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PREDICTION OF CLASSROOMS THAT ARE AT RISK:
IMPLICATIONS FOR STAFF DEVELOPMENT

by

Michelle Andreé Ellis-Schwabe

A Dissertation Submitted to the Faculty of the
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

1986
As members of the Final Examination Committee, we certify that we have read
the dissertation prepared by Michelle Andree Ellis-Schwabe
entitled Prediction of Classrooms That Are At-Risk:
Implications for Staff Development

and recommend that it be accepted as fulfilling the dissertation requirement
for the Degree of Doctor of Philosophy.

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S. Pearl Higginbotham  6-5-86
Marcia P. Dowd

Final approval and acceptance of this dissertation is contingent upon the
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I hereby certify that I have read this dissertation prepared under my
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SIGNED: Michelle Ellis-Schulke
DEDICATION

This dissertation is dedicated to my mother whose wisdom and encouragement has allowed me to find my own place among the landscapes and to my father whose profound integrity was and continues to be an inspiration to me.
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With the completion of this dissertation, I owe a debt of gratitude to a number of people; to Maryruth Farrell, without whose typing skills and professional patience, the completion of this dissertation may have been impossible; to the fifty University Education students whose careful observations provided the data on which this study is based; to Stephinee Pinnegar for her time and energy aiding in the administrative beginnings of this project; to Michael J. Wagner for his assistance and suggestions in the planning and analysis of the statistical components of this study; to my sister, Antoinette, for her professional editorial help in preparing this dissertation; to my committee members: Dr. Robert Grant and Dr. Shitala Mishra for their professional support and patience, Dr. Melvin R. Franklin and Dr. C. June Maker for their friendship and supportive words; and finally a special appreciation to my advisor and friend, Dr. David C. Berliner, for his guidance and encouragement over the last four years.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>viii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>ix</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem and Purpose of the Study</td>
<td>5</td>
</tr>
<tr>
<td>2. REVIEW OF THE LITERATURE</td>
<td>7</td>
</tr>
<tr>
<td>Time and Achievement Research</td>
<td>7</td>
</tr>
<tr>
<td>Models of School Learning</td>
<td>9</td>
</tr>
<tr>
<td>Process-Product and Descriptive Research</td>
<td>16</td>
</tr>
<tr>
<td>The Beginning Teacher Evaluation Study</td>
<td>19</td>
</tr>
<tr>
<td>Time and Teacher Variables in the Classroom</td>
<td>27</td>
</tr>
<tr>
<td>Opportunity to Learn</td>
<td>28</td>
</tr>
<tr>
<td>Allocated Time</td>
<td>31</td>
</tr>
<tr>
<td>Engaged Time</td>
<td>34</td>
</tr>
<tr>
<td>Academic Learning Time</td>
<td>47</td>
</tr>
<tr>
<td>Additional Teacher Variables</td>
<td>51</td>
</tr>
<tr>
<td>Teacher Evaluation</td>
<td>76</td>
</tr>
<tr>
<td>Staff Development</td>
<td>82</td>
</tr>
<tr>
<td>The Present, The Problems, The Future</td>
<td>90</td>
</tr>
<tr>
<td>The Present</td>
<td>90</td>
</tr>
<tr>
<td>The Problems</td>
<td>92</td>
</tr>
<tr>
<td>The Future</td>
<td>96</td>
</tr>
<tr>
<td>3. METHOD</td>
<td>100</td>
</tr>
<tr>
<td>Participants</td>
<td>100</td>
</tr>
<tr>
<td>Experimental Setting</td>
<td>101</td>
</tr>
<tr>
<td>Dependent Measure/Independent Measures</td>
<td>101</td>
</tr>
<tr>
<td>Instruments</td>
<td>103</td>
</tr>
<tr>
<td>Procedures</td>
<td>104</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>106</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>109</td>
</tr>
<tr>
<td>Descriptive Statistics</td>
<td>110</td>
</tr>
<tr>
<td>Correlational Analyses</td>
<td>112</td>
</tr>
<tr>
<td>Regression Analyses</td>
<td>117</td>
</tr>
<tr>
<td>Commonality Analyses</td>
<td>124</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS--Continued

5. DISCUSSION ................................................................. 131
APPENDIX A: DEFINITION OF TERMS ............................... 141
APPENDIX B: INDEPENDENT MEASURE CODING FORMS ........ 146
APPENDIX C: OBSERVER TRAINING FORMS ....................... 149
APPENDIX D: OBSERVER CORRESPONDENCE ..................... 155
APPENDIX E: TEACHER FORMS AND CORRESPONDENCE ...... 158
REFERENCES ................................................................. 166
LIST OF TABLES

Table                                                                 Page
1. Interrater Reliability for ALT and Related Variables Including Teacher Process Variables ........ 111
2. Classroom Means, Standard Deviations, Minimum and Maximum Values for ALT and Related Variables ........ 113
3. Intercorrelations Between Achievement Outcomes in Reading and ALT and Related Variables .................. 115
4. Intercorrelations Between Achievement Outcomes in Mathematics and ALT and Related Variables ............. 116
5. Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Reading Achievement Gain .......................................................... 119
6. Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Mathematics Achievement Gain ......................................................... 120
7. Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Reading Achievement Residual Scores .............................................. 121
8. Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Mathematics Achievement Residual Scores ............................................. 123
9. Explaining Variance in Reading Achievement Gain Using Commonality Analysis of ALT and Related Variables .......... 125
10. Explaining Variance in Mathematics Achievement Gain Using Commonality Analysis of ALT and Related Variables ................................................................. 126
11. Explaining Variance in Reading Achievement Residual Scores Using Commonality Analysis of ALT and Related Variables ............................................................ 128
12. Explaining Variance in Mathematics Achievement Residual Scores Using Commonality Analysis of ALT and Related Variables ......................................................... 129

vii
## LIST OF ILLUSTRATIONS

| Figure 1. | Schematic of the ALT Model | 15 |
| Figure 2. | Scatter Diagram of a Normal Regression Surface Using Validity Coefficients with Observational Data to Predict At-risk Classrooms | 135 |
ABSTRACT

This study was designed to isolate variables that could predict classrooms where there is some risk of low academic achievement. Observations were conducted in 18 second through sixth grade classrooms in Tucson, Arizona. A minimum of three observations were conducted in each classroom for each of two subject areas, reading and mathematics. The California Achievement Test was used as the pre and post outcome measure. Multiple correlation analyses were used to predict classrooms that would be expected to have low academic achievement gains over the course of one year of instruction. These "at-risk" classrooms were identified using variables derived from a model of academic learning time. The results indicated that the best predictors of reading achievement were process variables such as focusing on task and receiving corrective feedback. This was true when both achievement gain and achievement residuals were used as dependent measures. In mathematics, the best predictors of both achievement gain and achievement residuals were time variables such as allocated and engaged time. Though further research is necessary, this study suggests that variables associated with a model of academic learning time appear promising as predictors of classrooms that are at-risk. The possibility of early and valid predictions of this kind has obvious implications for staff development programs. Using the data from classroom observations, specific inservice procedures could be used to alleviate the causes of
academic risk. Staff development programs targeted to classrooms that are identified as at-risk would also allow more efficient use of scarce inservice dollars.
CHAPTER 1

INTRODUCTION

Research on the relationship between classroom instruction and student achievement is not new. Teacher effectiveness research has been in progress since the beginning of this century. Excellent histories on this topic are provided in Medley (1977a, 1977b), Dunkin and Biddle (1974), and Jackson (1968). Rosenshine (1979) divided the research between 1900 and 1979 into two major segments: the initial, or "old," teacher effectiveness research (1900 to about 1959) and the current, or "new," teacher effectiveness research of the last two decades.

The "old" teacher effectiveness research is described as having moved through two somewhat discrete phases. The first phase of this research, exemplified by the work of Barr and his associates, investigated the effects of such variables as teacher attitudes, personality characteristics, and amount of training on student achievement gains. These earliest studies centered on purely descriptive data generated by asking students to describe effective teachers. While these data provided some indicators about traits of teachers "perceived" by students as effective (Good, 1983; Duffy, 1981), the majority of these earliest studies resulted in nonsignificant findings which lacked any practical implications (Rosenshine, 1979). Getzels and Jackson (1963) assessed this earliest phase of research as having produced few reliable
conclusions concerning the relationship between specific teacher behaviors and teacher effectiveness.

The second phase of the "old" teacher effectiveness research emerged in the 1950s with the work of Flanders, Medley and Mitzel. This phase produced correlational studies which attempted to demonstrate that one instructional method was superior to another (Good, 1983; Duffy, 1981). Despite a new emphasis on empiricism, teacher accountability and instructional design, the majority of these studies failed to observe either instructional processes or classroom interactions (Duffy, 1981; Rosenshine, 1979). As a consequence, the findings were often inconclusive or contradictory and ultimately contributed little to the understanding of the relationship between teacher effectiveness and student achievement (Good, 1983; Rosenshine, 1979).

The "new" research on teacher effectiveness emerged in the late 1950s and early 1960s. The initial studies in this "new" period focused on classroom climate and teaching behavior that promoted student learning. Systematic classroom observation was emphasized. Despite the promise of this objective approach, the early results had limited impact (Good, 1983; Duffy, 1981; Rosenshine, 1979). Further developments in this period, such as the reaction to Sputnik, led educators and researchers to shift their attention from teacher behavior and classroom climate to curricular content and learning (Berliner and Rosenshine, 1977; Rosenshine & Berliner, 1978). The post-Sputnik federal initiatives in education were concerned considerably more with curriculum reform than with teacher training. This concern was reflected in the development of
"teacher-proof curricula" (Good, 1983, p. 6). The research in this area produced clear results indicating that students learned the content to which they were exposed (Walker and Schaffarzick, 1974).

A further move away from the study of teacher behavior and classroom climate was stimulated by the 1966 report on "Equality of Educational Opportunity" (Coleman, Campbell, Hobson, McPartland, Mood, Weinfield and York, 1966) and the 1972 report on "Inequality: A Reassessment of the Effect of Family and Schooling in America" (Jencks, Smith, Acland, Bane, Cohen, Gintis, Heyns, and Michelson, 1972). Despite the fact that these studies, focusing on the effects of primary-grade schooling, did not include systematic observation, they both presented the view that "educational attainment was largely independent of the schooling a child received" (Coleman et al., 1966, p. 1). Interestingly enough, even in their disavowal of teacher effects, Coleman and his colleagues suggested that approximately 20 percent of the variance in student outcomes could be accounted for by teacher behaviors. When looking at the complexity of the educational process, 20 percent of the variance accounted for may still be a socially significant effect (Berliner and Rosenshine, 1978).

Despite the difficulties and contradictions in the initial stage of the "new" research, the 1960s and 1970s proved to be an invaluable period for the growth of research on teaching. Interest in process-product variables increased (Rosenshine and Furst, 1973) as did the number of systematic observation instruments (Simon and Boyer, 1967, 1970). Questions concerning the reliability of the instruments and the stability of teacher behavior were dealt with by increasing the control
over extraneous variables as well as increasing the amount of classroom observation time (Brophy and Good, 1986). Eventually, the use of more sophisticated observation instruments, along with methodological refinements, produced more sensitive and significant data. This resulted in the appearance of interpretable and useful correlations between specific teacher behaviors and student achievement (see Rosenshine, 1971).

There were several specific events of the 1970s that built upon the progress of the 1960s and led the way to the present. Rosenshine and Furst (1971, 1973) discussed several of these events. First, in the 1970s, direct observation became a more frequently used method of teacher observation. This method led to more consistent findings. Second, in this decade more quantitative measurement of teacher behavior was promoted. This type of measurement enabled researchers to correlate more reliably teacher behavior variables to student achievement and to test these relationships in causal experiments. In 1974 Dunkin and Biddle's work, The Study of Teaching, helped define the field of research on teaching. Again, the need for empirical data, including descriptive data, adequate samples and comprehensive investigations was stressed.

Progress in the 1970s was also enhanced by the involvement of federal agencies such as the Office of Education and the National Institute of Education (NIE). In addition to the funding of evaluations and large scale field studies which examined teaching behavior, in 1974 NIE conducted a national conference on the study of teaching. With the aid of increased funding and national conferences, the field of research on teaching was established as a viable field of scientific inquiry.
During the last decade, with the work of researchers such as Berliner, Bloom, Harnischfeger and Wiley, the field shifted again from an emphasis on studying specific variables to looking at larger patterns of classroom interaction and time usage (Rosenshine, 1979).

The most recent and significant research efforts have focused on instructional time and teacher process variables (Rosenshine, 1977, 1978). These variables include allocated and engaged time, success rate, transition time and specific teacher behaviors and environmental factors that may affect student learning. Researchers are currently looking at the amount of time students spend engaged in academic tasks with high success and the achievement that results from such specific, active engagement (Berliner and Fisher, 1985; Rosenshine, 1979). This active engagement with high success in academic tasks related to the outcome measure is referred to as Academic Learning Time (ALT). As suggested by Berliner and Fisher (1985), the last decade of research on teaching has shown quite clearly that research on "instructional time can be used to modify instructional practices, and thereby improve schools" (p. 346). The current research has implications for improvements in teacher effectiveness and innovations in staff development and policy making.

Statement of the Problem and Purpose of the Study

This study addresses the need of school systems to identify classrooms that are in academic jeopardy in any particular school year. Classrooms can be "at-risk" for any number of reasons: new curriculum, new district policies or administrative philosophies, changing school populations and personnel, too little allocated time for a particular academic area, a lack of student engagement in an academic task,
curriculum content that is too difficult, too many interruptions, or the assignment of an unusually difficult group of students. Any of these conditions may affect a teacher's performance and student achievement.

Some causes of at-risk classrooms can be controlled or altered and others cannot. The ALT Model of instruction focuses on such alterable classroom variables as: allocated and engaged time, success rate, transition time, classroom interruptions and classroom organizational structure.

The purpose of this study is to examine the effect on student achievement gains of nine ALT and associated variables: (1) allocated time, (2) engaged time (involved time), (3) student engagement, (4) success rate, (5) academic learning time, (6) classroom transition time (uncommitted time), (7) classroom interruptions, (8) varying organizational structures and (9) various teacher behaviors. The terms used to define these variables are found in Appendix A.

If the above variables do predict student achievement, then, it will be possible to identify at-risk classrooms. Such prediction, especially early in the school year, will enable districts to provide teachers with specific procedures for making the needed classroom changes. These specific inservice procedures will improve the educational opportunity for the students in the at-risk classrooms for that year.
CHAPTER 2

REVIEW OF THE LITERATURE

Chapter 2 begins with a general overview of the relationship between time and achievement. The chapter then provides a discussion of the three major models of school learning clarifying the relationship between time factors and achievement. The next section describes both process-product and descriptive research. A comprehensive review of the literature follows. This section focuses on time factors and teacher variables and their relationship with student achievement. It is presented under five research headings: opportunity to learn, allocated time, engaged time, academic learning time and additional teacher variables. The social and practical implications of predicting at-risk classrooms are discussed in additional sections on Teacher Evaluation and Staff Development. The chapter concludes with an integration of the findings in the area including a discussion of future research needs.

Time and Achievement Research

Just as the research interest in classroom instruction and student achievement is not new, the interest in time as an important variable in the learning process is also not new. For the past century, educators have recognized the importance of time in student learning and achievement. As early as 1915, Thompson reviewed educational programs in an effort to determine the most efficient use of school time. Thompson's
(1915) work also highlighted the importance of the teacher as a key in effective student learning. In a surprisingly modern list of ways to achieve more efficient use of school time, Thompson included such means as providing more definite and immediate goals, minimizing distractions, increasing relevant curriculum content and reducing transition time between learning activities. Despite the initial interest in academic time and the insightful investigations by a handful of researchers, early research on the effect of time factors in the teaching-learning process had little impact (Berliner, 1983; Duffy, 1981).

In the early 1950s, new perspectives began to emerge in educational research. These changes were due in large measure to the American Educational Research Association (AERA) whose Committee on the Criteria of Teacher Effectiveness (Barr, Bechdolt, Coxe, Gage, Orleans, Remmers, & Ryan, 1952) called attention to the simple, unfortunate fact that after 40 years of research, there were still very few research outcomes that could be used in the school system. The work of the AERA Committee culminated in the publication of The Handbook of Research on Teaching (Gage, 1963). This work paved the way for subsequent federal involvement in the field. During the mid-1960s, several major universities received funding to study teaching. In addition, federally funded educational laboratories such as the Far West Laboratory for Educational Research and Development were also established with the "mission" of improving teacher education (Good, 1983).

The critical difference between the research focus on the earlier decades and that of the 1960s and 1970s was the utilization of classroom or naturalistic observations. Prior research had not used systematic
classroom observations and results were, therefore, usually based on subjective "perceptions" rather than on objective "observations" (Duffy, 1981). Because of the lack of classroom observations the fundamental "assumptions" about what happened in classrooms went unchallenged and the teaching principles and theories based on these assumptions were accepted uncritically. Simple reform models, also based on the prevailing assumptions, were designed to offer universal solutions to the varied and complex problems of the classroom (Good, 1983).

The early insights into the importance of time in learning received little, if any, attention prior to the 1960s. Federally funded educational projects, systematic classroom observation, and the consideration of classroom time factors all contributed to improvements in the quality of research conceptualization, research methodology and literature review work of the 1960s and 1970s. Also of major importance in the efforts responsible for significant advances in research were several models of school learning which were time-dependent: Carroll's Model of School Learning (Carroll, 1963), Bloom's Model (Bloom, 1968), Wiley-Harnischfeger's Model (Wiley & Harnischfeger, 1974), and the Academic Learning Time Model (Fisher, Berliner, Filby, Marliave, Cahen, Dishaw & Moore, 1978).

Models of School Learning

The Carroll Model of School Learning (MSL). Carroll's Model was one of the earliest theoretical frameworks that incorporated engaged time into a model for school learning (Anderson, 1985; Borg, 1980; Carroll, 1963). According to Carroll, the amount of school learning is the direct
effect of the amount of time a student spends academically engaged in a
learning task in relation to the amount of time the student actually
needs to learn the task. Carroll summarized his model in the equation
\[
\text{degree of learning} = \frac{\text{time actually spent}}{\text{time needed}}
\]
In this equation, the numerator (time actually spent) is determined by
both student opportunity to learn and learner perseverence. Time needed
to learn, the denominator of Carroll's equation, is determined by learner
aptitude, learner ability to understand instruction and quality of
instruction (Wyne & Stuck, 1982).

