent variables.
Data for the three target students on the variables not-engaged, ALT-PE and ALT-PE(M) were expressed as means with the range being indicated for each data point.

Conclusions

The conclusions of this study will be divided into three categories: conclusions for Teacher 1; Teacher 2; and Teacher 3.

The first set of conclusions refer to the analysis of the data in the study from Teacher 1.

1. Intervention consisting of instructions and daily feedback was successful in decreasing managerial time from a baseline mean of 26.1 to an intervention mean of 6.3.

2. Intervention was successful in reducing an already low percentage of student non-engagement in baseline of 21.2 to an intervention percentage of 16.0.

3. Intervention was successful in increasing teacher feedback from a baseline mean of 12.1 to an intervention mean of 26.2.

4. Though no statements of causality can be made, ALT-PE increased from a baseline mean of 41.16 to a total intervention mean of 60.04; ALT-PE(M) increased from a baseline mean of 17.25 to an intervention mean of 39.26.

5. The increase of ALT-PE from baseline of 41.16 to phase I of 58.95, and of ALT-PE(M) from baseline of
17.25 to phase I of 43.65 occurred along with the decrease in managerial time from 26.1 to 6.3. A case could be made that a reduction in management time might significantly influence an increase in ALT-PE and ALT-PE(M).

6. The decrease in ALT-PE from Phase I of 58.95 to Phase II of 50.3, and in ALT-PE(M) from Phase I of 43.65 to Phase II of 33.08 occurred along with an increase in student-non-engagement in spite of intervention on this variable. This decrease in ALT-PE and PE(M) and the increase in not-engaged might have been a result of a changing focus in the volleyball activity from drills to games in which some students had to wait to play.

7. The increase in ALT-PE from Phase II of 50.3 to Phase III of 70.88, and in ALT-PE(M) from Phase II of 33.08 to Phase III of 40.96 occurred along with an increase in feedback from 12.1 in baseline to 26.2 in intervention. The not-engaged category began to decrease again as a result of the teacher's modification of the volleyball game strategy.

8. All three variables, management, feedback, and student not-engaged, appear to influence ALT. However, it appears that the strongest of the three variables is the not-engaged variable. When this variable decreased, an increase was noted in both ALT variables. When non-engagement increased, ALT decreased.
The second set of conclusions refer to the analysis of the data from the study of Teacher 2.

9. The baseline mean percentage of occurrence of management time was relatively low, 11.7, yet intervention was successful in reducing this figure to 4.1.

10. Intervention was successful in increasing teacher feedback from a baseline mean of 13.3 to an intervention mean of 38.7.

11. The third behavior, student-not-engaged, remained in baseline throughout the major portion of the study. The high baseline rate of 45.4 may have been influenced by high rates of non-engagement during the first 10 sessions in which students were in a gymnastics unit. Hence changes in baseline at Day 11 were a function of the change in activity to a unit on badminton and table tennis. However, when intervention did occur, baseline data had been collected with students in this unit for 9 days. The mean for the days in badminton and table tennis was 36.6. Therefore, change from a baseline of 36.6 to an intervention mean of 13.8 is still sufficiently strong to predict that the intervention was responsible for the significant change.

12. Though no statements of causality can be made, ALT-PE increased from a baseline mean of 19.86 to
a total intervention mean of 49.34. ALT-PE(M) increased from a baseline mean of 12.18 to a total intervention mean of 37.34.

13. The increase in ALT-PE from baseline of 19.86 to Phase I of 29.53 and in ALT-PE(M) from baseline of 12.18 to Phase I of 18.83 occurred during a reduction in management time from 11.7 to 4.1. Such a small change might be accounted for by the fact that the variable student-not-engaged for this gymnastics unit remained at a baseline mean of 52.0.

14. The increase in ALT-PE from Phase I of 29.53 to Phase II of 51.09 and in ALT-PE(M) from Phase I of 18.83 to Phase II of 35.15 occurred during the second intervention in which feedback was increased from a baseline mean of 13.3 to an intervention mean of 38.7. In examining the data further, it is most likely that this increase in ALT (as well as the drop in student non-engagement without intervention to a mean of 36.6) is a result of a switch in activities to the badminton/table tennis unit and not the variables management and feedback.

15. The increase in ALT-PE from Phase II of 51.09 to Phase III of 67.4 and in ALT-PE(M) from Phase II of 35.15 to Phase III of 58.06, corresponds to the third intervention which was successful in reducing student non-engagement from a baseline mean of 36.6
(badminton unit only) to an intervention mean of 13.8. Since this intervention was not confounded by a switch in activities, it is highly possible that the reduction in the non-engagement category along with a continued reduction in managerial time and an increase in feedback had an influence on increasing both ALT variables.