Carroll emphasized the importance of observing and understanding
the interactions of the five variables in the model described above. The
two variables that hold the most promise for experimental manipulation
are external to the student: opportunity to learn and quality of
instruction. While opportunity to learn is relatively easy to define and
measure, quality of instruction is more problematic. Several researchers
have translated the quality of instruction concept into simple specific
elements; however, quality of instruction remains an elusive concept that
is difficult to define and/or measure. Although the Beginning Teacher
Evaluation Study (Fisher et al., 1978) provided validation for some of
the components of the MSL, Carroll (1985) warned "no instructional theory
could be devised that would universally and uniformly produce maximal
results for all students" (p. 48). Nevertheless, the MSL clearly
represents an important step in the development of effective
instructional procedures. It is not offered as an "educational panacea"
(Carroll, 1985, p.49), nor does it claim that "time" is sufficient to
learning. The model is intended as a guide to the understanding and interpretation of variations in student learning of which time is a key variable. Although many aspects of the model still have not been adequately investigated (e.g., relations between aptitudes and learning rates) it serves well as the basis for the planning and evaluation of new educational programs. The MSL "seems to have been an idea whose time has come and that is here to stay" (Carroll, 1985, p. 37).

Bloom's Model. After its initial acceptance, the MSL was unattended for several years until Bloom (1968, 1974), elaborating on specific components of the MSL, designed the system of instruction known as mastery learning. Bloom's first publication on mastery learning (Bloom, 1968) presented the MSL as Carroll had originally formulated it, yet added to it the component of task mastery through the manipulation of the variables of time, opportunity to learn and quality of instruction (Carroll, 1985). In his model for promoting learning, Bloom further stressed the use of alternative organizational structures and teacher behavior, such as small-group tutorial sessions, feedback and correction. His major emphasis was in the allocation of time necessary for a particular student to master a task. Simply allocating similar amounts of time for all students to reach mastery was not adequate. Findings by Glaser (1968) and Atkinson (1968) suggested that the slowest five percent of learners may need as much as five times as long to reach mastery levels as do the fastest five percent of learners. Bloom stressed, however, that if the slower learners are given the time they need to reach mastery, 90 percent will reach this level. Several studies (Block, 1971; Peterson, 1972) have found evidence that with only 10 to 20 percent
additional learning time, Bloom's mastery learning procedure typically bring nearly 80 percent of the students to a mastery criterion, a criterion usually met by only 20 percent of the students in a typical classroom.

Bloom's Model (1974, 1976) contains three major factors that influence engaged time and achievement: (a) cognitive entry behaviors, (i.e., previous learning), (b) affective entry behaviors (i.e., motivation and interest) and (c) quality of instruction (i.e., instructional cues to the learner, reinforcement, active participation, and feedback). Bloom (1976) estimated that as much 25 to 40 percent of the variance in achievement may be accounted for by the quality of instruction. The multiple correlations between variance in achievement and the model's three main components are typically .85. It is clear from the findings associated with Bloom's Model that both engaged time and specific teacher behaviors, contributing to the quality of instruction are essential for school achievement.

The Wiley-Harnischfeger (W-H Model). The Wiley-Harnischfeger Model is composed of three categories: background factors and the teaching-learning process that lead to pupil acquisitions. Background factors consist of curriculum/institutional factors and teacher and student background variables. The teaching-learning process is a combination of teacher activities and pupil pursuits. Pupil achievement is the pupil acquisition measure. Harnischfeger and Wiley (1976) described the foci of the model as the student's educational activities
and their relation to the teacher-learning process. Teacher activities are only relevant in the way they directly interact with pupil pursuits and influence pupil acquisition.

Like Bloom and Carroll, Wiley & Harnischfeger considered time to be a crucial component of the teaching-learning process (Harnischfeger & Wiley, 1974). Their model is derived from two major convictions: (a) the total amount of active learning time, in a particular instructional area, is the most important determinant of student achievement in that area and (b) there is great variation in the amount of allocated time, engaged time and time needed for learning among students both within and across classrooms. The time variables leading to student achievement are affected by many distinct school, teacher and student factors (Wiley and Harnischfeger, 1976).

Quantity of schooling depends on such variables as length of school year and length of the school day as well as student and teacher absences. The total allocated time in a particular content area may be limited by classroom interruptions, teacher behaviors and student motivation. Total active learning time is influenced by student intrinsic motivation, teacher motivating skills and teacher monitoring. Student aptitudes, and prior achievement, as well as teacher presentation skills and instructional media, have an effect on the total content comprehended.

A study by Kidder, O'Reilly and Kiesling (1975), conducted at the same time as Wiley and Harnischfeger's work, provided limited support for the W-H Model. Although the estimates of both quantity and quality of instruction were weak, some socially important correlations were
obtained. Using student pursuits, teacher and school characteristics and time variables to predict student achievement resulted in multiple corrections ranging from .87 to .90, again sustaining support for the predictive ability of "time" factors in student achievement.

**Academic Learning Time Model (ALT).** One of the newest and most powerful concepts in the field of research on teaching is the on-going measure of student learning known as Academic Learning Time (Fisher, Marliave & Filby, 1979). Berliner (1981) described ALT as "engaged time with materials or activities that produce high success rates and are related to the outcome measures used to assess achievement" (p. 5).

The ALT Model is composed of four major variables: allocated time (AT), engaged time (ET) (or, as defined in this study, student engagement), success rate (SR), and curriculum-test congruence (Berliner, 1981; Borg, 1980; Fisher, Berliner, Filby, Marliave, Cahen & Dishaw, 1980; - see Figure 1). A major proposition derived from the Model is that increased time spent working on a task with high success leads to increased achievement (Fisher et al., 1980; Marliave & Filby, 1985). This, however, does not suggest that a student should spend all his/her time in high-success tasks. High success also does not imply that little effort is needed on the part of the student. The ALT Model is compatible with the idea of a balance between medium and high success tasks, both requiring different amounts of effort at different times.

Another vital component of ALT is curriculum-test congruence (Berliner, 1981). It may seem reasonable, although it is not always practiced, that students have an opportunity to learn what later will appear on tests. One recent analysis of curriculum-test congruence found
Figure 1. Schematic of the Academic Learning Time Model

Interpretation: The time allocated for instruction is shown visually in (a). During some of this time, students are engaged as shown in (b). Some of the time students are engaged, is time related to the outcome measures that are used to assess instruction. This is shown visually in (c). The time allocated, whether engaged or not, can yield low, medium, or high success rates for students as shown in (d). That portion of allocated time that is time engaged in activities related to the outcome measures and which provides students with a high success rate, is defined as Academic Learning Time, as shown in (e).

that the overlap between what textbooks covered and what tests tested is not very high. For example, if a school district used the Stanford Achievement Test as an outcome measure, while using only the Houghton-Mifflin, Scott-Foresman or Addison-Wesley mathematics texts with a fourth grade class, the overlap is approximately 50 percent (Communication Quarterly, 1980). It does not seem reasonable to expect students to show achievement gains when 50 percent of the topics tested are not covered in the curriculum. In contrast, the ALT Model of instruction explicitly relates the curriculum with the outcome measure.

It is clear that the three models of school learning discussed above contributed important ideas for the ALT Model. What distinguishes the ALT Model from its predecessors is the fact that each component of the model is quantifiable. The concrete nature of this model makes intervention and change in the classroom a reasonable possibility.

The ALT Model was developed in and supported by the large-scale Beginning Teacher Evaluation Study (BTES). Although the BTES validated many of the variables shared by the MSL, Bloom's Model and the Wiley-Harnischfeger Model, the study was designed specifically to test the elements of the ALT Model (Borg, 1980).

The majority of research studies during the last several decades, including the BTES, have utilized both process-product and descriptive research techniques. The characteristics of both research techniques are described in the following section.

Process-Product and Descriptive Research

Process-product studies are characterized by the intensive use of observation instruments and trained observers to record the occurrence of
a particular event or behavior within the classroom (Duffy, 1981). Fenstermacher (1980) described process-product research as the study of the variation in academic gain from pretest to posttest clarified by the identification of significant relations between student gain (product) and teacher performance (process). The significant relations are obtained by correlating the particular coded behaviors or events and achievement growth.

Process-product research was originally influenced by the behaviorist tradition and concentrated on the frequency of overt teacher behavior and its relation to measurable outcomes. In its early stages, this research was not successful; however, Rosenshine and Furst (1973) and Dunkin and Biddle (1974) "created a comprehensible mosaic out of what had previously been a confused and largely contradictory mass of data" (Duffy, 1981, p. 7). Additional methodological improvements added to the credibility and, therefore, the acceptance of this type of research as the beginning of empirically based, scientific research on teaching (Berliner, 1979; Brophy, 1979).

Process-product research may have lost some credibility due to its simplicity. Yet Fenstermacher's view (1985), that "this research does not incorporate a conception or justification of what is ultimately worth knowing and doing..." (p. 175), seems too strong an indictment. There appears to be justification for this type of research by virtue of the fact that certain teacher behaviors do, in fact, lead to increased achievement gains in students. Teacher Behavior X may directly cause Student Behavior Y. Or Teacher Behavior X may only in some way be correlated with Student Behavior Y. Whichever the case may be, it
appears to be an irrelevant concern when it comes to inservice and intervention in the teaching-learning process. In sum, whether or not direct causation exists in a given situation may not be the central issue. Of greater importance and a more pragmatic approach, may be to decide what student behavior is desirable and then observe classrooms to determine which teacher behavior is most frequently linked to that student behavior. The links between teacher and student behaviors will be demonstrated in the finding of socially significant and theoretically sound correlations. These socially significant and theoretically sound correlations provide a firm basis from which inservice and intervention plans can be developed.

Process-product research has been broadly criticized for its lack of reliability and validity in observation instruments, its design/analysis weaknesses, its oversimplification of classroom complexities, and its over-reliance on prescriptive and behavioristic methodologies (Duffy, 1981). Nevertheless, the results of the process-product studies demonstrate consistent, socially significant correlations between specific teacher behaviors and student learning. In addition, many of these findings have been validated in experimental studies (Anderson, Evertson & Brophy, 1979; Good & Grouws, 1979).

The second methodology used in classroom observation research is that of descriptive or qualitative research. As Berliner and Tikunoff (1977) emphasized, hypothesis testing is of little value in the complex study of the classroom. Qualitative research attempts to describe, in an open-eyed and open-minded way, what the classroom process is, rather than what the process should be (Berliner & Tikunoff, 1977; Duffy, 1981).
While a process-product researcher observes specific behavior, the qualitative researcher often avoids specifics and records, in free-form, what he/she sees and feels about what is happening in the classroom.

Like process-product research, qualitative research has also had its share of criticisms for lack of outcome measures, lack of reliability, limited sample size and problems with generalizability. Despite these criticisms, qualitative research has produced a rich perspective on classroom life. This method of inquiry has provided a new and needed perspective for the field of research on teaching.

The nature of teacher effectiveness research has changed dramatically in the last decade. The impetus for this change was not only the use of classroom observation, but also the creative combination of process-product and qualitative forms of research; all of which were used in the Beginning Teacher Evaluation Study.

The Beginning Teacher Evaluation Study

The most extensive process-product study completed to date is the Beginning Teacher Evaluation Study (BTES). The BTES was a five-year study sponsored by the California Commission for Teacher Preparation and Licensing and funded by the National Institute of Education. The study, in its original form, had two purposes: the identification of generic teacher competencies and the evaluation of teacher education programs (Borg, 1980). Gradually the focus of the study changed. Researchers from the Educational Testing Service (ETS) and the Far West Regional Laboratory for Educational Research and Development, in conjunction with the California Commission for Teacher Preparation and Licensing (CTPL) and the National Institute of Education (NIE), produced a series of
studies with the purpose of identifying teaching activities and classroom
conditions that foster student academic learning (Brophy & Good, 1986; Dishaw, 1977a, 1977b; Filby & Cahen, 1977, 1978; Fisher, et. al., 1980; McDonald, 1977; Marliave, Filby & Dishaw, 1978; Powell, 1980). Although
the BTES name was applied to this series of studies, experienced rather
than beginning teachers were studied and research rather than evaluation
took place.

The research portion of the BTES used the ALT Model to examine
student acquisition of basic skills in the areas of reading and
mathematics. The amount of ALT accumulated by students in reading and
mathematics instruction was compared with changes in student achievement.
The sample consisted of six students from each of 25 second grade and 21
fifth grade classes. These six target students from each classroom
provided a total sample of 139 second graders and 122 fifth graders. The
teachers of these classrooms varied in age, years of experience, and
teaching style (Fisher et al., 1980).

Achievement of the target students was measured in October,
December and May using a comprehensive achievement battery in reading and
mathematics. Student attitudes toward reading, mathematics and school
were measured using a Likert-response scale.

The amount of AT for each content area of reading and math was
recorded by the teacher each day between October and May. Allocated
time, engaged time and success rate for the target students were also
measured once a week from October to May by trained observers. Each
observer visited eight classes, once each, over a two-week period. Each
classroom, then, was alternately visited by two different observers.
Paired observations were also carried out to provide reliability estimates of the observations (Fisher, Marliave & Filby, 1977).

During the direct classroom observations, the activity of the target students was coded approximately every four minutes as on or off-task. The students' level of success and the curriculum content area were also noted. In addition, general characteristics of the classroom and instructional program were rated each week by the observer. Ratings were obtained in such areas as classroom cooperation, teacher's presentation, teacher's knowledge of subject matter, and cognitive orientation of the class.

Using multiple regression analyses, three sets of relationships were assessed: (a) teaching processes/classroom environment and ALT, (b) ALT and student achievement and (c) teaching process/classroom environment and student achievement. As a result of the observational system used, the students rather than the teachers were in the foreground. It was difficult, then, to pinpoint specific teacher behaviors which did or did not facilitate student learning. In addition, most of the process variables used in the analysis were combinations of several teacher behaviors, again making the pinpointing of specific behaviors difficult. Despite these problems, analysis of the BTES data resulted in 14 major findings, the majority of which found increases in ALT to be associated with increases in student achievement (see Fisher et al., 1980).

The practical importance of adequate AT and the necessity of ET was also demonstrated in the BTES. In one analysis, across 25 second grade classrooms, AT in reading was found to vary from 47 minutes to 118
minutes per day. A variation of from 45 minutes to nearly 2 hours is important because differences in AT of such magnitude markedly effect student achievement. Within classrooms variability in ET was found to range from 10 to 90 percent. A one hour subtraction lesson with 10 percent engagement becomes 6 minutes of instruction as compared to 54 minutes of instruction for the student who is engaged 90 percent of the time. Between classroom variability, though not as great, was also substantial. The range of ET between classes was from approximately 50 to 90 percent. "Such marked variability in time...leads inevitably to differences in achievement" (Berliner, 1983, p. 54).

Berliner (1981) indicated that in education the "delivered" curriculum is often quite different from the "allocated" curriculum. The school year is composed of about nine months. The actual number of school days in those months is approximately 180 days. Within those 180 days, 30 to 50 are lost due to sick days, holidays, field trips, snow days, and special activity days. This leaves approximately 130-150 days of instruction a year (Siefert & Beck, 1984). If 30 minutes a day are allocated for reading with an engagement rate of 50 percent, the total delivered curriculum in reading for that student for that year would only be 35 hours. If, however, high success activity occurred only 50 percent of the time, the ALT for a student might be under 20 hours for the school year. Berliner stated, "The delivered, functional, or effective curriculum must be kept in mind and monitored; and it must be distinguished from the planned, allocated or nominal curriculum" (1981, p. 4).
In relation to achievement, Fisher et al., (1980) explained that if a second grade student, whose October reading score was at the 50th percentile, received an average amount of ALT per day (e.g., 23 minutes), his/her December achievement score would again be at the 50th percentile. If, however, a student beginning at the 50th percentile in October received 52 minutes of ALT per day, his/her December achievement score could be expected to show considerable improvement -- from the 50th to 66th percentile. On the other hand, if the same student received only four minutes of ALT per day, his/her percentile rank would drop from the 50th to the 39th percentile during the period from October to May. Fisher et al., (1979) noted that the December score is an "expected" score, or the average score for a large group of students.

The range of ALT from 4 to 52 minutes per day may seem unrealistically large. However, this range did occur in the classrooms in the BTES. Fisher et al., (1979) explained how both 4 and 52 minutes of ALT are relatively easy to obtain. If the AT for reading instruction is 50 minutes a day and a student is engaged about one-third of the time, experiencing high success one-fourth of the time, the student will experience about four minutes of ALT that day. Similarly, if AT for reading is 100 minutes with a student engaged 85 percent of the time and at high success two-thirds of the time, this student will experience about 52 minutes of ALT per day.

The BTES research identified a number of important aspects of teaching, and provided the basis for more comprehensive investigations of teachers' effectiveness. Directly relevant to the proposed research was a small effort within the BTES designed to change teacher behavior by (a)
promoting efficiency in classroom management; (b) increasing teachers' awareness of the difficulty of specific academic tasks; and (c) increasing the academic engaged time of students (Berliner, Filby, Marliave, Weir & Fisher, 1976). ALT was the major dependent variable for this sub-study and was posited to be the linking variable between teacher behavior and student learning.

This sub-study was a three-group comparative investigation. The maximum treatment condition used an AB or baseline-treatment design where six students were targeted for classroom observation in each of four intervention classrooms. A trained observer recorded information about teacher and student behavior once a week between October and May in each of these classrooms. This information was used to provide tailored intervention procedures for use in this group of classrooms. The second group, or workshop group, consisted of seven classrooms. The teachers of this minimum treatment group participated in two half-day workshops on engaged time and related issues. These teachers, then, worked toward implementing the ALT Model of instruction in their classrooms. The workshop treatment was designed to ascertain whether or not brief, inexpensive workshops, presenting the ALT instructional model, would be beneficial to teachers. A third group of 14 second grade classrooms acted as the control group. Data were collected from each class each week.

The observation team for the intervention classrooms consisted of two males and two females. Three observers held doctorates in Educational Psychology, but had never taught elementary school. The fourth member was an experienced teacher of both regular and special
education. At least one team member visited one of the four intervention classrooms at least once each week. In addition, descriptive data were recorded during each observation or teacher conference.

As could be expected, the data that were obtained differed by classroom. Obviously, then, intervention recommendations also varied across teacher and classroom. Nevertheless, Berliner (1981) stressed that all intervention procedures used the ALT model of instruction as a guide. There are five teaching functions hypothesized in the model to impact on ALT: diagnoses, prescription, explanation, feedback and monitoring. The purpose of the classroom observations and teacher conferences was to examine how teacher behavior, representing the five teaching functions, could be altered to increase ALT. The assumption was that ALT is "the strongest predictor of achievement in an academic content area" (1981, p. 8).

The changes needed in the classroom environment or in the teachers' behavior varied according to the demands of each setting. In one classroom, consultants were brought in to facilitate changes in teacher behavior. In another classroom, a television was used to provide feedback. In another classroom clocks were installed to facilitate time management, and in still other classrooms new curriculum materials were purchased to increase curriculum-test congruence or motivation in academic tasks.

In the workshop classes, the teachers were responsible for implementing the ALT Model of instruction without any information from classroom observers. Instead, after each of the two half-day workshops, the teachers stated the ways they intended to increase ALT within their
own classrooms. No follow-up observations concerning changes in classroom structure or teacher behavior resulting from the workshops occurred in any of these classrooms. Again, the purpose of this group was to test the Model's effectiveness with a minimum time and expense commitment.

The results for both the intervention and workshop classes showed substantial treatment effects. In general, the two treatment groups showed ALT gain of about six minutes per day (24 percent) in reading. The control group showed no change. In mathematics, the increase in ALT was about 20 percent for the intervention classrooms and about 56 percent for the workshop classrooms. Engaged time in reading increased about 17 percent in the intervention classes and 7 percent in the workshop classes. The control group showed no gain. In mathematics, engaged time increases were 12 percent for the intervention classes, 22 percent for the workshop classes, and a loss of 19 percent for the control group (Berliner, 1981).

Romberg (1980) discussed several limitations of the BTES-ALT framework. In order to posit any model of school learning, it is necessary to simplify classroom complexity by excluding several important factors. The ALT Model used in the BTES was limited in its omission of such factors as specific curricular plans, student motivational factors and peer influences. Nevertheless, the use of the ALT Model of instruction in the interventions resulted in positive changes in ALT. As Berliner stated,

In approximately 12 hours of meetings, a theory of instruction was presented, public commitment to change was elicited, self-reported evaluations were made, and time for mutual problem
solving of instructional problems was made available. The results, if these data are accepted, indicate that the workshop classes decreased in transition time, increased in allocated time for reading and mathematics, increased in engaged time in reading and math...and increased in ALT in reading and in mathematics (p. 17).

These changes are most impressive when considering their implications for policy changes.

In conclusion, Miller stated, "The BTES provides information that ultimately links teaching practices to student achievement outcomes" (1980, p. 161). These links between teaching practices and student achievement, in turn, provide clues about the process of teaching and learning under specific conditions.

Time and Teacher Variables in the Classroom

Teacher effectiveness research has occupied a central position within the field of teaching for decades. As Doyle (1977) noted, studies have attempted to distinguish effective from ineffective teachers since the 1920s. The number of studies increased substantially with the formation of the American Educational Research Association (AERA) Committee on Criteria of Teacher Effectiveness in the early 1950s. For a brief period, the findings of such investigators as Coleman et al., (1966), Jencks et al., (1972), and Mosteller and Moynihan (1972) raised doubts about the influence of the teacher in the educational process. These studies were soon dismissed due to methodological weaknesses. Berliner and Rosenshine (1977) summarized the growing professional perspective on the importance of the teacher's role in student learning: "It is no longer acceptable to take seriously those who minimize the
impact of the teacher on the students' acquisition of knowledge" (p. 381). Investigations of the importance of teacher behavior continued to flourish.

The research on teacher effectiveness has taken several forms. While the early research focused primarily on discovering desirable teacher characteristics, later research began to focus on classroom processes (Ruff, 1978). The emphasis on performance and competency-based approaches to teacher education, evaluation and accountability resulted in increased objective measures of student outcomes (or "products"). The major focus of research on teacher effectiveness for the past two decades has been on the establishment of the relationship between the teaching process, student behaviors and student products. As described earlier, this research is referred to as process-product research (Ruff, 1978; Rosenshine; 1971). Currently three process-product areas are being given attention: (a) the relationship between instructional time and student achievement; (b) the relationship between teaching variables such as pacing, grouping, feedback and monitoring and student achievement; and (c) the relationship between teacher thought, teacher decision making and teacher judgement and student achievement (Shulman, 1981).

Opportunity to learn. Process-product research provided support for the hypothesis that "opportunity to learn" is one of the most important factors in predicting whether or not a teacher will be effective and student learning will occur. This important variable has been defined differently by different investigators (Berliner, 1985; Brophy & Good, 1986; Carroll, 1963; Denham & Lieberman, 1980; Duffy, 1981; Walker & Schaffarzick, 1974; Wyne & Stuck, 1982). Arehart (1979),
Rosenshine (1978, 1979) and Walker and Schaffarzick (1974) defined the term as the amount of content covered. The majority of investigators, however, described opportunity to learn as the amount of time allowed for instruction (Brophy & Good, 1986; Carroll, 1963; Denham & Lieberman, 1980). Opportunity to learn is presented by Berliner (1985) and Cooley and Leinhardt (1980) as curriculum-test congruence or the overlapping of the curriculum with outcome measures. Curriculum-test congruence or curriculum alignment is conceived to be the necessary first step in giving students an opportunity to learn.

Curriculum-test congruence was not a serious problem earlier in this century when teachers were laden with strict policies concerning curricular guidelines. In contrast, teachers today have a great deal of curricular flexibility (Harnischfeger & Wiley, 1976). There are obvious advantages of this kind of flexibility. The educational reality is that students may not have the same learning goals and may not be directed toward the same content, yet the same achievement test is administered. Research has confirmed that in these situations curricular alignment rarely exists. Harnischfeger & Wiley (1976) conceived the educational and scientific knowledge concerning the necessity of curricular alignment to be lost in the quantitative scoring of achievement tests. These outcome measures may leave ambiguous the distinction between that which is not learned because it is not taught and that which is not learned for other reasons. Therefore, variations in assessed achievement are caused by mismatches between test and taught content as
well as differences in the amounts learnt" (Harnischfeger & Wiley, 1976, p. 3). A cyclic pattern of mismatches between curricula and tests then becomes another problematic educational reality.

Leinhardt and Seewald (1981) discussed the problem of curriculum-test congruence in their article "What's Tested, What's Taught"? Leinhardt and Seewald explained overlap as the match between the content taught and content tested. Effective ways of estimating curriculum-test congruence are beginning to emerge. Basically, there are two approaches that can be used for estimating overlap: a systematic analysis of both curricula and tests and direct measurement of classroom processes (see Leinhardt & Seewald, 1981).

Berliner (1985) stated that one of two conditions must be met before a test is used as an outcome measure. Either "a test is created to assess the curriculum that has been chosen to produce the desired outcomes or a curriculum is created to teach the things that are on the test that has been chosen to assess the desired outcomes? (1985, p. 4). The link between opportunity to learn, and student learning will never be clear if the curriculum-test mismatch continues in educational settings. As Berliner discussed, if students do not have an opportunity to learn that which they are tested on, opportunity to learn becomes a useless concept. "The single most important factor in predicting whether or not a teacher will be effective is whether the curriculum that is delivered to students in their classrooms is linked logically or empirically to the outcomes that are desired." (1985, p. 1).

Aside from being a concept related to the issues surrounding the congruence of curriculum and tests, opportunity to learn is also an
important concept when thinking about the measurement of time factors such as AT, ET and ALT. These time variables are discussed in the next section.

**Allocated Time.** The first time concept to be explored by educational researchers was that of allocated time (AT). The earliest studies of AT presented descriptive data on the amount of AT across subject areas and school districts (Holmes, 1915; Mann, 1928; Payne, 1905).

More recent research on AT focused on the enormous variability found across classrooms (Borg, 1980; Fisher et al., 1980). Despite state or school district prescriptions about how much time should be allocated to a specific subject area each day or each week, teachers make the final decisions about allocated time.

The BTES found daily AT in reading at grade two to vary from 47 minutes to 118 minutes per day. It is only reasonable to assume that the students receiving 118 minutes of reading each day achieved more than those students receiving 47 minutes of reading a day. As Berliner (1985) emphasized, "more is better" (p. 9) until too much becomes boring. But how much is too little or too much? That decision can only be made with an awareness of the outcome measures and an intimate knowledge of the characteristics of the students in the class. "Such decisions are tough ones, which is why effective teaching is not a characteristic of every teacher" (Berliner, 1985, p. 9).

Wiley and Harnischfeger began their study of AT in the early 1970s with a re-analysis of the data from Coleman et al., (1966) and Jencks et al., (1972) on attendance and achievement (Wiley, 1976;
Harnischfeger & Wiley, 1976; Wiley & Harnischfeger, 1974). Based on these data, Wiley predicted the effects of various changes in quantity of schooling (i.e., length of school day, length of school year, and daily attendance) on student achievement. For example, Wiley predicted that increasing the total number of school days by 10, increasing the hours in the day to 6 and increasing the attendance rate to 95 percent would bring about a 24 percent increase in school time. These increases in quantity of schooling were predicted to lead to increases in achievement from 33 to 65 percent. Karweit (1976) carried out analyses of the same data. Although her results showed positive relationships between the quantity of schooling and the level of achievement, the predicted improvements were not as large as those suggested in Wiley's study. The contributions of the later work of Harnischfeger and Wiley (1976) on quantity of schooling were two-fold. First, their work corrected the false conclusion that schooling has no effect on student learning. Second, it alerted educational researchers to the importance of time in school learning.

The BTES provided the most detailed and comprehensive information collected to date on the relationship between AT and student achievement. This study differed from previous work in this area in several ways. First, classroom data were gathered on a number of different content areas. Second, information was gathered from both teacher logs and classroom observation instruments. Third, for replication purposes, data were collected over two separate and lengthy time periods, October through December and January through April.
Significant relationships were found between AT and achievement for 6 of the 17 second grade content areas and 5 of the 12 fifth grade content areas. Although the relationships found were not strong, AT did account for between three and six percent of the variance in residual achievement gain. Even when no significant relationships were present, all correlations consistently found AT to be a positive predictor of achievement. In no case was a negative relationship found.

More recent studies continued to demonstrate the effect of AT on student achievement. Powell (1980) found the amount of AT to affect achievement in elementary school students over a 23 week period. In a study by Jacobsen (1980) data were collected on 200 third graders at three elementary schools in Wisconsin. In this study, time utilization data were collected in reading and math over three separate periods during the 1979-80 school year. Achievement gains in reading and math were determined using pre- and posttests. The results of this study found AT to vary significantly across schools. The students receiving the greater amounts of AT exhibited significantly greater achievement gains. These gains were particularly evident in math. In a doctoral dissertation by Muzik (1983), a baseline-treatment design was used where two students each from low, medium, and a high ability algebra groups were observed for nine weeks. The results indicated that AT for seatwork had the greatest positive effect on the achievement of the low-ability group. The medium-ability group also showed increased achievement based on AT. The high-ability groups showed no significant gain related to AT. Interestingly enough, if AT was high, the low-ability students surpassed both the medium- and high-ability groups in achievement (Muzik, 1983).
Although several of the studies on AT found nonsignificant results (Guthrie, Martuza & Seifert, 1976; Smith, 1976; Welch & Bridgham, 1968), it is important to observe that before student engagement is possible, time must be allocated. The amount of time allocated for academic learning is important as it provides the constraints within which engaged time occurs (Karweit & Slavin, 1981). Yet Borg (1980) noted, "Allocated time does not take into account the time that the individual pupil is actually engaged in relevant school work and must, therefore, always be, by itself, a rather crude estimate of pupil work involvement" (p. 50). Yet when the basic AT variable is combined with more powerful learning factors such as ET and SR, the prediction of student achievement is possible.

**Engaged Time.** The relationship between a teacher's ability to maintain student engagement and the resulting student achievement has been understood for centuries. Holmes (1915) was the first investigator actually to distinguish between engaged time (ET) and AT when he stated, "Eventually our standards must be based on the study of time actually consumed; but even then we shall have to allow for obstacles and interruptions" (p. 22).

Numerous studies investigating student attention or engagement were conducted prior to the 1950s (French, 1924; Bjarnason, 1925; Blume, 1929; Edminston & Braddock, 1941; Shannon, 1941, 1942). The majority of these early investigations studied the variation in student engaged time or attention within and across classrooms. Using different methodologies these investigators found student attention to range from 80 to 98 percent across elementary and high school students.
Although educators and researchers have understood the importance of student attention for many years, only recently have they begun to quantify the variable of attention by systematically measuring the number of minutes a student is actively engaged in academic content (Rosenshine, 1979). There are obvious difficulties when trying to measure student engagement. First, the observation instruments are often crude and unreliable. Second, observers often have difficulty determining whether a student is actively engaged. In an attempt to study the accuracy of self-reported recall of engagement versus observer judgements, Bloom (1976) made sound recordings of class sessions asking the students to report what thoughts they had during the sessions. When comparing the observer's reports of engagement to the student's self-reports, Bloom concluded the accuracy of self-reported recall of engagement over observer impressions or vice versa could not be determined. Bloom's findings again raise the question of how to accurately measure engagement.

During the last decade, a number of studies have explored the relationship between student engagement and achievement. Bloom (1974, 1976) reviewed a number of studies on engagement and achievement (Anderson, 1973; Arlin, 1973; Attwell, Orpet & Meyers, 1967; Bloom, 1974; Edmiston & Rhoades, 1959; Krauskopf, 1963; Lahaderne, 1964, 1967; Ozcelik, 1973; Siegel, 1963; Sjogren, 1967; Turnure & Samuels, 1972). Using individual students as the unit of analysis, several of the studies showed correlations between ET and final achievement ranging from .37 to .58. Between ET and achievement gain the correlations ranged from .26 to
.87. Using the classroom as the unit of analysis, correlations between engagement and final achievement scores ranged from .19 to .51. Correlations between engagement and achievement gain ranged from .06 to .58. Obviously then, ET or student engagement, an important variable in the ALT Model, holds promise as a predictor of student achievement.

An observational study of follow-through classrooms (Stallings and Kaskowitz, 1974) provided yet another excellent example of the effect of academic engaged time on student achievement. The purpose of this study was to examine the impact of different instructional processes on the growth and development of children. The population in this study included students from 288 first and third grade classrooms in 36 cities across the U.S. The classroom processes were measured using the SRI classroom observation instrument. The entering ability of the children was assessed using the Wide Range Achievement Test (WRAT), the Metropolitan Achievement Test (MAT) and several other instruments which measured perceptual and affective changes. The observers coded the students every fifteen minutes as attending or not attending. The results indicated that the percentage of time students were involved in academic tasks was positively correlated with reading and math achievement. Stallings and Kaskowitz also found that time engaged in either reading or math was a better predictor of achievement gain than any other coded behavior or classroom interaction.

In the final analysis, Stallings concluded that the observed classroom processes, including ET, were as important in explaining test score results as the initial ability of the students. It is also interesting to note that as a student gets older, classroom processes
begin to account for more than initial ability. For first graders, Stallings found initial ability to account for 50 percent of the variance in achievement, with instructional processes accounting for only 25 percent of the variance. In third grade, however, the two variables account equally for achievement variability (Stallings, 1975; Stallings & Kaskowitz, 1974).

Brophy and Evertson (1974, 1977) also used the Metropolitan Achievement Test (MAT) as an outcome measurement when observing 40 experienced second and third grade teachers on 341 variables. Again, student academic engagement was positively correlated with achievement gains. In contrast, time spent on nonacademic activities, such as personal concerns and family backgrounds, was negatively correlated with achievement.

In the preliminary studies of the BTES, ET was found to be positively related to student learning in second grade reading and fifth grade math and reading classes. In the major field study, however, the findings were more consistent and positive correlations were found between ET and achievement in both subject areas at both grade levels (Fisher et al., 1978).

Anderson, Evertson and Brophy (1979) conducted an experimental study of effective teaching in first grade reading groups of predominantly middle-class Anglo students. The instructional model used in this study had two major purposes: (a) management of the group as a whole, and (b) feedback to individual students. Observations of teachers' interactions with the group and with individuals were made once a week in both the 10 treatment and the 10 control classes. The
observations began in November and continued through April. The results of this study again indicated that achievement gains were positively correlated with increased academic engagement and decreased transition time. These results were interpreted as support for the concept of direct instruction (Rosenshine, 1979) in which students actively engaged in a structured, teacher-directed academic task make the greatest achievement gains (Anderson, Evertson, & Brophy, 1979).

Fitz-Gibbon and Clark (1982) examined the use of time by teachers and students in eight randomly selected secondary mathematics classes. The observations were made across four weeks of instruction (two weeks each in the fall and spring). The observer made two minute scans of the classroom recording both teacher and individual student behavior. A total classroom time-on-task measure was determined by a quick fifteen-second survey of the classroom.

In this study researchers found about 75 percent of the students to be on-task at any one point in the lesson. However, when absences, late starts and off-task behavior were noted, students were found to be using only about 50 percent of the time scheduled for academic tasks. Fitz-Gibbon and Clark (1982) also observed individual student on-task behavior to be erratic and relatively unstable while classroom on-task behavior was more stable. This does not seem surprising, as group data is usually more stable than individual data. Fitz-Gibbon and Clark concluded that, "On-taskness is a necessary, if not a sufficient, condition for learning in the classroom" (p. 315). These investigators also cautioned against making superficial, pedagogical choices when drawing conclusions from the data. As an example, a school may use
individualization as a method for dealing with high absence rates or disruptive student behavior. The lower levels of on-taskness or engagement found in the individualized classrooms may be due then to the pre-existing student characteristics and/or community environment rather than individualization.

Frederick (1977) gathered data in 184 high schools in the Chicago Public Schools. Results from the observations indicated that high-achieving classrooms had better student attendance, more on-task behavior, fewer interruptions, and more students completing homework than were found with the low-achieving groups.

Another study linking achievement to student engagement was based on observations of sixth grade students in six classrooms (Good & Beckerman, 1978). Fourteen hours of observational data were collected in each classroom. The results again showed the high-achieving class to display more on-task behavior than the low-achieving class (75 percent as compared to 67 percent). The amount of on-task behavior also varied according to subject matter, organizational structure, and type of task. For teacher assigned tasks, the engagement rate was 74 percent as compared to 53 percent for student chosen tasks. The data relating organizational structure to engagement showed small group activities or large group teacher involved activities to have the highest percentage of on-task behavior (i.e., 82 and 70 percent, respectively).