The third set of conclusions refer to the analysis of data in the study of Teacher 3.

16. Intervention consisting of instructions and daily feedback was successful in reducing the mean percentages of student non-engagement from a baseline mean of 33.4 to an intervention mean of 10.4.

17. The increase in ALT-PE from a baseline of 43.32 to an intervention of 62.8 and in ALT-PE(M) from a baseline of 23.44 to an intervention of 42.46 occurred simultaneously with a decrease in the percentage of student non-engagement due to intervention. This study presents perhaps the most substantial evidence regarding the strength of the variable, student not-engaged, in influencing student ALT-PE and ALT-PE(M).

This study demonstrated that instructions and daily feedback to teachers were a successful and cost effective method for changing teacher behaviors and for helping teachers to change student behaviors. In noting the increase in the ALT-PE and ALT-PE(M) variables, it can be said that
student achievement in physical education improved throughout the duration of this study, given the assumption that these variables are related to student achievement.

**Recommendations for Further Study**

This study represented one of the initial efforts to change Academic Learning Time in physical education settings. It might represent a model for conducting future experimental studies involving ALT-PE. The following suggestions for further research might be categorized into three areas: additional experimental studies; descriptive studies; and process-product studies.

Recommendations for further experimental studies include:

1. Systematic replication of this study utilizing additional subjects at the elementary, junior high and high school levels.

2. Additional intervention studies designed to increase ALT-PE which utilize ALT-PE and ALT-PE(M) as directly manipulated dependent variables.

3. Use of time series analysis to analyze significant trends in data such as changes in level and trend in dependent or concurrent baseline variables.

4. Experimental studies using an in-service workshop as an intervention strategy to increase ALT-PE.

5. Experimental studies utilizing pre-service teachers as subjects.

Recommendations for further descriptive studies include:

1. Descriptive studies to determine differential patterns of teaching behavior in classrooms which produce high and low rates of ALT-PE.
2. Development of recording instruments to collect data specific to large numbers of motor skill (sport) areas. Use of these instruments to collect descriptive data in numerous sport areas.

3. Use of descriptive data from the original ALT-PE recording instrument to validate the degree to which mainstreamed students receive instruction and the opportunity to respond, appropriate to their special needs.

Recommendations for process-product research:

1. Development of reliable and valid product measures of performance in physical education to enable correlations to be made between such measures and the ALT Variables. It is recommended that individual sports such as gymnastics, swimming or archery might provide a useful starting point for the development of such measures.

2. Development of Experimental Teaching Units (ETU's) in physical education to facilitate the measurement of teacher effectiveness utilizing a process-product approach.

In order for the Academic Learning Time variables, ALT-PE and ALT-PE(M), to truly become valid means for assessing student achievement in physical education and thus the effectiveness of teachers of physical education, valid product measures of the acquisition of motor skills in physical education must be established. Only then will it be possible to specifically determine the relationship between ALT and achievement in physical education.
APPENDIX A
SUMMARY OF ORAL PRESENTATION TO SUBJECTS

I am a doctoral student in physical education, and I would like to work with you in your classroom for my dissertation. I would like to watch you teach one class for a ten week period. During that time I will be observing your behavior as well as collecting some data on the achievement of your students. The first portion of the study will involve myself or one of my colleagues observing your classes without providing any feedback to you. During the second portion, we will be sharing the results of the data collection with you and asking that you spend approximately four hours participating in a series of clinical interventions designed to help you change some behaviors. We will also be providing you with information concerning the achievement of your students as you work on changing certain behaviors. Of course this is strictly voluntary and you will be able to discontinue participation at any time. Observations will be as unobtrusive as possible in order not to disrupt the flow of activities in your classroom. A written consent form will be provided for your official confirmation as a participant.
---THE OHIO STATE UNIVERSITY---

CONSENT FOR PARTICIPATION IN
SOCIAL AND BEHAVIORAL RESEARCH

I consent to participating in (or my child’s participation in) a study entitled The Effects of Modification of Teacher Behavior on the Academic Learning Time of Selected Students in Physical Education

Deborah M. Birdwell (Investigator/Project Director or his/her authorized representative) has explained the purpose of the study and procedures to be followed. Possible benefits of the study have been described as have alternative procedures, if such procedures are applicable and available.

I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have raised have been answered to my full satisfaction. Further, I understand that I am (my child is) free to withdraw consent at any time and to discontinue participation in the study without prejudice to me (my child). The information obtained from me (my child) will remain confidential and anonymous unless I specifically agree otherwise.

Finally, I acknowledge that I have read and fully understand the consent form. I have signed it freely and voluntarily and understand a copy is available upon request.