A study by Combleth and Korth (1980) sampled 16 fourth grade students from four classrooms; 8 students with high achievement growth (AG) and 8 students with low achievement growth. The study focused on three context variables: subject area, day of the week, and academic
activity format. The resulting data showed students to be engaged in academic tasks approximately 78 percent of the time. This finding is similar to that of Fisher et al., (1978). Student engagement also varied significantly by subject area. Interestingly enough, the subject areas having more allocated time showed proportionally less student engaged time. This does not seem unreasonable because as AT increases, there must be, at some point, a diminishing return. Combleth and Korth were concerned that the time allocated for instruction be used in ways that optimally benefit the student. They suggested altering types or patterns of activities including organizational structure and motivational factors to facilitate student engagement.

Although initially it may seem reasonable to expect high achievement growth (AG) students to show greater ET than low AG students, in actuality high AG students need less time to master a concept or complete a task than low AG students. Combleth and Korth found no differences in ET across AG groups, except in classrooms where students were able to work at their own pace. In those situations, high AG students maintained greater amounts of ET across organizational formats and activity changes.

Combleth and Korth's study (1980) also indicated that specific divergent type activities such as creative projects and games produced high engagement rates. Disappointingly, these activities only accounted for approximately 10 percent of the academic activity time observed in this study. Completing worksheets, on the other hand, accounted for about one-third of the academic activity time. Combleth and Korth concluded, "Assuming that involved time reflects pupil learning, greater
understanding of how specific academic activities in different contexts with different pupils might affect involved time would facilitate the development of strategies for increasing pupil learning" (p. 323).

In partial agreement with the findings of Combleth and Korth (1980), Karweit and Slavin (1981) found high achievers to spend more time on-task (i.e., 92 percent) than medium or low-achievers (i.e., 85 percent). Higher achievers also spent less time interacting with teachers and aides than medium or low-achievers. These investigators found student engagement to have the highest correlation with achievement. In observational studies of 18 elementary school classes, ET was found to be the time factor that had the most direct effect on learning. The research evidence reviewed to this point emphatically reiterates the significance of ET for learning and provides future research with a basis in psychological and sociological (attention and interest) studies.

Several recent doctoral dissertations also reported on studies that showed ET to be positively correlated with achievement. Donovan (1983) used the results of the California Achievement Test (CAT) to assign 90 students to average and above-average reading groups. A scale designed by the investigator was used to record the student engagement as well as teacher/student interactions. Although there were no significant differences between the two groups in ET or amount of teacher interaction, engaged time was positively correlated with achievement. In another recent doctoral dissertation, Muzik (1984) found ET to be greater for high-ability algebra students (86 percent) and lowest for low-ability students (64 percent). The high-ability students started the task sooner
and stayed on-task longer than students in the two lower-ability groups. As stated earlier, increases in AT also increased achievement in the low and middle ability groups. This increase in achievement is not surprising because, within limits, the longer time lower achievers have available for ET to occur, the greater the probability that academic engagement and learning will take place.

Similar findings were obtained by Derevensky, Hart and Farrell (1983). One hundred observations were conducted on 138 low SES elementary school students from grades one to six. Again, the higher achievers were on-task more than the lower achievers (i.e., 80 percent compared to 75 percent). The investigators suggested, however, that in this study, the higher engagement rates may have been due to an atypical sample, dissimilar codings, differences in interpretation or cross-cultural differences.

In a recent study by Curry (1984), the sample consisted of 16 fifth and sixth grade students, 8 from an "open school" and 8 from a "traditional school." This study used a regression model to predict school achievement by school type, student task behavior, IQ, and commitment. Intelligence was measured using the Peabody Picture Vocabulary Test and the Iowa Test of Basic Skills. An interview with students and teachers was used to measure commitment. Each student was observed in academic activities for seven hours during May. The CAT was used as the outcome measure. The results indicated that school achievement is predicted by intelligence and academic time-on-task in traditionally structured schools and by intelligence and school commitment in open structured schools. The amount of teacher directed
time is positively related to achievement in the traditional school, but negatively related to achievement in the open school.

Using slow learners or special education students as subjects, several researchers again found ET to be a good predictor of achievement (Arlin, 1973, 1982, 1984a, 1984b; Arlin & Webster, 1983; Crawford, 1983; Rossmiller, 1982). Data collected by Rossmiller (1982), showed that for low-ability children, the variance in achievement gain in reading and math accounted for by ET variables was as high 73 percent. Crawford (1983) studied remedial instruction in 79 first through eighth grade Title One classes. Again, the results showed that across grade level and subject area, the greatest achievement gains were associated with high percentages of time with academic tasks, good classroom management, few interruptions and decreased transition times. Arlin stated,

Increased achievement appears to require the continual provision of remedial time for slower learners. Thus, the price of equal achievement outcomes is unequal learning time. It appears necessary to provide extra time, on a long-term basis, to slower students. Time is traded for achievement, and time variability for achievement homogeneity (1984, p. 75).

Similarly, Wyne and Stuck (1979) found a highly structured resource room program to increase significantly the on-task time and reading achievement in 10 elementary students. These advances in reading were compared to those of a control group of 10 students. These students remained in the regular class and were not a part of the intervention phase designed to provide time to learn and to increase time-on-task (O'Conner, Stuck & Wyne, 1979).

In an investigation of the relationship between time-to-learn, general intelligence, and school achievement, time-to-learn was found to vary widely among students (Gettinger & White, 1979). In this study,
time-to-learn was a behavioral measure of the number of repetitions or trials to mastery on a particular task. Although the corrections between time-to-learn and achievement and between IQ and achievement were high (i.e., .59 to .76), the authors contended that time-to-learn is a more important consideration than IQ in predicting school achievement. Instead of using IQ or aptitude scores as an index from which to derive a measurement of time-to-learn, the authors also suggested using an empirical measure of trials-to-criterion for the estimation of time-to-learn. This information was suggested as being an aid to teachers in estimating the rate at which specific students will progress through units and also in indicating which students may need more repetitions or extra help (Gettinger & White, 1979). Similarly, Anderson (1976) investigated the magnitude and stability of individual differences in time-to-learn and suggested that time-to-learn was an alterable human characteristic if effective teaching-learning strategies were used.

The results of the considerable research on ET and time-to-learn factors have given rise to important new insights into "equality of education" (Arlin, 1984a). Arlin (1984a) suggested that the achievement gap among students increases from the first grade onward and may be viewed as a negative result of an "equality of educational" opportunity or of the "equal provision of learning time for all students" (p. 67). Further, Bloom (1976, 1980) suggested that an obvious way to decrease this gap is to provide students with extra learning time in those areas in which they are deficient. If these students fail to learn steps one and two (the prerequisites for steps three and four), the probability of attaining steps three and four is decreased. Anderson (1976) discussed
the possibility of providing different amounts of instructional and learning time for students with different learning needs. By using this approach early in the learning process, student equality both in the time needed to attain criterion and general achievement level is an exciting possibility.

resulting correlations between achievement measures and engagement are as high as .87, although the majority are in the range from .30 to .50, which accounts for approximately 9 to 25 percent of the achievement variance. The findings in the BTES provided further demonstration and replication of these results. Educators agree that time-on-task or student engagement will increase learning; however, of concern to those interested in the improvement of schools is the variability in ET across classrooms.

As is the case with AT, there are large variations in ET across classrooms. Good and Beckerman (1978) found variations in ET from 60 to 82 percent. In close agreement with Good and Beckerman's findings, the BTES found engaged rates to vary from 50 to 90 percent. These findings appear more realistic than the earlier studies reporting 80 to 98 percent. The differences may be due to differences in observational techniques, differences in operational definitions, or perhaps the changes in classroom structures and student populations which have occurred over the last 40 years.

As Rosenshine (1979) noted "...a teacher is not obligated to maintain high engagement of students at all times; what is more critical is the total number of academically engaged minutes and the amount of content covered" (p. 36). Such factors as the amount of time students wait for teacher assistance (i.e., wait time), the amount of time spent changing from one subject or classroom to the next (i.e., transition time) and classroom interruptions often prevent students from maintaining active engagement in tasks. Even well-intended, specific teacher behavior may interfere with student engagement. Rosenshine also
indicated that an important problem is the determination of how many minutes of engagement will produce either satisfactory progress for an average student or needed progress for a below-average student. Nevertheless, academic engagement has shown consistent and positive correlations with achievement gain. Research in this area has suggested factors that can lead to greater amounts of student engagement in the classroom. It is essential that effective programs are developed to give teachers the necessary training in the skills and strategies that apparently increase the time students devote to active learning. As Harnischfeger and Wiley stressed "...the teacher controls and allocates her own time in the teaching process and directs pupils in ways which strongly influence and condition the kinds and degrees of their active learning" (1976, p. 6). The bottom line is "What is not taught and attended to in academic areas, is not learned" (Rosenshine, 1979, p. 36).

**Academic Learning Time.** One of the newest instructional factors found to be predictive of student achievement is that of Academic Learning Time (ALT). ALT is composed of four variables: AT, ET, success rate (SR) and curriculum-test congruence. Because these four variables can be observed and measured in the classroom, ALT is proving to be one of the most useful tools for judging whether student learning is taking place at any particular point in time. Recent data collected on hundreds of elementary school children have found that students who have accrued large amounts of ALT make greater achievement gains than those students experiencing lesser amounts of ALT (Fisher, 1978; Fisher et al., 1980;

The Beginning Teacher Evaluation Study was the first work to be conducted on ALT. One of the major findings of the BTES was the positive relation between ALT and student achievement (Borg, 1980; Fisher et al., 1980). The analyses of the data on ALT and its relationship to student achievement gains consisted of a series of regressions that examined the individual and joint effect of the ALT variables. For grade two reading, the residual variance accounted for by the combined effect of the ALT variables ranged from .02 to .23. For grade two math, the combined ALT variables accounted for between .01 to .22 of the residual variance. For grade five reading, the amount of residual variances explained ranged from .05 to .21. There are a number of factors other than ALT that affect student achievement. These factors include: curriculum, classroom environment, student and teacher characteristics, instructional processes, aptitude and perseverance. If all possible factors that affect student achievement were to be taken into account, the findings that the ALT variables may account for as much as 23 percent of achievement variance are important. The findings of the BTES, which indicated that ALT can predict student achievement, are impressive (Borg, 1981; Fisher et al., 1980).

ALT is an important operationally defined, behavioral indicator of student learning. A promising attribute of ALT is the fact that it can be used to study learning as it occurs rather than waiting until the end of the year or any other particular point in time. In order to take
advantage of this attribute, teachers must learn to keep ALT in mind as they instruct. Teachers should know the outcome measures that are used with the curriculum and assign activities related to those outcome measures. In addition, teachers should see to it that sufficient time is allocated for learning in all academic areas and find ways to keep students engaged. Finally, teachers should allow younger or academically less able students to spend greater percentages of time in high-success experiences. Under the above conditions, students will accumulate more ALT. "Students and classes that accumulate high levels of ALT are those that are likely to achieve more than students or classes with lower accumulations of ALT" (Berliner, 1983, p. 62).

Berliner (1979) explained that ALT is actually a more refined measure of time and a better predictor of student achievement than other measures of time that do not account for quality of instruction. One of the most important components of the ALT Model is "success rate," a quality of instruction indicator (Berliner, 1978; Block, 1970; Brophy, 1983). First, success rate is the only "quality" variable in the ALT Model. Both AT and ET involve quantity of learning rather than quality. Second, instead of focusing on "error-rate" as was done in earlier studies, educators are now looking at learning successes rather than learning errors. This new system encourages teachers to provide continually successful learning experiences to their students. A final positive feature of the success rate variable is its manipulability. There are many components of the educational process over which the
teacher has no control. Success rate is one important variable the teacher can directly control. This ensures what Block (1980, p. 100) calls a "can do" educational approach.

Efficient learning occurs when students maintain high rates of success (Block, 1980). Brophy and Evertson (1976) discussed their findings that, under regular classroom conditions, the most efficient learning occurs with success rates of between 70 and 80 percent. According to Fisher et al., (1980) when students are working individually, success rates of at least 95 percent are appropriate. This percentage may seem too high, but it is important to keep in mind that seatwork and homework assignments, completed independently, "demand application of hierarchically organized knowledge and skills that must be not merely learned but mastered to the point of overlearning if they are going to be retained and applied to still more complex material" (Brophy, 1983, p. 268).

Fisher et al., (1980) found that almost errorless performance in learning tasks resulted in the highest test performance and the greatest student satisfaction for younger students as well as for the academically less able. Other research in this area (Becker & Engelmann, 1981; Kifer, 1975) indicated that once a learner experiences a high level of success in the learning environment, a high self-concept will follow. In addition, high success rate is also associated with higher test scores, better retention of learned material and more positive attitudes about school in general (Fisher et al., 1978, 1980).

Despite the positive findings associated with academic success, several observational studies (Fisher et al., 1980; Gambrell, Wilson &
Ganitt, 1981; Jorgenson, 1977) found the majority of assignments assessed as "inappropriate" to be too difficult rather than too easy. Data from classroom observations in the BIES showed some students making almost 100 percent errors in their workbooks as much as 14 percent of the time (Fisher et al., 1978). In addition, the percent of time students spend in activities with high error rates has been found to be negatively correlated with achievement (Fisher et al., 1978, 1980). As is well summarized by Berliner, "Engagement in and the difficulty level of academic activities are crucial variables to manipulate when attempting to improve the academic achievement of elementary school students" (1978, p. 22).

The ALT Model, in contrast to the earlier models of Carroll, Bloom and Wiley-Harnischfeger, provides classroom indicators of factors affecting student learning. It appears to form a useful basis from which to make future decisions regarding AT, ET, student success rates, and curriculum-test congruence. The ALT Model of school learning provides classroom indicators of quantity as well as quality of instruction issues and provides the starting point for shaping future policies in teacher education. As the overview in the next section suggests, the shaping of guidelines for teacher education in the first decades of the century were based on comparatively incomplete and subjective data with unexceptional results. The research on ALT offers a comparatively much stronger basis from which to derive future educational guidelines.

**Additional Teacher Variables.** Over the past decades, the research on teacher effectiveness has seen major changes. In the early 1900s, teacher effectiveness was thought to be connected to personality
characteristics. Because the techniques necessary to measure these traits were virtually nonexistent, researchers asked students to describe an effective teacher. These studies resulted in lists of qualities or traits that students thought effective teachers possessed. One of the more effectively designed of these studies (Hart, 1934) identified four characteristics named by 10 percent of the students questioned. These characteristics were the following: makes greater demands of students, has more teaching skill, has more knowledge of subject matter, and has better discipline.

In later studies of this kind, expert judges were asked to describe effective teachers. The Commonwealth Teacher Training Study found the top six characteristics to be good judgement, self-control, considerateness, enthusiasm, magnetism and adaptability (Charters & Waples, 1929). By the 1930s the teacher rating scale was being used in teacher evaluation and again lists of traits were generated that described teachers perceived as effective (Barr & Emans, 1930). There was no evidence that any of these traits were actually traits possessed by effective teachers, or that teachers with these traits were actually any more effective than teachers who lacked them. Researchers as well as educators began questioning how this research aided the teacher training process.

As research in this area progressed, experimental methods were used. Using the experimental approach, two or more classes were taught by different methods and the mean gains in knowledge were compared. The findings were often contradictory from one study to the next. In addition, because the unit of analysis was usually the student, valid
generalization to teachers, other than those in the study, were nearly impossible. As it became increasingly apparent that research in this area should focus on both teacher variables and pupil achievement, process-product research became widespread. As Medley (1979) explained, "This method of research is to observe behavior in teachers' classrooms on random occasions, looking for behaviors that are stable across observations" (p. 14). Any variations in behavior or other teacher variables across occasions are treated as measurement errors. Although Stevens (1912) utilized observational methods as early as 1912, systematic observations of this kind were uncommon before 1960.

Finally, with the dissemination of "Interaction Analysis" (Flanders, 1960), and the publication of the first Handbook of Research on Teaching (Gage, 1963), process-product research began to blossom. It became apparent that specific aspects of teaching style and classroom climate were related to pupil learning (Rosenshine, 1971). In addition, researchers noted that patterns of behavior that distinguished effective from ineffective teaching (e.g., clarity, variability, enthusiasm, task-orientedness, opportunity to learn, structuring, pacing, monitoring and management) could also be modified with appropriate training. The present research in the area of teacher effectiveness focuses on three areas: measures of teacher effectiveness based on student learning, measures of teacher behavior through systematic observation of classrooms, and information about teachers' intent or purpose.

As with many areas of educational research, the study of the variables involved in teacher effectiveness has been plagued by problems in methodology and theory. Although recent research has been more
successful in pinpointing variables that do affect teacher effectiveness, past investigations have found few consistent relationships in this area (Dunkin & Biddle, 1974; Doyle, 1977; Flanders, 1969, 1970; Gage, 1979; Getzels & Jackson, 1963; Good, Biddle & Brophy, 1975; McKeachie & Kulik, 1975; Medley & Mitzel, 1963; Rosenshine, 1971; Rosenshine & Furst, 1973; Shavelson & Dempsey-Atwood, 1976).

Despite its shortcomings, process-product research has produced both reliable and valid information about factors involved in effective teaching. Medley (1979) examined 289 empirical studies, utilizing a specific criterion of quality, to draw consensus on a definition of effective teaching. Medley concluded, "And it is the teachers who produce permanent changes in pupils who deserve to be called effective" (1979, p. 17). Medley also stressed that the function of an effective teacher is to teach facts, principles, vocabulary, etc., the learning of which the student will display through testing. Medley stated, "It seems logical, therefore, to assess teacher effectiveness on the basis of how much of this content a teacher's students master in how brief a period of time, with allowances made for relevant characteristics of the particular group of students being taught and other factors affecting pupil's learning that are beyond the teacher's control" (1979, p. 17).

The acceptance of Medley's concept of teacher effectiveness by some researchers as being determined by student test scores, has greatly facilitated research in the field. Although this type of research cannot detect achievement gains over short periods of time, Medley stated, "Teachers are hired to educate children, to produce important, lasting changes in their behavior, not short term changes in test scores" (1979,
There is little evidence that teachers can produce both quick gains and permanent changes in students' achievement levels.

The analysis of the relationships between measures of classroom behavior (process) and gains in student learning (product) is imperative if educators and researchers are going to make changes in the training of new and novice teachers. A positive relationship between the process (the behavior) and the product (student achievement) suggests that teachers will have to increase, strengthen or learn specific behaviors in order to become more effective. It is imperative then, that the description of these behaviors be accurate and intelligible, and if possible, operational.

As Berliner stated, "It is a reasonable belief to hold that effective teachers can exist outside exemplarily schools, but that an exemplary school cannot exist without a large number of effective teachers" (1985, p. 1). What then is an effective teacher? The research suggests that the majority of teachers instinctively use the principles behind ALT. For example, they are aware of the outcome measures and make an effort to align academic activities to those measures. In addition, effective teachers also make efforts to allocate sufficient time to each academic area to ensure that learning occurs. Effective teachers also try to maintain engagement among their students at appropriate levels of success. Berliner emphasized that students of effective teachers accumulate more ALT than students of ineffective teachers. "That is, an effective teacher controls ALT" (Berliner, 1985, p. 17).

If ALT increases achievement and if an effective teacher controls ALT, then it is important to ask what specific characteristics do
effective teachers have that allow them to control ALT? For example, how do effective teachers increase ET or successful learning or increase a student's opportunity to learn?


Each of the ten variables listed above has several important implications for the learning process. A brief description and discussion of these variables follows.

Monitoring can be described as the teacher's ability to move around the classroom while checking individual student's work (Berliner,
1985). Monitoring raises the number of substantive interactions between the teacher and the students. Berliner described a substantive interaction as one, for example, where the teacher monitors the student's success with the task, asks questions, and gives the student academic feedback. Substantive interactions are positively correlated with academic achievement (Fisher et al., 1978). As was noted earlier in this paper, in several studies examining hundreds of elementary classrooms, researchers found students to be engaged in seatwork approximately 50 percent of the time (Good & Beckerman, 1978; McDonald, 1976). During these times, substantive interactions are often few, and academic engagement and achievement ordinarily decline (Berliner, 1985; Fisher, et al., 1978).

Structuring is the designing and presenting of an instructional sequence that gives the students a clear indication of the goals, content to be learned and expectations for behavior. This enables students to be adequately oriented and prepared for the instructional sequence. Fisher et al., (1980) found that students "pay attention more when the teacher spends time discussing the goals or structures of the lesson and/or giving directions about what students are to do" (p. 26). In several other studies, Armento (1977) and Smith and Sanders (1980) found structuring to aid students in academic achievement. In contrast, in an ethnographic study of more or less effective teachers, Tikinoff, Berliner and Rist (1975) found that in many classrooms, the teacher's intent or purpose could not even be inferred. Obviously, this lack of clarity would affect the attention and success rate of the students (Berliner, 1985).
Feedback is another important characteristic of the behavior of effective teachers. Several forms of feedback have been found to effect student behavior: contingent praise, ignoring inappropriate behavior, using student ideas, and corrective feedback. Only criticism, another form of feedback, has been found to be associated with ineffective teachers (Gage & Berliner, 1984; Sulzer-Azaroff & Mayer, 1977).

Praise is often used to stimulate performance. When using praise it is necessary that it be contingent upon the quality of students' responses. A teacher must also ensure that it is not used so frequently as to lose its reinforcing properties (Gage & Berliner, 1984). Brophy analyzed this process in more detail and listed uses of effective and ineffective praise (see Brophy, 1981).

Another process of providing students with positive feedback is using their ideas. A teacher may acknowledge a student's response or idea by restating it, modifying it, summarizing it, applying it, or comparing it with the responses or ideas of others. This process indicates to the student that his or her idea was worth taking seriously. Research in this area has found a moderate, but positive relationship between the use of student ideas and achievement gain (Rosenshine, 1971; Dunkin & Biddle, 1974).

Learning theory postulates the benefits of corrective feedback. This type of feedback provides the student, who has just given an incorrect response, with information about the correct response without
being criticized. Berliner (1983) described corrective feedback as "affectively neutral" (p. 32).

Questioning, another important instructional technique, is frequently utilized by teachers as a method to ensure that learning is occurring. Bloom's taxonomy sets forth two categories of questions. Lower-order knowledge questions require a fact answer and higher-order questions require application, synthesis, evaluation and/or analysis of information (Bloom et al., 1956). When using this technique, it is important for teachers to be aware of the number of lower versus higher-order questions they use (Bloom et al., 1956). In an analysis of questions found in curricular materials, Trachtenberg (1974) found over 95 percent to be lower-order questions requiring only a restatement of a fact. Lower-order questions do have a positive function, specifically with lower socio-economic status children and academically less able students (Brophy & Evertson, 1976). With adequate response time provided, higher-order questions appear to be more positively related to achievement than lower-order questions and responses (Redfield & Rousseau, 1981; Rowe, 1974).

Grouping or the organizational structure provided in the classroom is another important variable in the study of teacher effectiveness. As Harnischfeger and Wiley (1976) discussed, teacher grouping and individualization strategies play an important role in the determination of ALT.

Stallings and Kaskowitz (1974) found that groups of one or two students in a classroom were a negative correlate of achievement. In contrast, groups of more than two students were positively related to
academic gains. Results from BTES were similar. When students were working independently, their engagement rate ranged from approximately 60 to 70 percent. When the teacher was actively involved with the student(s), the engaged percentage rate increased from approximately 70 to 90 percent. These studies clearly indicated that when a teacher works with one or two children at a time, total classroom supervision is more difficult. Large group instruction facilitates classroom supervision. Nevertheless, the study by the Far West Laboratory found students working individually, doing seatwork, from 55 to 70 percent of the time (Filby & Marliave, 1977). Good and Beckerman (1978), and McDonald (1976) found similar results. If a teacher does not have the management skills to work in small groups or supervise seatwork, it would appear that increasing large group instructional time in classrooms may increase the student's ALT. This possibility has important implications for student academic growth.

Kiesling (1977-78) looked at the relation between student reading performance and amounts of time spent in different types of groupings for reading instruction. The results indicated that both small and large group instruction were positively related to reading gains, with the strongest relationship occurring for students at or below grade level. Good, Grouws and Ebmeier (1983) found both positive and negative effects with the consistent use of large group instruction. Although teachers who consistently obtained better than predicted gains generally used large group instruction, these investigators cautioned that, "The form of organizational structure alone has not, does not, and will never predict student outcomes" (Good, 1983, p. 127).
Climate refers to characteristics of the environment that effect achievement. Expectancy effects, behavior management techniques, and the orderliness and safety factors of the environment all influence classroom climate.

The literature on expectancy effects has shown strong indications that when teachers set high but attainable academic goals for students, academic achievement increases. In contrast, when goals for performance are lower, achievement is also lower. The research literature includes numerous discussions concerning ways these performance expectancies are communicated to students. Good (1983) found students who were expected to be low performers to be consistently dealt with differently than high performers. Low performers were found: to be seated farther away from the teacher, to be dealt with more frequently as a group rather than as individuals, to have less teacher contact, to be praised more often for inadequate or marginal answers, to be praised less often for successful public responses and to be interrupted in their work more often than high performers. This kind of differential treatment obviously affects student achievement in predictable ways. Rutter et al., (1979) found the expectancy effect to produce marked differences in high school students' academic achievement. Their data revealed that, "Children have better academic success in schools where teachers expressed expectations that a high proportion of the children would do well in national examinations" (Rutter, et al., 1979, p. 188). Furthermore, the research on effective schools indicated that the communication of high academic expectations or
standards also created a more positive and effective school climate (Rutter et al., 1979; Brookover & Lezotte, 1977; Edmonds, 1979; McDonald & Elias, 1976; Vanezky & Winfield, 1979).

In the same way that high academic expectations create a more effective school and classroom environment, a safe, orderly and academically focused environment has been found to enhance teacher effectiveness and academic achievement (Fisher et al., 1978; Karweit, 1983; Karweit & Slavin, 1981; Rutter et al., 1979; Purkey & Smith, 1983). As Rosenshine (1979) pointed out, a classroom that is highly structured and academically oriented can also have a warm atmosphere where genuine, caring interactions take place.

Another important teacher behavior related to achievement is that of content-coverage or pacing. Content-coverage in some content areas can be described quantitatively, as the number of pages that are covered or studied in a textbook (Good, Grouws & Beckerman, 1978), or the number of problems or words taught (Barr, 1973-74, 1980; McDonald, 1976). The amount of content-coverage in some particular time period is called pacing. Although content-coverage has been studied in many forms with promising results, its use is not common within educational research. This is because curriculum materials differ across counties, districts, schools, and even classrooms which makes comparisons different. The majority of the studies of content-coverage or pacing have focused on short, common teaching units or have relied upon teacher reports. Both have obvious methodological problems, but despite these definitional and measurement problems, a positive correlation between achievement and the
amount of content-coverage or pace is common. Cooley and Leinhardt (1980) and Dunkin (1978) discussed content-coverage as a potent variable in accounting for student achievement gains.

In addressing the problem of managing behavior deviancy within the school environment, Kounin (1970) presented eight concepts. These concepts aid the teacher in the process of maintaining appropriate student behavior as well as providing an environment that encourages academic engagement. "Withitness" is the ability to be aware of the entire classroom. This enables an effective teacher to prevent behavior problems rather than having to deal with them after they occur. "Overlappingness" is the ability to manage more than one task at a time. An effective teacher will also use the appropriate amount of "momentum" and "smoothness" when presenting classroom lessons, as well as "signal continuity." These characteristics have to do with the teacher's ability to move the lessons at a clear, brisk pace, while maintaining a continuous academic "signal" to which students can attend. "Group alerting" and "accountability" in lessons concern the teacher's presentation and questioning techniques that are intended to keep students attentive to lessons and accountable for learning the content. Kounin also stressed the need for teachers to provide variety and challenge for students when doing seatwork (Kounin, 1974). These variables have not only been described in detail by Kounin, but have been verified in research as well as practice (Brophy & Evertson, 1976; Anderson, Evertson & Brophy, 1979). Several researchers (Borg & Ascione, 1982; Evertson et al., 1984; Emmer et al., 1984) have used these concepts in the formation of training packets for teachers.
In addition to the variables Kounin set forth for teacher effectiveness, Brophy (1983) stressed several behavior management techniques. These techniques include: positive reinforcement (Kazdin, 1977), negative reinforcement, punishment (Krumboltz & Krumboltz, 1972; O'Leary & O'Leary, 1977) and several cognitive intervention strategies including: self-monitoring (McLaughlin, 1976; Meichenbaum, 1977; O'Leary & Dubey, 1979; Rosenbaum & Drabman, 1979), contingency contracting, and individual therapy (Dreikurs, 1968; Glasser, 1969, 1977; Good & Brophy, 1978, 1980; Gordon, 1974). As Berliner stressed, effective teachers are good managers. Their effective control of student attention and behavior can reduce the amount of ALT lost to needless distractions (Berliner, 1983). As Brophy (1983) discussed, effective classroom management and effective instruction are interdependent. "Successful classroom managers maximize the time their students spend engaged in academic tasks. They also maximize their student's opportunity to learn academic content, and this is exhibited in superior performance on achievement tests" (Brophy & Evertson, 1983, p. 266).

Time management, including transition time, wait time, and classroom interruptions, is another area that affects both content-coverage and ALT. Several studies have found transition time to be disruptive to instructional time (Arlin, 1979; Berliner, 1983; Rossmiller, 1982). Berliner (1983) described one classroom in the BTES where learning centers were used freely and creatively. What went unnoticed, however, was the vast amount of time lost transitioning from center to center -- approximately one fourth of the entire day. When
given feedback about this occurrence, teachers can make rapid changes. Six minutes of transition time saved per day adds up to eighteen hours of potential ET per year.

Like transition time, wait time, or the amount of time students spend waiting for help, also disrupts the learning process. Berliner (1983) suggested using "help signs" or other signs that a student can display, to alleviate the time that is wasted when a student sits with his or her hand in the air. In the same way, a sign-up sheet can be used for such individual student needs as special tutoring or contract changes. This will prevent students from wasting time in line at the teacher's desk. In addition, alternate academic activities, such as a math puzzle displayed on the blackboard, can be used by students during both wait time and transition time when they cannot proceed with their regular assignments.

Disjointedness, a cognitive/behavioral issue, refers to classroom interruptions that disrupt the time planned for teaching an activity (Kounin, 1970). These interruptions can take the form of a message over the loud speaker, a knock at the door or a student demanding individual attention during a group lesson (Berliner, 1978). Disjointedness can be reduced by using good contingency management programs within the classroom and practicing good behavior management procedures. In addition, it is important that the principal be sympathetic to the effect of classroom interruptions on student engaged behavior.

Beginning with a classic study undertaken during World War II, the positive, motivational effects of grades and tests have become known (Hovland, Lumsdaine & Sheffield, 1949; Fitch, Drucker & Norton, 1951;
Hales, Bain & Rand, 1971; Clark, 1969). The more frequent the testing and grading, the higher the achievement. The more conventional the grading system (A,B,C,D vs pass/fail), the higher the achievement. Despite the positive results of the use of tests and grades, with the majority of students, some students learn to rely only on those external performance standards without building internal standards of their own. Still other students may become so anxious over the prospect of a test or a grade, that their performance may actually decrease. Over-emphasis on tests and/or grades for summative evaluation may be associated with ineffective teaching. An effective teacher is thought to be aware of both the positive and negative motivational effects of these two forms of evaluation.

Over the last two decades, larger scale investigations have studied the effects of several teacher effectiveness characteristics at one time. Despite the improvements in observation instruments and research design, the number of teaching behaviors linked directly to student achievement is still limited (Brophy & Evertson, 1974). One reason for this may be that, "Teaching is a complex and mystical art, rather than an applied science that can be analyzed and measured objectively" (Brophy & Evertson, 1974, p. 79). On the other hand, however, these authors believed that the problem may not be the complex nature of teaching, but rather the remaining weaknesses in the research approaches used.

A series of studies were conducted at the University of Canterbury in New Zealand. In a correlational study (Wright & Nuthall, 1970) teachers taught science to groups of 20 randomly selected third
graders. No significant correlation with achievement was found in the areas of teacher or pupil talk, teacher structuring comments, reviewing, percentage of closed versus open questions, or praising of student responses. Redirecting a question to a second student after an incorrect response was found to correlate positively with achievement.

Follow-up studies (Hughes, 1973) used experimental manipulation of teachers' reactions to students' participation with seventh graders. The results of these studies suggested that students can learn effectively without overt participation in lessons. Enthusiastic and supportive teacher reactions to participating students were found to effect the learning of all students.

The results of a study by Nuthall and Church (1973) indicated that increases in achievement test scores were related to teachers concentrating on teaching conceptual knowledge versus teachers concentrating on maximizing achievement test scores. Another study by Nuthall and Church resulted in findings contrary to those of Hughes. These authors found that when teaching science to ten year olds, if content-coverage was held constant, there was no difference in achievement between the questioning and lecture methods of teaching. Within the questioning method group, however, participants in the questioning method learned more than non-participants. In general, Nuthall and Church found content-coverage to be more closely related to achievement gains than either the questioning or lecture method of teaching.

In general, the Canterbury studies suggested the following: (a) content-coverage correlates more highly with achievement than specific
teacher behavior, (b) active participation by older students is not as vital as is participation by younger students, (c) teacher reactions indicating enthusiasm for content and support increased student motivation, and (d) teacher structuring of content aided student achievement.

Flanders (1970) was interested in the effects of teacher indirection on student achievement, as well as student attitudes toward that teacher and classroom. Flanders theorized that teachers should do less lecturing, more questioning, and more listening to their students. The data from Flander's work indicated that: (a) teacher talk correlated positively with both achievement and attitude; (b) teacher indirection and acceptance of student ideas also correlated positively with attitudes and achievement, especially beyond the primary grades; and (c) restrictiveness and criticism correlated negatively with student achievement and attitudes. Despite these results, Flanders cautioned against the conclusion that teacher indirection leads to achievement. He discussed other plausible conclusions. For example, "indirect" teachers may stimulate greater student achievement gains because they use group instruction, not because they use indirect methods. Group instruction may be the variable that increases achievement. In addition, lecturing was not included in the direct methods described in Flander's work. It should be noted that Rosenshine (1970) found no significant differences between directedness and indirection and achievement.

The Texas Teacher Effectiveness Project was designed to discover specific teacher behaviors or characteristics associated with student achievement gains on the Metropolitan Achievement Test (MAT). This
outcome measure was chosen because it was thought to be reasonably representative of the curriculum goals of the second and third grade teachers in the study.

Although the results of this study indicated that many of the positive correlations between teacher behavior and student achievement were non-linear, or at times only minimal, several interesting relationships were noted. One variable found to correlate consistently with achievement gains across SES groups was classroom management. Another variable found to show predictive ability was success rate. Brophy and Evertson (1974) found that the greatest achievement gains were associated with curriculum material presented at an optimal level; not too difficult nor too easy. Obviously though, high achievers would benefit from curriculum material at a more difficult level than lower achievers. Optimal learning for both high and low achievers occurred at a success rate of between 70 and 80 percent. These investigations also indicated that specific forms of reward and punishment, high student expectations, opportunity to practice new material, teacher feedback, and student-initiated questions were associated with student achievement.

Soar (1977) and Soar and Soar (1979) conducted a variety of studies that resulted in several well-established conclusions. For example, high rates of teacher criticism, negative affect, and pupil resistance are usually negatively correlated with achievement. High rates of positive teacher affect and praise usually showed a significant positive correlation with achievement gains. Although more important for
low SES students, these studies also found that greater teacher control over student behavior and learning tasks was predictive of achievement gain.

Stallings and her colleagues (1974) conducted an evaluation of Project Follow-Through. These studies included correlational studies at the third grade level. In one study of 108 first and 58 third grade classes, experienced teachers implemented one of seven Follow-Through models. These models ranged from structured programs emphasizing basic skills to open classrooms emphasizing affective objectives and self-discovery. The results of these studies were typical of many other studies of primary grade instruction with low SES students and also typical of many larger scale studies using multiple measures of teacher behaviors. The results showed positive correlations between achievement and process variables related to the student's opportunity to learn. In addition, negative correlations were found between achievement and nonacademic activities. In addition, small group instruction (less than eight students) correlated positively with achievement in first grade. Large group instruction (eight or more students) correlated positively with achievement in third grade. Praise for on-task work correlated positively with achievement, but this correlation was greater in first than third grade, greater in math than reading and greater for low-ability students.