Date: December 5, 1979 Signed: ____________________________

(Participant)

Deborah M. Birdwell (Investigator/Project Director or Authorized Representative) [Person Authorized to Consent for Participant – If Required]

PA-027 (2/79) -- To be used only in connection with social and behavioral research for which an OSU Human Subject Review Committee has determined that the research poses no risk to participants.
APPENDIX B
INTRODUCTION

This is the training manual which you will use to prepare yourself to utilize the Academic Learning Time-Physical Education-Teacher Behavior Observation System (ALT-PE-TB). The system is designed for on-site observations of students in physical education classes at all grade levels.

The coding system is based on interval recording techniques in which student and teacher behaviors are observed for short periods of time and then recorded onto the ALT-PE-TB coding sheet.

This manual is intended to take you through the training procedures for the ALT-PE-TB system in a sequenced, step-wise fashion. Ten tasks have been prepared to teach you to reliably code with this system. Tasks 1 through 3 may be completed on your own and at your own pace within five days of receiving this manual. Tasks 4 through 9 must be completed under the supervision of the principle investigator in the Teaching-Learning Center. Task 10 must also be completed with the investigator in live settings at Ohio State University. Once the criterion for task 10 has been met two times in succession, you will be ready to begin actual data collection in the public school classrooms.
TASK 1

On the next six pages you will find a list of the 27 ALT-PE behavioral definitions and 17 teacher behavior definitions to be used in the ALT-PE-TB recording instrument. Study this list carefully until you can identify each behavior category, its coding symbol, and the corresponding behavioral definition.

Once you have learned the definitions, symbols and behavior categories, proceed to TASK 2.
**SETTING:** Assign a setting and content code for each interval.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Instruction (D)</td>
<td>Teacher controls instruction, focus, and pacing of instruction (includes attendance checks, announcements, other preliminary classwork, etc.).</td>
</tr>
<tr>
<td>Task (T)</td>
<td>Instruction defined by task - multiple station and/or multiple task.</td>
</tr>
<tr>
<td>Reciprocal (R)</td>
<td>Students in pairs for instruction and feedback to each other.</td>
</tr>
<tr>
<td>Group (G)</td>
<td>Same functions as reciprocal with larger group.</td>
</tr>
<tr>
<td>Guided Discovery (GD)</td>
<td>Teacher leads students toward predetermined goal through series of sequenced prompts.</td>
</tr>
<tr>
<td>Problem Solving (P)</td>
<td>Teacher controls instruction through sequenced problems in which alternative solutions are possible.</td>
</tr>
</tbody>
</table>

**CONTENT-GENERAL**

<table>
<thead>
<tr>
<th>Content</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait (W)</td>
<td>Period when student has performed the necessary activity (after transition or management) and is</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transition (T)</td>
<td>Time devoted to class business that is related to instructional activity (includes managerial activities related to instruction, such as equipment change, lining up, selecting teams, etc.).</td>
</tr>
<tr>
<td>Management (M)</td>
<td>Time devoted to class business that is unrelated to instructional activity, such as taking attendance.</td>
</tr>
<tr>
<td>Break (B)</td>
<td>Intentional periods of no activity to rest students, drink water, etc.</td>
</tr>
<tr>
<td>Non-academic Instruction (N)</td>
<td>Activities which fall outside the narrow domain of focused instruction, such as rapport building.</td>
</tr>
<tr>
<td>CONTENT-PE Skill Practice (P)</td>
<td>Direct participation in drills and other activities in which the primary goal is individual skill development.</td>
</tr>
<tr>
<td>Content-PE Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Scrimmage (S)</strong></td>
<td>Controlled group practice in which instruction and feedback are frequent.</td>
</tr>
<tr>
<td><strong>Game (G)</strong></td>
<td>Practice under game conditions.</td>
</tr>
<tr>
<td><strong>Fitness (F)</strong></td>
<td>Repetitive activities for fitness development such as calisthenics, running laps, weight lifting, etc. Also warm up and cool down activities such as stretching.</td>
</tr>
<tr>
<td><strong>Other Motor Activity (O)</strong></td>
<td>Motor activity unrelated to specific goals of the day's instruction.</td>
</tr>
<tr>
<td><strong>Knowledge Focus (K)</strong></td>
<td>Activities in which teacher is giving verbal instructions or demonstration about skill, fitness, historical information, strategies, rules, etc. as the focus.</td>
</tr>
<tr>
<td><strong>Social Behavior (B)</strong></td>
<td>Activities in which social behavior, attitudes, etc. are the focus.</td>
</tr>
</tbody>
</table>

**LEARNER MOVES**: Assign a learner moves code for every interval in which one of the content-PE codes is assigned.

**Engaged, Motor Response (M)** | Student is performing a skill including supportive motor
Engaged, Indirect Participation (I)

Student is in an activity but is not directly involved with the immediate action such as right fielder during pitch, basketballer who does not move down court during a fast break, servicing another player by spotting, feeding balls, or other supportive activities unless that is the main focus of the instruction.

Engaged, Cognitive (C)

Cognitive involvement related to instruction, such as listening, questioning, verbal responding, or thinking about the activity (as in problem solving).

Not Engaged, Interim (NI)

Any non-instructional activity that is a natural part of the practice activity (such as changing equipment, changing sides of a court, retrieving the ball, etc.).
Not Engaged, Waiting (NW)

Time during activity when student is waiting for help or waiting to participate again. (Student does not have an opportunity to respond, such as in line or a substitute or waiting for equipment to be repaired, etc.).

Not Engaged, Off Task (NO)

Periods when student is inappropriately disengaged from the practice, including socializing, daydreaming, misbehaving and failing to respond when given the opportunity.

DIFFICULTY LEVEL: Assign a level of difficulty for every interval in which one of the engaged codes are entered on the learner moves level.

Easy (E)

Few errors are made and student performs appropriately with little effort, experiencing success frequently. In game or scrimmage situations the student anticipates properly, moves and responds to situations appropriately and fulfills the roles demanded by the game.
Medium (M)  
Any performance that is other than easy or hard. When in doubt, code the response as medium.

Hard (H)  
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.

TEACHER BEHAVIORS: Assign a teacher behavior for every interval.

Lecturing (LE)  
Teacher gives facts or opinions about content or procedures. Teacher may lecture to one or many students.

Giving Directions (G)  
Teacher directs a student or group of students to perform a task. The direction may be verbal or non-verbal.

Listening (L)  
Teacher listens to a student's question or response. Teacher may be listening to one student or a group of students and must be silent for the full interval.
Asking Questions (AQ)  Teacher asks questions about content or procedures with the intent of obtaining a response. Rhetorical questions should not be coded in this category. Questions may be individual or group oriented.

Answering Questions (Q)  Teacher answers a student or group of student's questions.

Nonfunctional (NF)  Teacher is engaged in behavior unrelated to the content or procedures of the practice. Talking to a visitor or an observer are prime examples.

Monitoring (M)  Teacher observes the practice without reacting verbally to the behaviors of individuals in the practice. The teacher's eyes must be directed toward at least one individual in the practice to code in this category. Watching a practice game is an example.

Maintenance (MT)  Teacher is engaged in activities that are indirectly related to the practice objectives. These
include such behaviors as checking attendance, putting away or handing out equipment, or administering first aid.

**Hustles (H)**

Teacher uses verbal statements or gestures to activate or intensify the motor performance of the student(s). Examples include such statements as "Run, run, run," "Move," "Go, go." Encouraging clapping of the hands would be considered a hustle. The tone of the voice and general level of enthusiasm are extremely important in this category. Do not mistake these statements and gestures as negative or corrective skill feedback statements.

**Modeling (MO)**

Teacher demonstrates a skill behavior for one or many students. If verbal instruction accompanies a modeling behavior, prioritize the modeling for coding purposes. Showing a student how to perform a skill properly would be a modeling behavior.
Officiating (O) Teacher is actively refereeing a sport or game. Verbal behavior which entails rules, regulations or judgements about the sport or game should be coded officiating.

Behavior Praise (B) Teacher provides positive or supportive statements or gestures to a behavior episode unrelated to motor skill performance. Examples include "Tremendous class, you lined up beautifully," or "I like the way you are sitting without talking, Judy."

Nags (N) Teacher verbally or nonverbally scolds a student or group of students for undesirable behavior or skill attempts in a low intensity manner. Nags also include pleas to the class that they return to on-task behavior that go unheeded by the students. Examples of nags are "I told you to get in line," "Listen up, listen up," "Quit it," "Didn't I say to stop chattering."
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punishment (P)</td>
<td>Specific penalties imposed by teacher to a student or group of students who exhibit disruptive or deviant behaviors. Examples include assigning a student to &quot;time-out,&quot; doing &quot;laps,&quot; having the student apologize to another student or the teacher.</td>
</tr>
<tr>
<td>Teacher Participation (TF)</td>
<td>Teacher actively participates in a game or sport with the students. Any verbal behavior on the part of the teacher would take priority over this behavior.</td>
</tr>
<tr>
<td>Spotting (S)</td>
<td>Teacher assists a student in the performance of a motor task with the intent of providing safe conditions for that student. If the teacher engages in verbal behavior while spotting, the verbal behavior should receive priority for coding purposes.</td>
</tr>
<tr>
<td>Feedback (F)</td>
<td>Teacher provides verbal or non-verbal information to a student during or following a performance. Such information can be positive</td>
</tr>
</tbody>
</table>
or negative, general or specific or corrective. Examples: "Keep your toes pointed."; "Good job!"; "Really lousy."; "Super, you followed through that time."
TASK 2

In the left hand column, you will find behavioral definitions as they appear on the list you have studied. Read each definition and write the corresponding behavior category and coding symbol in the right hand column.