Another investigation, similar to the Follow-Through investigation, studied reading instruction in 45 third grade classes in the California Early Childhood Education (ECE) Program (Stallings, Cory, Fairweather & Needles, 1978). The results of this study found the
greatest reading gains to be in those classes that spent the greatest amount of time engaged in reading. In addition, the classrooms with the highest reading achievement had teachers who spent more time in small group instruction. These classrooms also had teachers who provided more instruction and feedback and asked more academic questions. The results of this study, linking reading achievement to small group instruction, supported the findings of the Follow-Through Study in first grade, but contradicted those findings for third grade. It is most plausible that effective instruction can be accomplished using either small or large groups and that the most vital variable is the active teacher instruction rather than the size of the instructional group.

Stallings, Needles, Stayrook (1979) conducted a two-phase study in 87 secondary remedial classrooms. The first phase was a correlational study involving 43 teachers from six school districts in Northern California. The second phase, a quasi-experimental study, was conducted in the same school districts with 44 teachers. Each teacher selected one class period where observations were conducted for three consecutive days. Pretest, posttest reading scores and absence data were kept on each student. In addition, students were given a classroom environment scale while teachers were asked to rate their own behavior on a flexibility/structured scale. Partial correlations and analyses of variance were then computed to examine the relationships between observed instructional processes and class means for achievement gains and absence rates. In contrast to many of the prior studies, Stallings et al., (1979) used very specific variables to describe the instructional process. When these variables were correlated with student gain on the
outcome measure (Comprehensive Test of Basic Skills), strong positive correlations were identified between time-on-task, academic interactions, and academic instruction and reading gain. Such variables, as the number of social interactions, the number of behavior problems, the number of uninvolved students and the amount of transition time were found to be negatively associated with achievement gains.

Because the variables used in this study were specific, translating the findings into specific teacher recommendations was relatively easy. Each teacher participating in this study received a specific set of recommendations based on the observations conducted in his/her classroom.

In addition to specific teacher recommendations, in the second phase of this study workshops were conducted on the management of classroom time. In this phase, a treatment and a control group of teachers were observed in the fall, winter, and again in the spring. The treatment group attended the workshops early in the school year and were found to make appropriate behavioral changes in the classroom. These changes were maintained through the spring observations.

In a study by Good & Grouws (1979) 40 teachers (grades four through eight) were divided into a treatment and a control group. The treatment group received a 45-page manual containing a system of sequential, instructional behaviors for teaching mathematics. After reading the manual they received two 90-minute training sessions before implementing the system in their classrooms. The control group was instructed to continue teaching as they had been. All teachers were observed six times over a four month period. The teachers in the
treatment group implemented many of the desired instructional behaviors such as reviewing, checking homework, and maintaining on-task student behavior significantly more often than the teachers in the control group. In addition, the mathematics test scores for students of the treatment teachers increased significantly more often than the test scores for students of the control teachers.

In a similar study, Fitzpatrick (1982) used a treatment-control group design with 20 teachers of algebra and foreign language. The results indicated that treatment teachers provided teaching behaviors such as clear expectations, feedback and a warm, supportive environment more frequently than teachers in the control group. Overall engagement was higher in the classrooms of the treatment teachers.

In summary, the previously discussed set of classroom characteristics and teacher behaviors relating to student achievement is extensive. Despite the completeness of any set of variables, there will obviously be some selection involved. As Berliner stressed, "No one set of behaviors or characteristics of classrooms will adequately describe all the events in an effective teacher's classroom" (1985, p. 33). Nevertheless, the above discussed set of characteristics and behaviors appears to be a sensible beginning.

As has been discussed, affective teaching manifests itself in students' successful engagement in a curriculum that is linked to specific outcome measures. The teacher behaviors and environmental characteristics discussed in this paper distinguish between effective and less effective teachers. For the purposes of this study, it is assumed that these behaviors and characteristics influence achievement by
affecting the variables associated with ALT. For example, monitoring maintains high levels of engagement. Structuring increases success rates. Pacing affects opportunity to learn. Questioning is a process that can aid the teacher in linking curriculum to outcomes. The climate variables, such as communicating academic expectations, influences motivation, which in turn influences academic engagement. A safe and orderly classroom, with an academic focus, also increases the amount of student engaged time. Successful management of student inappropriate behaviors decreases classroom interruptions, which again increases engagement. A warm atmosphere creates the trust and cooperation necessary for an effective classroom. Tests and grades, when used appropriately, provide the motivation necessary for academic pursuit. And finally, feedback is another mechanism providing students with motivation, thereby insuring higher rates of attention. Yet, as Harnischfeger and Wiley indicated, "The teaching/learning process consists of many diverse teacher and student demands that result in a vast divergence of teacher planning and preparation" (1976, p. 26). These diverse teacher behaviors and environmental factors, along with the student's "intrinsic and task-specific motivations" (Harnischfeger & Wiley, 1976), can limit or facilitate the student's opportunity and desire for task engagement, ALT, and finally achievement gain. Each and every hindrance to task engagement, whether due to lack of teacher skill, classroom environmental factors, or student attention, will result in lessened ALT and, most likely, lessened achievement gain. Berliner (1983) discussed the contextualized nature of teaching ensuring the
interactive effect of many variables. "The power of these variables is clear. The ability to balance these forces is the problem that teachers face" (p. 67).

As the awareness of and knowledge about the teaching-learning process progresses, these hindrances to task engagement become more predictable in some cases and less predictable in others. Nevertheless, as Harnischfeger and Wiley (1976) suggested, "These time losses may cumulate to a significant amount and thus can considerably curtail actual teaching and learning" (p. 36). Once at-risk classrooms have been identified, as is the aim of this study, the specific problems within each classroom may be identified. It is the aim of teacher evaluation and staff development programs to address these problems both during the initial teacher training and on-going teacher education process. This initial and on-going training and education is necessary to ensure quality teaching and effective schooling.

**Teacher Evaluation**

The last several decades have seen a shift in interest from broad issues of school finance and program development to concerns about the quality of teaching within the classroom (Darling-Hammond, Wise & Pease, 1983; Kovach, 1982; Levin, 1979; Wise, Darling-Hammond, McLaughlin & Bernstein, 1985). Community members are requesting evidence about teacher and administrative performance and the influence of that performance on student academic growth and achievement (Kovach, 1982). These concerns have led to increased interest in teacher evaluation (Ellett, Capie & Johnson, 1980; Haefele, 1980; Lewis, 1982; Millman, 1981; Peterson & Kauchak, 1982). Yet, as all educators search for a more
reasonable, fair, and in the end, better evaluation system, teacher evaluation remains in a state of flux (Kovach, 1982).

During the last several decades, the public has come to believe that the major thrust behind educational improvement lies in upgrading the quality of teachers. Modern philosophical views of evaluation see this process as a method to help "improve" performance rather than to "prove" performance (Kovach, 1982). Many states and local school districts are in the midst of wide-range policy changes affecting the certification, evaluation and tenure of teachers. Teacher competency tests have been established as well as licensure exams and professional standards and practices boards (see Lewis, 1979; McNeil, 1981; Vlaaderen, 1980). Due to the upsurge of interest in teacher quality, it is not surprising that this process is a common subject of collective bargaining agreements. Mitchell and Kerchner (1983) suggested that because of collective bargaining practices, teacher evaluation is presently becoming increasingly rule-based, linked to specified minimum work standards rather than competencies. These authors also discussed the difficulty in using the same evaluative results for both formative (improvement-oriented) and summative (personnel decision-making) purposes.

Guidelines set forth for evaluation systems pose specific questions depending on whether the evaluative purpose is improving teaching quality or providing job status decision. As Darling-Hammond et al., (1983) discussed, detecting and preventing teacher incompetencies or deficiencies may be difficult. Nevertheless, correcting these deficiencies appears to be the most reasonable and approachable task to
undertake. Using both summative and formative evaluation to meet this end does pose some difficulties. Darling-Hammond et al., stated, "...the content free generalization necessary for implementing a uniform evaluation system may counteract the context specific purposes needed to effect change in individual or organizational behavior" (1983, p. 288).

What is the primary purpose of teacher evaluation within the schools? (see Knapp, 1982). Teachers want a system that encourages self-improvement yet protects their rights. Administrators, on the other hand, want an evaluation system that is not time consuming and is feasible within the organizational context. Parents and public officials are interested in student outcomes and how they relate to teacher effectiveness. These differing views obviously pose problems in both the design and implementation of any evaluation system.

Increasing the problems inherent in teacher evaluation are the many theories and models of the educational process. In addition, the evaluation system must take into account the differing conceptions of teaching. As information is collected and used in the evaluation process, is the teacher being judged as an artist, a laborer, a craftsperson, a professional or a manager? Levin (1979) outlined six general approaches to teacher evaluation discussed in the literature. They are the following: student ratings, observations by supervisors, observations using instruments, self-evaluation, student achievement gains and teaching tests. There are obviously pros and cons to each of the above methods. There are questions of validity concerning the use of student ratings (Medley, 1977a, 1977b; Natriello, 1977) and supervisor observations (McNeil & Popham, 1973; Swartz, 1975) and questions of
reliability when using teaching tests (Glass, 1974). Self-evaluation may be unproductive because teachers find it hard to separate their self-evaluation from their overall attitudes toward the evaluation process (Medley, 1977; Natriello, 1977; Wolf, 1973). Although infrequent, several districts have evaluated teachers according to their contribution to the performance of their students or student academic gain (McNeil & Popham, 1973). It is interesting to note, however, that only a minority of teachers believe that achievement test scores are a valid measure of their effectiveness (NEA, 1979). Research points to the undesirability of this approach because the low stability effects do not justify its use for accountability purposes (Glass, 1974; Brophy, 1976; Soar & Soar, 1975; Shavelson & Dempsey, 1975).

A more promising evaluation tool is that of systematic observation using an observation instrument or system. Levin (1979) cautioned that although many of these instruments have been carefully developed and validated, reliability and/or validity data should be carefully examined when choosing an instrument or system. These instruments or systems have failed as research tools, to pinpoint a specific instructional variable or behavior as the main ingredient in effective teaching. Despite this fact, they are very useful for providing teachers with the needed feedback to focus on discrete aspects of their teaching behavior and to make any needed changes (Levin, 1979; Popham & McNeil, 1973).

Doyle and Ponder (1977-1978) suggested that teachers are more likely to use feedback about a specific teaching technique or principle if it meets three criteria. It must be operational. That is, it must
describe the behaviors to be used. It must be consistent with the teacher's philosophy and role definition. Finally, it must be cost effective in terms of time and money. Anderson, Evertson and Brophy (1979) added that teachers are more likely to implement changes when the changes or ideas are based on naturalistic classroom research with similar teachers and schools. Their study, in particular, found teachers more readily implemented changes in the areas that are most directly related to achievement: opportunity for practice, group and individual responses, feedback and specific behavior management techniques such as the use of praise. Anderson et al., (1979) also found teachers to be less influenced by ideas that were more complex or novel to them. To implement more complex or unfamiliar behavior changes, teachers will obviously need adequate rationale and more assistance.

Recent research (Good & Brophy, 1974) suggested that teachers are often unaware of certain aspects of their classroom behavior. They are rarely asked about or given the opportunity to reflect on specific teaching techniques or teaching behaviors. Simple feedback about these techniques and behaviors, however, has been successful in creating the needed awareness and self-monitoring to initiate change. Even though the appropriateness of specific teaching techniques or behaviors may change with the context, Anderson et al., discussed the fact "...that the value of general principles is not negated." (1979, p. 220). It is important that the research on teaching be organized to enable identification of important major principles. It will then be the job of educational specialists in specific training sessions to "...describe for teachers

In general, different teacher evaluation systems reflect differing educational philosophies (Darling-Hammond et al., 1983). Competency or performance-based evaluation systems that depend on validity, stability and generalizability of teaching behavior for their utility will be in direct contrast with evaluation systems that rely on situation-specific elements such as clinical supervision and self-assessment. The choice of which evaluation system to use is associated then with the view of the school as an organization, as well as the view of teaching itself. In conclusion, Darling-Hammond et al., (1983), Fahey (1980) and Kovach (1982) stressed the need for a multi-faceted evaluation system which satisfies both individual and organizational needs.

Despite the different evaluative methods, it is imperative that one not lose sight of a primary goal of teacher evaluation -- the increase of teacher effectiveness and improvement of student learning. All evaluation systems, no matter how diverse in philosophy or orientation, should have as an aim providing information about the link between teacher competence, teacher performance and student learning. After teachers are given information about the teaching-learning process, a good teacher evaluation system should also provide the teacher with strategies to use in the change process. Because a list of measurable teaching behaviors, effective in all contexts, is not available and may never exist, the need for context/teacher-specific strategies for improving teaching are necessary. As Medley stated, "Teacher education,
both at the preservice and the inservice level, should adopt as primary goals the development of the competencies needed to create and maintain the learning environment, to engage pupils in learning-related activities and to implement the kind of instruction that research indicates is provided by effective teachers" (1977, p. 25). This type of teacher education or staff development program should be an outgrowth of any productive teacher evaluation system.

**Staff Development**

As one of the basic outcomes of teacher evaluation, staff development is of particular importance. According to Floden and Feirman (1981) staff development is a procedure used to accomplish several goals. For example, staff development may focus on training teachers to implement specific classroom procedures, to use their skills in the development of curricula or to implement specific school policies.

Only recently have researchers begun to deal with the complex problems involved in the design and implementation of staff development programs (Griffin, 1983). In efforts to make research findings applicable to practicing educators, several researchers (Anderson, Evertson & Brophy, 1979; Crawford, Gage, Corno, Stayrock, Mittman, Schunk & Stallings et al., 1978; Good & Grouws, 1979; Rouk, 1982; Stallings, Needles, & Stayrook, 1979) have translated their findings into inservice training models such as the ALT Training Model. During the late 1970s, the ALT training procedures were used with elementary school teachers at the Far West Laboratory (Fisher et al., 1980). In the Far West Laboratory training program, the researchers worked closely with the teachers to develop practical procedures for monitoring the variables of
ALT in their classrooms. Initially, descriptive baseline data were gathered from a classroom, during which time the teacher and the staff developer were free to build a positive, working relationship. The teacher then identified a problematic situation or process within the classroom under study, such as reducing transition time. Baseline data on the ALT variables were analyzed and used to provide feedback to the teacher concerning the problematic situation or variable. Intervention occurred as the teacher, with the help of the staff developer, operationalized the insights gained from the baseline data analysis and began to make the necessary classroom changes. The impact of the intervention phase was determined by the continued gathering and analysis of data on the ALT variables.

The ALT Training Model proved to be especially beneficial for teachers who tended to lose sight of the learning process of individual students in the process of instructing an entire class. Because ALT provides an individual student variable for assessing the impact of instruction, it is of "potentially great value as an information tool to be used by teachers in the evaluation of their daily instruction" (Fisher et al., 1980, p. 30).

Several other staff development studies have shown the positive effects of teacher training on student achievement (Anderson, Evertson & Brophy, 1979, 1982; Becker, 1977; Berliner, 1983; Ebmeier & Good, 1979; Emmer et al., 1984; Evertson, Emmer, Clements & Sanford, 1982; Gage & Giaconia, 1981; Good & Grouws, 1979; Fisher et al., 1980; Fitzpatrick, 1982; Miller, 1980; Reid, 1982; Ponzio, 1984; Stallings et al., 1979; Tharp, 1982; Waimon, Waimon & Ramsey, 1983). In the 1976-1977 school
year, the San Diego City Schools came under court order to improve the quality of education in 19 of their schools. Their goal stated that 50 percent of the students would perform at the fiftieth percentile within five years. A task force developed a staff development training program by reviewing the findings of the BTES and the Follow Through Direct Instruction Model as well as the work of Carroll and Bloom. The task force's staff development training program provided the teachers with baseline data plus systematic, weekly feedback from site resource teachers. The sole responsibility of the site resource teachers was to provide technical assistance to the teachers trying to implement the program in areas of reading and math. By the end of the first year, all schools had made substantial gains and some were above the requirements of the court order.

The experimental Missouri Math Project of Good and Grouws (1979) used training procedures based on available research as well as common sense. The treatment group in this study consisted of elementary school teachers who were trained in the areas of feedback, pacing, structuring, success rate, allocated and engaged time, monitoring and questioning. These teachers developed safe, orderly environments where achievement gains were higher than in the control classrooms where no training occurred. When studying the actual implementation of the techniques, an interesting pattern was noted. Of the 15 techniques recommended in the training procedures, only 8 were used more frequently by the trained teachers than the untrained teachers. Each of these 8 recommended teaching practices showed a significant relationship with student achievement gains. In contrast, the remaining 7 recommended teaching
practices were used at comparable rates across both trained and untrained teachers. Of these seven recommended teaching practices, none showed a significant relationship with student achievement gains (Gage & Giaconia, 1981). Similarly, the experimental study by Anderson, Evertson & Brophy (1979) found that when teachers used the recommended techniques, higher student achievement gains resulted. In addition, those teaching techniques that were used consistently and became a routine were found to relate positively to student achievement. In contrast, practices less frequently or consistently used showed no relationship to achievement. The results of these studies indicate that teachers may not necessarily use all components of staff development programs. It is the more consistently-used techniques acquired from such programs that will constitute the major impact of interventions resulting from these programs.

Emmer, Sanford, Evertson, Clements & Martin (1981) conducted an experimental field study in which they observed the effects of "brief" staff training coupled with individual work to bring about teacher behavior change. In this study, experimental teachers attended a three-hour workshop and studied a training manual that recommended specific teacher behaviors in classroom management. Follow-up analysis found the experimental teachers understood and used significantly more of the recommended management behaviors than the control teachers. Because of the possibility that experimental teachers may have more previous knowledge concerning classroom management skills than control teachers, Griffin, Hughes, and Martin (1982) conducted a related study in which both experimental and control teachers completed a questionnaire on
behavior management techniques prior to the brief training intervention. After a content analysis of the training manual, it was determined that there were no significant differences between the experimental and control groups in their knowledge of desired management behaviors prior to treatment. These recent studies indicated that brief inservice training may be both an economical and a productive method of improving teacher effectiveness in the classroom. This type of inservice training would seem to be a worthwhile avenue of future research.