The criterion level for this task is 18 out of 20 items answered correctly.
<table>
<thead>
<tr>
<th><strong>DEFINITION</strong></th>
<th><strong>CATEGORY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Teacher controls instruction, focus, and pacing of instruction - includes attendance checks, announcements, etc.</td>
<td></td>
</tr>
<tr>
<td>2. Students in pairs for instruction and feedback.</td>
<td></td>
</tr>
<tr>
<td>3. Period when student has performed the necessary activity (after transition or management) and is waiting for the next.</td>
<td></td>
</tr>
<tr>
<td>4. Intentional periods of no activity to rest, get water, etc.</td>
<td></td>
</tr>
<tr>
<td>5. Time devoted to class business that is unrelated to instructional activity.</td>
<td></td>
</tr>
<tr>
<td>6. Direct participation in drills and other activities in which the primary goal is individual skill development.</td>
<td></td>
</tr>
<tr>
<td>7. Motor activity unrelated to the specific goals of the day/s instruction.</td>
<td></td>
</tr>
</tbody>
</table>
8. Activities in which social behavior, attitudes etc, are the focus.

9. Athlete is performing a skill including supportive motor involvement such as screening in basketball, backing up in baseball, moving to block in volleyball.

10. Any non-instructional activity that is part of the class activity such as changing equipment, changing sides of the court, retrieving a ball, etc.

11. Cognitive involvement related to instruction, such as listening, questioning, verbal responding or thinking about the activity (as in problem solving).

12. Teacher gives facts or opinions about content or procedures, expresses his/her ideas of someone else. Teacher may lecture to one or many students.
13. Teacher listens to a student's question or response. Teacher may be listening to one student or group of students and must be silent for the entire interval.

14. Teacher is engaged in behavior unrelated to the content or procedure of the class. Talking to a visitor or an observer are prime examples.

15. Teacher is engaged in activities that are indirectly related to the practice objectives. These include such behaviors as checking attendance, putting away or handing out equipment, or administering first aid.

16. Teacher demonstrates a skill behavior for one or many students. If verbal instruction accompanies a modeling behavior, prioritize the modeling for coding purposes. Showing a student how to sit quietly would be a modeling behavior.
17. Teacher is actively refereeing a sport or game. Verbal behavior which entails regulations or judgements about the sport or game should be coded officiating.

18. Specific penalties imposed upon a student or group of students who exhibit disruptive or deviant behavior. Examples include, assigning a student to "time out," doing laps, having the student apologize to another student or the teacher.

19. Teacher praises a student's skill performance without referring to the specifics of the performance. The information may be verbal or nonverbal and directed toward an individual or group. Examples include: Great, Good job, Terrible (negative instance).

20. Teacher provides verbal information about how a student might improve or adjust a motor skill performance during that
performance or during a subsequent performance. Examples:
Keep your toes pointed, arch your back.
TASK 3

Complete the written test below. The column on the left will describe teacher and/or student behavior. On the line in the column on the right, enter the coding symbol for the behavior listed on the left. The criterion is 27 of 30 correct items.
<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Setting Level)</td>
<td></td>
</tr>
<tr>
<td>1. Teacher is checking attendance.</td>
<td></td>
</tr>
<tr>
<td>2. Class is in three groups each going to a</td>
<td></td>
</tr>
<tr>
<td>separate station for practice</td>
<td></td>
</tr>
<tr>
<td>3. Students are working in pairs giving help</td>
<td></td>
</tr>
<tr>
<td>to each other.</td>
<td></td>
</tr>
<tr>
<td>4. Students are doing calisthentics on</td>
<td></td>
</tr>
<tr>
<td>teacher's command.</td>
<td></td>
</tr>
<tr>
<td>(Content Level)</td>
<td></td>
</tr>
<tr>
<td>5. Students listen while teacher takes</td>
<td></td>
</tr>
<tr>
<td>attendance.</td>
<td></td>
</tr>
<tr>
<td>6. Teacher is explaining how to do a lay-up</td>
<td></td>
</tr>
<tr>
<td>prior to practice of the skill.</td>
<td></td>
</tr>
<tr>
<td>7. Student is walking to next stations.</td>
<td></td>
</tr>
<tr>
<td>8. Basketball players are doing a jump shot</td>
<td></td>
</tr>
<tr>
<td>drill.</td>
<td></td>
</tr>
<tr>
<td>9. Wrestlers are involved in two man contests.</td>
<td></td>
</tr>
<tr>
<td>10. Students are stretching before class begins.</td>
<td></td>
</tr>
<tr>
<td>11. Teacher is giving students directions for</td>
<td></td>
</tr>
<tr>
<td>changing stations.</td>
<td></td>
</tr>
<tr>
<td>12. Teacher goes to the other end of the gym</td>
<td></td>
</tr>
<tr>
<td>and the students are waiting for the next</td>
<td></td>
</tr>
<tr>
<td>activity.</td>
<td></td>
</tr>
<tr>
<td>(Learner Moves Level)</td>
<td></td>
</tr>
<tr>
<td>13. Student is changing the gymnastics apparatus.</td>
<td></td>
</tr>
</tbody>
</table>
14. Student is tossing yarn balls and catching them in one hand.
15. Student is fooling around with another.
16. Student is a substitute in basketball.
17. Student is listening to an explanation of a gymnastics routine.
18. Student has the opportunity to tumble on the mat but does not.

(Difficulty Level)
20. Basketballer travels during game.
21. Gymnast completes a beam routine in two attempts.
22. Basketballer is in poor defensive position away from the ball.

(Teacher Behavior)
23. Teacher urges more physical efforts from the students.
24. Teacher stands and watches the class practicing.
25. A student is reprimanded for being off task.
26. Teacher says, "good shot, but keep your hands down."
27. Teacher commends squad for organizing for practice efficiently.
28. Teacher demonstrates a routine for a gymnast.
29. Teacher is describing what is going to be done that day.

30. Teacher adjusts the uneven bars.
TASK 4

The investigator will give you several copies of the ALT-PE-TB interval recording instrument coding sheets. At this time you will also receive instructions on how to use the coding sheet, along with all coding conventions to be used while coding in target classrooms.
TASK 5

With the investigator present for immediate feedback and to answer questions, you will view a pre-selected video training tape focusing on one student and the teacher. You will verbally code the tape each time the investigator stops it. Whenever a wrong answer is given, the investigator will clarify the correct response.
TASK 6

Using the coding sheet, you will code one student and the teacher from a video training tape with the investigator. After the segment, your codes will be informally compared to what the investigator has coded. Any problems or questions will be examined at this time. You may continue to practice on various tapes without the investigator present in order to increase your efficiency.
TASK 7

The investigator will give you a copy of the coder's decision log. This log is the result of ALT-PE field testing and is designed to cover those instances of behavior which are not clearly within one single category. It also lists the several coding conventions to be used with the coding instrument.

It is very important that you understand all of the entries into the decision log, and know how to translate these decisions into observed student and teacher behaviors.

You will receive an update of decisions made throughout the duration of this study. You are encouraged to call to the investigator's attention, any instances of behavior that do not seem to fit clearly into the system. When confusion arises, a decision will be made and entered into the current decision log for future reference.
**Decision Log**

As with any category observation system, the definitions themselves are not sufficient as guidelines for coding decisions. During early practice coding, when reliability is being established it is important to keep a decision log with emphasis on specific examples relating to the instrument. The decision log will, eventually, help coders to observe and record consistently. The ALT-PE-TB decision log follows.

**Setting**

1. When a teacher is taking attendance or doing other preliminary class work, code direct instruction.
2. When instructional format is not yet clear, code direct instruction until it becomes clear and then adjust previous intervals. Circle the D code in the first interval in which the instruction is not clear, so as to mark the interval to begin your adjustment.

**Content**

1. Code management only for noninstructional time such as attendance taking, class business, and other matters unrelated to instructional activity.
2. Code transition for all managerial activities related to instruction such as equipment changes, lining up, selecting teams, etc.
3. Code wait only when student has performed necessary activity and is waiting for the next event. Wait can occur after management or after transition. Waiting in
line, or for the next turn to practice is coded on the learner move level, not on the content level.

4. Knowledge should be coded whenever the teacher is providing verbal instruction or giving a demonstration, regardless of whether the focus of the instruction is the skill itself, a game, history, fitness, or rules.

5. Skill practice should be coded only when the class is directly involved in participation.

6. Fitness should be coded for warm-up and cool-down activities as well as for lessons in which fitness is the primary objective.

7. When the teacher is giving directions to a part of the class, or part of the group in which the target student is located, and the directions are not to the target student, code the content of the movement and code the target student by him/herself.