In the development of one specific training model, the variables used in the Stallings et al., (1979) Teaching Basic Skills in Secondary School Study were translated into a staff development model called the Effective Time Training Program (Stallings, 1985). The goal of this model was to help teachers manage their classroom time more effectively. The content or curriculum of the program was based on research findings. The delivery system was individual instruction and interactive small-group problem-solving. The model consisted of the following components (Stallings, 1985, pp. 292-293):

**Pretest**
- Observe teachers
- Assess what is needed from teacher observation profiles
- Start where they are

**Inform**
- Link theory, practice and teacher experience
- Provide practical examples from classroom situations

**Organize and Guide Practice**
- Provide conceptual units of behaviors to change
- Support and encourage behavioral change
- Assess and provide feedback
- Help integrate into scheme

**Posttest**
- Observe teachers
- Provide feedback to teachers
- Provide feedback to trainers
Stallings stressed the importance of the following five activities included in the model: stating the objectives of the program, selecting or developing instruments for measuring the behavior of concern, observing the teacher's implementation of the instructional strategies (baseline), providing intervention and finally observing any behavioral change. Using this model as the basis for an experimental study, Stallings et al., (1979) found the trained teachers to have implemented 25 of the 31 recommended variables by the end of the school year. In addition, the students of the experimental group teachers showed more reading gains than the students of the control group teachers.

Other studies have show the utility of using research on teaching as a guide to improve teacher training and practices. Inservice training of elementary teachers at Stanford University showed positive effects on student achievement (Crawford et al., 1978). The results of another study, stressing such variables as ET, SR and monitoring, showed increases in reading achievement with low-income Hawaiian children (Tharp, 1982). In a project led by Research for Better Schools (RBS), educators worked with researchers to improve learning. The RBS approach to instructional improvement involved training supervisors and teachers to use an empirical approach to make needed classroom changes in such areas as AT, ET, transition time and instructional planning. The results of this study demonstrated that improvement efforts of this kind can be successful with the involvement of all levels of school staff (Rouk 1982). Waimon et al., (1983) developed an experimental preservice teacher education program to train prospective high school teachers to
increase ALT through the identification and arrangement of instructional tasks. Thirty-four prospective teachers were selected and randomly assigned to either the experimental or the control group. They were given one semester to prepare to teach the content of a specific chapter to a high school class. One experimental and one control teacher were assigned to each class. Prior to the teaching of the assigned classes, the control group received a three-week traditional competency-based, teacher education program. Teachers in the experimental group received a three-week task-significance training course. This training course aided the experimental teachers in performing a content analysis, identifying educational levels, and establishing behavioral objectives. The results of this study supported the prediction that teachers in the experimental group would increase ALT to a greater extent than teachers in the control group.

In a recent study, using a baseline-treatment design, five preservice teacher candidates from Mills College and five experienced teachers from Vallejo City Schools volunteered to participate in a three-day training program. In this training program the teachers and teacher candidates were instructed in the recording of both ALT and active teaching behaviors. The experienced teachers found ALT assessments to be more useful than instruction in active teaching behaviors. The student teachers found instruction in active teaching behaviors to be the most useful. Both groups increased the use of ALT and active teaching behaviors (Ponzio, 1984).

One interesting aspect of this type of individual inservice staff development is that it allows the teachers to examine particular,
selected, problematic aspects of their own classroom. Using this individualized system of staff development, teachers are not bombarded with hours of inservice information for which they have no interest or use, but rather work with a staff developer to develop solutions and alternatives that can be immediately implemented (Miller, 1980). In summary, Muir (1980) evaluated staff development programs that use the ALT model as particularly appropriate for improving instruction. Research of the last decade begins to give strong evidence that teacher effectiveness is dependent upon teachers receiving ongoing educational support services that are consistent with the purposes of schooling. Obviously, quality instruction throughout the years begins with quality preservice and on-going preparation and education. As the authors of the NEA report Excellence in Our Schools (1983) indicated, teachers should be seen as a major source for identifying the changes that are needed in the teacher education provided in staff development programs.

Overall, the recently expanded purpose of staff development is to explore both theoretical and practical issues involved in student learning. This is accomplished by combining research findings with a variety of classroom problem solving techniques. The new staff development programs are in sharp contrast to the mere formal, mechanical imitation of teaching practices that was often offered in early staff development programs (Miller, 1980). There is continued need for close, personal collaboration between researchers, staff developers and teachers aimed at helping teachers make immediate and appropriate classroom modifications to ensure the most effective teaching and student learning (Brown & Saks, 1985). As Fenstermacher (1983) stated, "...The
researcher of teaching cannot do research without in some way participating in the education of teachers, nor can the teacher educator transform beliefs without participating in the study of teaching" (p. 182).

The Present, The Problems, The Future

The Present

In contrast to the outcries prevailing in the 1960s and 1970s that "the schools have failed," the 1980s have been filled with recommendations for improvements on all levels of the educational process. After a decade of continual search for links between teacher behavior and student learning, however, the research finally provides more than suggestions or indications. Many of the more recent studies, although descriptive or correlational, show strong and socially important relationships. These studies are typically followed by specific recommendations for improvements in the teaching-learning classroom process as well as improvements in teacher training and staff development programs. Gage described these recommendations as "a moral cry for action" (1983, pp. 492-493).

Evidence of this positive shift in attitude is seen in the quantity and quality of educational reports released in the last several years (Griesemer & Butler, 1983). America's Competitive Challenge recommended private sector involvement in university-based research on teaching. Research in the areas of curriculum, teaching and evaluation were recommendations set forth in A Place Called School. Making the Grade supported research efforts in the areas of student and teacher performance, the learning process and program evaluation.
important educational report, *A Nation at Risk: The Imperative for Educational Reform*, is a report based on papers commissioned from experts; testimony from several meetings of educators, students, professional and public groups, parents and scholars; analysis of educational problems; letters from concerned citizens, teachers and administrators and descriptions of notable programs and promising approaches in education. This document focused on time factors associated with instruction and the need for more effective use of the existing school day to ensure that more time is devoted to learning.

Frederick and Walberg (1980) discussed the need to clarify and understand the conditions under which more time produces more learning. Because time is one of the few components of the learning process that teachers can directly control, understanding the relationship between time and learning is of utmost importance for teachers. Studies in the last decade have contributed significantly to the understanding of how students spend their school day. What the studies have not determined adequately is how teachers use their days in terms of time. "We need to understand teacher time if we are going to influence how teachers get children to spend time" (Leinhardt, 1985, p. 278). How is time used when it is not used for academic instruction? Much of this time can be taken up by disciplinary problems and/or behavioral control. Sirotnik (1982) stated that understanding the amount of teacher time spent on student behavior can have important implications for classroom management and, therefore, student learning. Although few studies to date have focused on this issue, it is only reasonable that research focusing on time-on-task should also include in its focus time-on-discipline to
understand fully the "quantity of schooling" hypothesis. Hamischfeger and Wiley stated "...until we trace the implications of teachers' uses of their own time...we will not be able to fully evaluate the importance of planning and implementation for pupil achievement" (1985, p. 59).

The Problems

Researchers on teacher effectiveness and student learning have been "motivated by the desire to transform teaching into an empirically based science" (Ruff, 1978, p. 9). The activities of teaching are rational, observable, quantifiable events that have discoverable causes and effects (Duncan & Biddle, 1974). As the systematic study of teacher behaviors and their effects on student performance progresses, it is obvious that process-product research has contributed significantly to the start of an empirical knowledge base in the field of research on teaching. Research on teaching has specified researchable, educational variables with more precision (Berliner & Fisher, 1985). Despite these promising research results and their implications for improvements in the area of teacher education and practice, researchers readily admit that the field is plagued with problems of theory, methodology and analysis (Berliner, 1976, 1977; Ruff, 1978). The connection between teacher behaviors and student achievement is not always clear (Brophy & Good, 1986). As Brophy and Good (1986) emphasized, even when the links between teacher behaviors, time factors and student achievement gain are clear, process-product relationships do not always translate directly into prescriptions for teacher education or practice. Berliner (1975, 1976) characterized the major problems in the field in three categories: methodology, instrumentation, and analysis.
The first methodological issue of considerable importance is the question of how much student academic growth can legitimately be attributed to teacher effects? Although criticized on methodological and statistical grounds (Berliner & Rosenshine, 1977), the reports of Coleman et al., (1966), Jencks et al., (1972) and Mosteller & Moynihan (1972) indicated that intelligence, ethnicity and socio-economic status were the major determinants of learning. In addition, Berliner (1976) suggested that home factors and subject matter differences also affected student learning.

A second methodological issue is that of inaccurate extrapolations concerning ET. Differences in student populations, subject matters, variable definitions, observation instruments and methods, statistical procedures and experimental design all create inconsistencies in the resulting data (Karweit & Slavin, 1981, 1982). Karweit and Slavin (1982) studied several other possible causes of the inconsistencies present in the research. They compared achievement outcomes using the same time-on-task measures under different conditions. They examined the effects of variations in the following areas: (a) definition of off-task behavior; (b) length of observation visit; (c) days of observation; (d) scheduling of observation in the school year; and (3) sampling of students for observation. The results of the study indicated that variations in the above methodological considerations do have an impact on the degree of the relationship between time and student achievement. These sometimes subtle variations may be especially important as the time/student achievement relationship is often found to be riding the line between significance and nonsignificance.
Another methodological issue is the relationship between individual student differences and teacher effectiveness. All teachers realize that not everything they do will be effective with all students. Perhaps low-achieving students will show only minimal growth in a particular area while high-achieving students will show maximum growth, despite the effectiveness or ineffectiveness of the teacher. In the same way, a technique that proves to be very effective with one student or a particular group of students may be ineffective with another student or group of students. The majority of teachers tailor their behavior, as best they can, to meet the individual needs of their students. Interestingly enough, research in the area of teacher effectiveness usually ignores the phenomenon of diverse effects on different students. It is rare that a study will focus on the differential effects particular teacher behaviors have on different types of students (Berliner, 1975).

If, within the field of research on teaching, teachers are to be characterized as more or less effective, it is essential that the stability of teacher effects also be studied (Berliner, 1975; Shavelson & Dempsey, 1975). Shavelson and Atwood-Russo (1977) conducted an examination on the stability of teacher effects and found that the generalization of results is difficult due to the variations in the different educational contexts. The lack of systematic variation in the situational and observational characteristics of teachers, including the lack of measurement standardization, creates numerous problems in the research on stability effects. Despite these difficulties, Shavelson and Atwood-Russo found that long-term studies of teacher effects, although plagued with internal and external validity problems, showed
low-to-moderate stability coefficients. The stability coefficients found in the short term studies differed according to content and student variations. In studies where the same content was taught to similar students results showed low stability coefficients. In order to obtain stable teacher estimates, Tikunoff and Ward (1983) also stressed the need for interaction between the researcher and the teacher in the research process.

Along with the numerous methodological problems plaguing the research on teacher effectiveness and student achievement, problems of instrumentation are also frequent. Several decades ago, teacher observation instruments had proven unsuccessful in their task of measuring teaching skill (Medley & Mitzel, 1963). The sources of unreliability and invalidity were numerous. By the early 1970s the view of rating scales for use in predicting student achievement was in the process of changing. Rosenshine and Furst (1973), among others, found these scales useful in the prediction of student performance. Despite the many improvements, these scales as well as other measurement procedures, may still yield results that are confounded or biased. Expectancy effects, variable definitions of key concepts, and variable judgements may occur as a result of the different standards of comparison used by the observers (Cooper, 1979; Fiske, 1978; Nelson & Ray, 1983). To alleviate some of these errors, several procedures have been used. Medley and Mitzel (1963) and Fiske (1978) advocated the use of narrowly defined acts that can be reliably coded. In much the same way, low inference measures also increased reliability (Good & Brophy, 1978; Rosenshine & Furst, 1973).
Another instrumentation problem is the use of standardized achievement tests as outcome measures. Despite their high reliability and adequate validity, they are often unrelated to what was taught in the classroom. As Berliner (1975) stated, "They simply lack content validity at the classroom level" (p. 148). One would have to ask then -- what are they measuring? This question may become even more important as one questions the biased nature of many of these instruments as well as their high correlation with intelligence measures.

In the discussion of statistical problems related to research on teacher effectiveness, Berliner (1976) discussed the difficulty in measuring change without a true experimental design. Aside from the frequent lack of reliable results, the research findings are often also disparate or not comparable, making valid conclusions difficult to draw. Despite these research problems, Centra and Potter (1977) commented, "Although research has not provided a (sound) foundation for planning empirically based change, it has yielded...sign posts on which significant progress can be based. The administrator planning for educational improvement in schools would be well advised to begin planning from this base" (p. 32).

The Future

Recent classroom research is rich in empirical findings that have important implications for the practice of teaching. It is difficult to refute the association between time factors and student achievement. What can be questioned, however, is the strength of that relationship and its consistency across different types of students, content areas, and grade levels (Smyth, 1985). Smyth (1983) stressed the need for future
research needs on four levels. The first research need is to further substantiate the relationship between engaged time and pupil achievement by looking more carefully at interacting variables such as student ability level, success rate and allocated time. In addition, there is a necessity to extend classroom observations to academic areas beyond reading and mathematics. Smyth suggested using intensive observational/descriptive methods with fewer students over extended periods of time.

The second area of research proposed by Smyth is indepth case study analyses of classrooms. Direct evidence is now available to refute the myth that teachers do not make a difference. Teachers do make a difference and are an important investment in the educational process. This type of research will provide teachers with specific recommendations based on their personal classroom data. In addition, teachers' diaries and journal records may provide educational researchers with a rich domain of new ideas worth testing.

A third proposed area of research is intervention studies designed to monitor research implementation. Smyth described these studies as "an 'organic' or adaptive process whereby teachers and researchers collaboratively interpret, negotiate, and modify the findings to suit their own idiosyncratic circumstances" (1985, p. 19).

Smyth (1985) discussed a final need in future research which cuts across the three major areas already discussed. There is a need for studies that refine methodological variations such as (a) disagreements in definition of terms, (b) sampling of students, (c) length of observation visits, (d) total number of observations, (e) scheduling of
observations during the school year, and (f) coding instruments used in observations. These refinements will eventually increase the utility of research findings.

In agreement with Smyth, Wang (1985) stressed the need for two specific kinds of research. The first need is descriptive studies that will utilize "fine-grained, micro-level analysis" (p. 259) of time usage, including information on time relevance and time quality. Wang (1985) also stressed the need to study the effects of different time-use patterns on various learning tasks in various learning situations. "...the nature and quality of teacher-and-student-time use have much to do with the amount of learning that actually takes place" (Wang, 1985, p. 259). Similarly, Good (1983) discussed the necessity of understanding how teacher and student behaviors and characteristics combine with the teaching process, student learning, classroom environment, curriculum, and time factors to bring about quality instruction.

The research of the future must become more comprehensive. Rather than focusing on single variables, the focus needs to be interaction of several variables across different contexts. It is also essential that the research findings be carefully disseminated for use in teacher training and staff development programs. It is this dissemination that will continue to bridge the gap between research on teaching and the actual practice of teaching. "Unless we actually participate in and monitor the findings relating to pupil-engaged learning time at the classroom level, molding and shaping staff development models that fit with the spirit of the findings we are trying
to implement, we run the risk of much of our painstaking efforts at the
design and fieldwork phase being wasted" (Smyth, 1985, pp. 19-20).

The small scale study described below addresses several of the
above stated needs. The investigation focuses on the interaction between
several variables (i.e., time, process, success rate, and teacher
variables) and student achievement across different contexts. If any of
these variables, uniquely or in combination, are found to predict student
achievement, then classroom observational data will be vital in the
development of specific inservice or staff development programs used to
alleviate the causes of academic risk in those classrooms for that year.
CHAPTER 3

METHODS

Participants

Fifty junior and senior elementary education majors (five males, forty-five females) participated as observers (data collectors) in this study. Their ages ranged from 19 to 46 years old ($\bar{x}$=23 years old). For 32 of the observers, the observations were included as part of their educational field work. The remaining 18 observers volunteered for the study and were eligible to sign up for one credit of independent study from the University of Arizona. All observers were naive to the purposes of the study.

The classroom observations occurred in elementary level classrooms in the Tucson Unified School District in Tucson, Arizona. All school and classroom participation was voluntary. Participation in this study qualified the classroom teachers to receive one academic credit for graduate level independent study from the University of Arizona. Among the requirements for both undergraduate and graduate observers and graduate teacher-participants was a seminar held after completion of the observational phase of the study. The purpose of this seminar was to discuss the implications and results of the observations. Individual classroom data were also available for discussion between the
investigator and individual teachers. Participating teachers and observers receiving credit and those not receiving credit were encouraged to attend the seminar.

**Experimental Setting**

The study was conducted in 18 classrooms (grades second through sixth) located in 8 schools in the Tucson Unified School District in Tucson, Arizona. A breakdown of classroom by grade was as follows: 3 second grade classrooms, 4 third grade classrooms, 5 fourth grade classrooms, 3 fifth grade classrooms, 2 sixth grade classrooms, and one multi-grade classroom of fourth, fifth and sixth grades. The schools were a combination of low and middle socioeconomic status with ethnic populations of between 13 and 99 percent. The 50 observers were assigned randomly to classrooms to observe reading and math classes only.

**Dependent Measure/Independent Measures**

The dependent variable in this study consisted of achievement gain over one year of instruction as measured by the California Achievement Test (CAT). The CAT pretest was administered in April 1983. The CAT posttest was administered in April of 1984. Achievement gain was calculated by subtracting students' mean achievement on the pretest from students' mean achievement on the posttest. Achievement gain was reported in normal curve equivalents (NCEs). NCEs are normalized standard scores. Scale scores were used as the metric for the statistical analyses. Scale scores enabled achievement on the CAT to be compared from grade level to grade level. At-risk classrooms were
operationally defined as those classrooms that were predicted to have low levels of achievement gain over one year of instruction.

The independent variables were classified into three groups: time, success, and process. Time and success variables were measured using the Berliner/Rosenshine Classroom Observation Coding Form. Process variables were measured using the Berliner/Rosenshine Teacher Rating Scale (see Appendix B).

Four time variables were included in the time group. Allocated time (AT) was the mean time in minutes that teachers scheduled for instruction in each subject area. Engaged time (ET), or involved time, was the time in which two-thirds or more of the students were observed to be engaged in instruction. ET began when two-thirds of the students started working and ended when two-thirds of the students stopped working and entered transition time. Uncommitted time (UCT) was AT less ET. Engagement rate (ER), or student engagement, was the mean percent of students engaged in instruction during AT.