Learner Moves

1. Engaged motor should be coded not only for direct involvement in the activity, but also for motor involvement in game settings that involve a supportive rather than a direct role; i.e., setting a screen in basketball, moving to block at the net in volleyball, or covering second base in a baseball/softball game even though the play is at first base.

2. Engaged indirect should be coded when a student is in a game, drill, or scrimmage, but is not directly involved
or in an active supporting role; i.e., a right fielder between pitches, a basketball player who stays at one end of the court while his/her team fastbreaks.

3. Whenever the teacher is giving directions, as per content decision number 7, code engaged cognitive for the student. If the student is on-task, automatically assign a difficulty level of easy.

4. Servicing another student, such as spotting, hitting ground balls, measuring or timing, and other supportive activities are coded engaged indirect unless that activity is the main focus of the instruction.

5. Code not engaged waiting when a student is a substitute in a game.

6. Code not engaged interim when an interruption is a natural part of the game or drill, such as changing sides, retrieving the ball, etc.

   Code wait (on the content level) if the interruption is not a natural part of the game or drill, such as repairing equipment.

7. If the student is waiting and does not have the opportunity to make a response, code not engaged waiting.

   If the student is waiting and does have an opportunity to make a response, code not engaged off-task.
Level of Difficulty

1. Assign a level of difficulty for every interval in which one of the engaged codes are entered on the learner moves level.

2. In a drill setting, assess the level of difficulty according to the objectives set forth by the teacher, whether they be directly stated or implied.

3. In order for a response to be coded as easy, it must meet the criterion very well, and the response must have been performed with ease.
   WHEN IN DOUBT CODE THE RESPONSE AS MEDIUM, BECAUSE IF YOU HAD DOUBT, IT PROBABLY WAS NOT EASY ENOUGH TO BE CODED AS EASY.

4. Code hard for all responses in which the student's chances of doing the task are not greater than succeeding by luck.

5. Code medium for all responses between easy and hard.

6. When in a game or scrimmage setting, a student's responses have to be judged according to how well the student performs the game behaviors. This involves anticipation, appropriate movement on the court/field, proper choice of responses, and appropriate filling of the roles demanded by the game/scrimmage. For easy to be coded, the student would have to anticipate properly, move appropriately, respond to situations appropriately, and fulfill the roles demanded by the game. When games are modified to fit the game-playing skills of the
students, they can often participate at an easy level of difficulty. But, most who often participate in a non-modified game, do not have the necessary game-playing skills to participate at an easy level.

**Hierarchy Decisions**

1. If two or more behaviors are observed in the same interval, and are located at different levels, code the behavior listed further to the right of the coding sheet.

2. If two behaviors from the same level are observed in the same interval, code the behavior listed higher on the coding sheet.

3. If the student makes more than one response in the same interval, code the response with the easiest level of difficulty.

**Coding Conventions**

1. If the present interval has any codes identical to those in the immediately preceding interval, place a (-) in the appropriate box(es).

2. If you miss an interval, leave it blank and get ready for the next observation interval.

3. If you discover that you are not in sequence with the cuing tape, begin coding again with the next numbered interval from the tape.
Teacher Behaviors

1. Prioritize the teacher behaviors as follows:
   a. Feedback and Hustles
   b. Behavior Feedback
      1) Behavior Praise
      2) Nags, Punishment
   c. Teaching Modeling
   d. Teacher Talk and Listening
      1) Lecturing
      2) Giving Directions
      3) Listening
      4) Asking and Answering Questions
   e. Other Teacher Activities
      1) Monitoring
      2) Maintenance
      3) Non-Functional
      4) Officiating
      5) Spotting
      6) Teacher Participation

2. Other decisions will be added as the study continues.
From a video-training tape, code two students and one teacher and compare your coding sheet to that of the investigator. This will also be done informally and you may continue to practice on your own.
TASK 9

With the investigator present, code one video training tape focusing on three students and one teacher. When you feel confident that you have had sufficient practice, you will code a new tape focusing again on three students and one teacher and comparing your coding sheet with that of the investigator. Your reliability will be checked and reported to you. Should you meet criterion, you will move to the tenth and final task.
In a physical education activity class at Ohio State University you will observe three students and the teacher with a reliability checker present (usually the investigator). You must meet the reliability criterion two times in succession in a live setting in order to collect data for analysis. Each time your reliability will be reported to you along with any needed feedback.
APPENDIX C
SCHEDULE FOR CODERS

WEEK OF ________________________________ CODER __________________

SCHOOLS AND DATES

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

SUBJECTS/SCHOOL _____________ SUBJECTS/SCHOOL _____________

#1 ________________________ #2 ________________________

#1 ________________________ #2 ________________________

#3 ________________________ #3 ________________________

DIRECTIONS TO SCHOOLS

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
DECISION LOG UPDATE

1. If a student is in a situation that would normally be coded as (K) in Content-PE and (C) in Learner Moves, and that student is not paying attention to the teacher but is not disrupting the class--code (K) - (NO).

2. The only time you would code a difficulty level other than easy (E) for (K)-(C) is when it is obvious the student is having trouble understanding the material presented.

3. Climbing onto a piece of apparatus in preparation for another task is coded Engaged-Indirect (DI) unless the climbing is actually part of the motor task. In that case, you would code (M).

4. A student keeping score is coded (K)-(C)-(E).

5. A student officiating is coded Engaged-Indirect (I).

6. Code Feedback (F) when the teacher is talking to a student during or after motor performance and you cannot understand exactly what the teacher said.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Observation</th>
<th>Phase</th>
<th>Date</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDENT 1</td>
<td>Obs. #1</td>
<td>Rel. Obs. #2</td>
<td>S.I. Rel.</td>
<td></td>
</tr>
<tr>
<td>ALT-PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Engaged</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STUDENT 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT-PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Engaged</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STUDENT 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT-PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT-PE(M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Engaged</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content-PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Behaviors</td>
<td>Obs. #1</td>
<td>Rel. Obs. #2</td>
<td>S.E. Rel.</td>
<td></td>
</tr>
<tr>
<td>LE/G</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT/NF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q/AQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## DATA RECORDING SHEET
(Continued)

<table>
<thead>
<tr>
<th>Teacher Behaviors</th>
<th>Obs. #1</th>
<th>Rel. Obs. #2</th>
<th>S.E. Rel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td>________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F
INTRODUCTION

The major objective of this project is to assist you in changing certain teaching behaviors in your classroom so that your students might have a better chance to accrue Academic Learning Time.

Academic Learning Time is simply the time that a student is on task with material relevant to the instruction in physical education at a low level of difficulty. We have evidence that leads us to believe such engagement is related to achievement in physical education. Hence if we can produce more ALT in physical education classes, students ought to become more skilled in this subject matter.

DATA COLLECTION AND INSTRUMENT

As you are well aware, we have been collecting data not only on your teaching behaviors, but also on three students in your class. The data we have collected on the three students allows us to get a picture of the ALT in your classroom.

Please look at the example coding sheet in this packet. This is an example of the format we use to collect data in your class. As you can see we can gain information about 1) the setting of the lesson; 2) the content (whether physical education related or managerial); 3) student engagement (whether the student is engaged in activity...
appropriately or is not engaged due to waiting or off task behavior; and 4) level of difficulty (High, medium or low) if the student is engaged. Data is also collected on various teaching behaviors such as lecturing, giving directions, questioning, feedback, spotting, monitoring, punishing and nagging etc.

**INTERVENTION**

The strategy to change teaching behaviors will be quite simple. I will examine one behavior or condition at a time and approach its improvement in a clinical manner. I will make suggestions for change at the beginning of the intervention and will assist you in practicing certain behaviors or preparing materials if necessary. This will require less than one hour of your time.

I will also teach you to graph your progress based upon data that I will give you following each observation. Each evening after an observation, I will phone you with the data you are to plot. This feedback and graphing should help you to chart your progress.

Each time a new behavior is targeted for change, I will visit your school and conduct a small clinic based upon that particular change to be implemented. You will then begin to graph that behavior as well as the behaviors that have already been targeted for change.
Graph paper is included in this packet, and I have graphed your baseline (period before any intervention) data points on the graph for you.

Barr, A.S.; & Emans, L.M. "What Qualities are Prerequisites to Success in Teaching?" Nations Schools, 1930, 6, 60-64.


Clark, M.S.; Lachowcz, J.; & Wolf, M.M. "A Pilot Incentive Remedial Education Program." Behavior Research and Therapy, 1968, 6, 183-188.


Good, T.L. "Teacher Effectiveness in the Elementary School." Journal of Teacher Education. 1979, 30, 52-64.


McNamara, J.R. "Teachers and Students as Sources for Behavior Modification in the Classroom," Behavior Therapy, 1971, 2, 205-213.


Ward, B.; & Tikanoff, W.J. "The Effective Teacher
Education Program: Application of Selected Research
Results and Methodology to Teaching," *Journal of

Washburne, C.; Vogel, M.; & Gray, W.S. "Results of Practical
Experiments in Fitting Schools to Individuals," *Supplementary Educational Monograph, Journal of

Wolf, M.M.; Giles, D.; & Hall, R.V. "Experiments with Token
Reinforcement in a Remedial Classroom," *Behaviour
Research and Therapy*, 1968, 6, 51-54.