Three variables were included in the success group. Success was measured by the mean percent of students engaged in instructional tasks that were observed to be hard, medium, or easy. High success tasks involved minimal effort. Medium success tasks involved moderate effort and low success tasks involved substantial effort.

Process variables were measured by rating teachers in seven effectiveness categories: stated objectives, presentation of instructions, directions to the student, student opportunity to learn under guidance, reviewing and summarizing, feedback to student and teacher monitoring.
Instruments

As noted in the section above, the observation instrument employed in this study was the Berliner/Rosenshine Classroom Observation Coding Form. This coding form is an adaptation of the instrument used in the Beginning Teacher Evaluation Study (Fisher, et al., 1980). This form requires the observers to view the classroom and record the amounts of such variables as AT, ET and high success rate. These data then allowed the derivation of the amount of Academic Learning Time (ALT) that was occurring in each classroom. The observer viewed the classroom one student at a time and recorded whether that student was engaged or not. After a student's status as engaged or not-engaged was coded, the organizational structure in which the individual student was involved was coded (i.e., individual, small group or large group). This procedure of coding the status of engagement and the organization structure for each student was referred to as "sweeping" and was completed three times for the entire classroom. At the completion of the third classroom sweep, the observer was free to walk around the room to code each student's success rate. Determining success rate was a subjective judgement on the part of the observer as to whether the student was having high, medium, or low success with the task at hand. An observation block, consisting of three classroom sweeps for engagement and organizational structure together with one ambulatory sweep for judging success rates, took approximately 15 minutes and was repeated for the entirety of the reading or math session.

In addition, the Berliner/Rosenshine Teacher Rating Scale was used to measure the teacher/process variables. The observers were
asked to rate the teacher of each observed classroom in the seven effectiveness categories. These subjective ratings were done at the conclusion of each reading and math session by means of a seven-point Likert Scale. A copy of each instrument is included in Appendix B.

**Procedures**

In September of 1983, the investigator met with the regional supervisors to receive initial permission to conduct the study within the district. After initial district approval was received, the investigator met with the principals of 31 randomly selected schools to discuss the purposes and procedures involved in the study. Participation on the part of the individual schools was voluntary and determined by the principal. Twenty-six of the thirty-one principals granted approval for school participation. If permission was obtained from the principal, a second meeting was scheduled with the teachers again to discuss the purposes and procedures involved in the study. Individual teachers were invited to sign up for participation in the study on a voluntary basis.

Prior to classroom observations, all 50 observers attended a one-hour training session (see Appendix C). The training session consisted of a discussion of the background and purposes of the study and an explanation of the instruments. During this training, the variables were defined and role playing was used to ensure accurate distinctions between such variables as student engagement and non-engagement. Because of the complexity of this decision, several rules were established. If a student was sharpening a pencil or getting something from a desk, purse, or pack and this action was not a direct teacher command, the student was coded not engaged or off-task. If a direct command, "Get out a piece of
paper" was given and the student was following the command, he/she was coded engaged or on-task. If a teacher was lecturing and the student did not have eye contact with the teacher, but appeared to the observer to be listening, the student was coded engaged. In addition, classroom organization was defined as follows. A group of 10 or more students was classified as a "large" group. A student was only included as a member of a small group (less than 10) if that student was participating in joint task effort with the other group members. If a student was sitting with a small group but working independently, he/she was coded as individualized. Finally, success rate was subjectively coded as hard, medium, or easy. For example, if a student seemed to be laboring at a task, appeared frustrated, or his/her paper showed inaccuracy, the success rate for that student was coded hard. If a student appeared to be working easily and his/her paper showed accuracy and understanding of the task, the success rate was coded easy. If for any student the observer was unable to make a fair judgement, the success rate was coded as medium.

Approximately two to three days after training the observers were given a schedule of three to eight classroom observations. They were directed to dress appropriately, arrive on time, check into the office and, once in the classroom, to sit in an unobtrusive place in the room from where they were able to see all the students. When the observation was completed, the rating scale was filled out and the completed forms were returned to the investigator's office. The investigator was available to answer questions at any time. A minimum of five observations for each subject area (reading and math) were initially set
up for each classroom but, due to teacher illness, observer illness and/or schedule changes, several classrooms received only three observations.

Classroom observations were conducted from February through May, 1984. Observers were randomly assigned to classrooms until all classrooms were observed a minimum of three times during both reading and math sessions. For the purposes of computing interrater reliability, on 15 randomly selected occasions for both reading and mathematics, two randomly selected observers were assigned to the same classroom for the same time period.

At the conclusion of all observations, a seminar was held for all teachers and observers to discuss the study and answer any questions. All teachers and observers were encouraged to contact the investigator for the results of the study.

Data Analysis

The first phase of the data analysis consisted of checking the raw data on the observation forms to identify any possible inaccuracies or missing data. Box plots and stem and leaf displays of the data were used to identify outlying values on the variable of AT (see Tukey, 1977).

California Achievement Test (CAT) scores for both subject areas are reported in Normal Curve Equivalents (NCEs). NCEs are normalized standard scores with a range of 1 to 99, a mean (X) of 50 and a standard deviation (SD) of 21.06. The statistical analyses were computed using scaled scores. Scaled scores are "vertically equated" (see Lim, 1981) and are therefore often used as the basis for expressing scores on
different levels of the test on the same metric. Although scale scores are not an absolute scale, they are generally the best choice for measuring growth (see Linn, 1981).

The means, standard deviations, and minimum and maximum values were computed on the following variables: AT, ET, student engagement rate (number of students engaged ÷ number of students observed), uncommitted time (AT minus ET), success rate (high, medium and low), scale score gain, residual scores (see below), and specific teacher process variables which were determined using factor scores. In addition, an intercorrelational matrix was computed with all variables for each subject area, reading and mathematics.

Pearson's product-moment correlation was used to compute interrater reliability on the occasions where two observers were in the same classroom at the same time (Norusis, 1986). By correlating paired observations interrater reliability was determined for the variables of AT, ER, student engagement rate (ER), success rate, and the seven teacher process variables. The reliability coefficients were computed for reading and mathematics separately and combined.

Stepwise multiple regression equations were computed using the ALT and related variables to determine the best predictors of achievement gain. A second set of stepwise multiple regression equations were computed using the same variables in predicting residual scores. Residual scores are simply measures of whether a student's posttest score is larger or smaller than the value predicted for that student (see Linn, 1981). The prediction is made using the linear regression of the posttest on the pretest. These scores provide a way of identifying
students who changed more or less than expected on the basis of their initial status. It is desirable to use residual scores because the resulting gain score is uncorrelated with initial status (see Linn, 1981). In addition, because both R and R² are often inflated, especially with a small sample, the regression results are also presented using an adjusted R² (see Kerlinger, 1973).

In order to analyze the proportion of variance in achievement gains attributable to specific variables, uniquely or jointly, a Commonality Analysis was used (see Pedhazur, 1974). The time variables used in this analysis were allocated time (AT), engaged time (ET), and student engagement rate (ER). The success variables used were medium to high success rate. Rather than using all seven teacher variables in this analysis, the teacher/process variables included in this equation were those that appeared to be useful after performing a factor analysis. A second Commonality Analysis was performed on the data to determine the unique or joint contribution of the predictor variables to residual scores.

The ALT model of instruction focuses on classroom variables that can be altered. If ALT and associated variables are found to predict at-risk classrooms, and can be altered, remediation through specific staff development or inservice procedures may be a viable solution to improve the educational opportunity and academic performance in those classrooms.
CHAPTER 4

RESULTS

The initial data set consisted of 153 observations in reading and 141 observations in mathematics. The selection of the final data set used in this study was completed using Tukey's Exploratory Data Analysis (EDA) method (see Tukey, 1977). This method allowed the identification of observations that were illogical or coding forms that had missing data. Box plots and stem and leaf displays (Tukey, 1977) aided in the identification of outlying values on the variable of allocated time (AT). In reading, outlying values on AT were found to be greater than 120 minutes or less than 30 minutes. No outlying values on AT were found in mathematics. In addition, the investigator checked all observation forms by hand and classroom data were used only in the cases where (a) pre- and posttest scores were available for more than nine students, (b) individual observations included ten or more students, and (c) the total number of occasions for observation of a particular classroom was at least three. The final data set consisted of 90 observations in reading and 85 observations in mathematics.

Separate factor analyses in reading and mathematics were performed on the teacher rating scales. In reading, two factors were extracted from this sample. One factor was identified as focusing on task (FT-R). The factor, FT-R, is characterized by teachers who provide
clearly stated objectives, good instructional presentations, clear
directions and opportunity for students to practice under guidance. The
other factor identified for the reading sample was a concern for
correctives (CR-R). The factor, CR-R, is characterized by teachers who
provide reviews and summaries, feedback to students and monitoring of
student progress. In mathematics only one factor was extracted. This
factor was identified as a general classroom process factor (PF-M) which
included the components of both CR-T and FT-R.

Interrater reliability was computed using Pearson's
Product-Moment Correlation (Norusis, 1986) on nine paired observations in
reading and three paired observations in mathematics. The reliability
coefficients, computed for reading and mathematics separately and
combined, are presented on the variables: AT, ET, student engagement
rate (ER), high, medium and low success rates, and the seven teacher
process variables (see Table 1). Due to the small number of paired
observations, specifically in mathematics, the fluctuations in
reliability coefficients are apparent. Despite these fluctuations, in
reading moderate interrater reliability coefficients were found for the
two significant predictors of achievement gain, FT-R and CR-R. Two
additional predictors of achievement gain in reading, MS and ER, also
showed moderate to strong interrater reliability coefficients (.50 and
.89 respectively). In mathematics the interrater reliability coefficient
for the single, best predictor of achievement gain, AT, was strong (.99).

Descriptive Statistics

California Achievement Test scores for mathematics and reading
are reported in normal curve equivalents (NCEs). On the reading pretest
Table 1
Interrater Reliability for ALT and Related Variables Including Teacher Process Variables

<table>
<thead>
<tr>
<th></th>
<th>Reading</th>
<th>Mathematics</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALT and Related Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allocated Time</td>
<td>.70</td>
<td>.99</td>
<td>.89</td>
</tr>
<tr>
<td>Engaged Time</td>
<td>.16</td>
<td>.94</td>
<td>.60</td>
</tr>
<tr>
<td>Engagement Rate</td>
<td>.89</td>
<td>.98</td>
<td>.89</td>
</tr>
<tr>
<td>High Success Rate</td>
<td>.27</td>
<td>.59</td>
<td>.21</td>
</tr>
<tr>
<td>Medium Success Rate</td>
<td>.50</td>
<td>.60</td>
<td>.27</td>
</tr>
<tr>
<td>Low Success Rate</td>
<td>.11</td>
<td>1.00</td>
<td>.22</td>
</tr>
<tr>
<td><strong>Teacher Process Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation of Objectives</td>
<td>.30</td>
<td>.19</td>
<td>-.17</td>
</tr>
<tr>
<td>Presentation of Instruction</td>
<td>.48</td>
<td>.19</td>
<td>.38</td>
</tr>
<tr>
<td>Presentation of Directions</td>
<td>.56</td>
<td>-.19</td>
<td>.13</td>
</tr>
<tr>
<td>Opportunity to Practice Under Guidance</td>
<td>.17</td>
<td>-.98</td>
<td>-.19</td>
</tr>
<tr>
<td>Reviewing and Summarizing</td>
<td>.57</td>
<td>-.19</td>
<td>-.05</td>
</tr>
<tr>
<td>Feedback</td>
<td>.52</td>
<td>a</td>
<td>.52</td>
</tr>
<tr>
<td>Teacher Monitoring</td>
<td>.73</td>
<td>.87</td>
<td>.61</td>
</tr>
</tbody>
</table>

^a = missing data
the mean NCE for the total sample was 53.1 with a SD of 17.8. The classroom means ranged from 42.9 to 63.2 NCEs. On the reading posttest the mean NCE was 54.2 with a SD of 18.7. The classroom means ranged from 38.1 to 66.3 NCEs. The mean mathematics pretest NCE for the total sample was 55.3 with a SD of 16.8. The classroom means ranged from 41.9 to 67.9 NCEs. On the mathematics posttest the average NCE was 57.7 with a SD of 18.2. The classroom mean ranged from 43.8 to 79.4 NCEs (see Table 2).

The classroom means, standard deviations, minimum and maximum values were computed for the ALT and related variables (see Table 2).

Correlational Statistics

An intercorrelation matrix was computed with all variables for each subject area, reading and mathematics (see Tables 3-4).

**Reading.** A high, positive correlation was observed between gain in reading achievement (Gain) and the factor focusing on task (FT-R), r=.72. A moderate positive correlation was found between achievement gain in reading and student engagement rate (ER), r=.57. Low positive correlations were observed between achievement gain and the following variables: uncommitted time (UCR), r=.18, the factor measuring correctives (CR-R), r=.17, and medium success tasks (MS), r=.16 (see Table 3).

**Mathematics.** Moderate positive correlations were found between gain in mathematics and AT, r=.54 and for ET, r=.42. A low positive correlation was observed between achievement gain and uncommitted time (UCT), r=.35 (see Table 4).
Table 2

Classroom Means, Standard Deviations, Minimum and Maximum Values for ALT and Related Variables

<table>
<thead>
<tr>
<th></th>
<th>Reading</th>
<th>Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Allocated Time (Minutes)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>91.33</td>
<td>61.83</td>
</tr>
<tr>
<td>SD</td>
<td>24.71</td>
<td>21.95</td>
</tr>
<tr>
<td>Minimum</td>
<td>39.00</td>
<td>30.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>126.67</td>
<td>95.33</td>
</tr>
<tr>
<td><strong>Engaged Time (Minutes)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>79.81</td>
<td>55.52</td>
</tr>
<tr>
<td>SD</td>
<td>22.14</td>
<td>19.45</td>
</tr>
<tr>
<td>Minimum</td>
<td>31.50</td>
<td>25.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>116.33</td>
<td>89.40</td>
</tr>
<tr>
<td><strong>Engagement Rate (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>.71</td>
<td>.71</td>
</tr>
<tr>
<td>SD</td>
<td>.07</td>
<td>.08</td>
</tr>
<tr>
<td>Minimum</td>
<td>.60</td>
<td>.54</td>
</tr>
<tr>
<td>Maximum</td>
<td>.90</td>
<td>.84</td>
</tr>
<tr>
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Table 2 (continued)

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<tr>
<td>Maximum</td>
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*aUC = AT-ET. In several cases the teacher continued instruction beyond the time that was allocated.*
### Table 3

**Intercorrelations Between Achievement Outcomes in Reading and ALT and Related Variables**

<table>
<thead>
<tr>
<th>Variables</th>
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<td>-</td>
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<td>6. MS</td>
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<td>9. FT-R</td>
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<td></td>
<td></td>
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<tr>
<td>10. GAIN</td>
<td>.99</td>
<td>-</td>
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</tr>
</tbody>
</table>

**Note.** AT = allocated time, ET = engaged time, ER = student engagement rate, UCT = uncommitted time (AT-ET), HS = high success, MS = medium success, LS = low success, CR-R = concern for correctives (factor in reading), FT-R = focusing on task (factor in reading), GAIN = achievement gain, RESSCR = residual score.
Table 4

Intercorrelations Between Achievement Outcomes in Mathematics and ALT and Related Variables

<table>
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<td>-.06</td>
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<td>8. PF-M</td>
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<td>-.28</td>
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<td>9. GAIN</td>
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<td>10. RESSCR</td>
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</table>

*Note. PF-M = process factor in math (CR-R + FT-R).*
Regression Analyses

Stepwise multiple regression equations were computed for predicting achievement gain using the ALT and related variables. This was done for each subject area.

Reading. Allocated time (AT), engaged time (ET), engagement rate (ER), uncommitted time (UCT), high success (HS), moderate success (MS), low success (LS), focusing on task (FT-R), and concern for correctives (CR-R) were regressed on achievement gain in reading (Gain - see Table 5). A significant regression equation was obtained utilizing one success variable, MS; two process variables, FT-R and CR-R; and two time variables, ER and UCT. The single best predictor of achievement gain in reading was the process factor that measured the teacher's ability to focus students on task (FT-R), \( R = .72, F(1,16) = 17.52, p < .01, (R^2 = .52, \text{Adjusted } R^2 = .49) \). The second variable that contributed significantly to the prediction of achievement gain was the rate at which students were observed to be engaged with instructional materials with medium success (MS), \( R = .74, F(2,15) = 8.77, p < .01, (R^2 = .55, \text{Adjusted } R^2 = .49) \). The third, fourth and fifth variables, engagement rate (ER), the factor measuring correctives (CR-R) and uncommitted time (UCT) also contributed significantly to the prediction equation. ER was entered third in the equation, \( R = .75, F(3,14) = 5.94, p < .01, (R^2 = .56, \text{Adjusted } R^2 = .47) \). CR-R was entered fourth in the equation, \( R = .76, F(4,13) = 4.39, p < .05, (R^2 = .57, \text{Adjusted } R^2 = .44) \). UCT was entered fifth in the equation, \( R = .77, F(5,12) = 3.44, p < .05, (R^2 = .59, \text{Adjusted } R^2 = .42) \). Student's rate of
engagement with high success task (HS) and student's rate of engagement with low success tasks (LS) were entered in that order but did not add significantly to the prediction equation.

**Mathematics.** Allocated time (AT), engaged time (ET), engagement rate (ER), uncommitted time (UCT), high success (HS), moderate success (MS), low success (LS) and the general process factor (PF-M) were regressed on achievement gain in mathematics (Gain - see Table 6). The single best predictor of achievement gain in mathematics was the amount of time a teacher allocated for instruction in mathematics (AT), \( R = .54 \), \( F(1,16)=6.61, \ p < .05, \ (R^2=.29, \ \text{Adjusted } R^2=.25) \). The variable that measured students' engaged time (or involved time) in instructional materials was included in a second step of the least squares solution but did not contribute significantly to the prediction of achievement gain, \( R = .55, \ F(2,15)=3.28, \ p < .05, \ (R^2=.30, \ \text{Adjusted } R^2=.21) \). The remaining variables could not be used to obtain a significant solution.

A second set of stepwise multiple regression equations were computed for predicting residual scores using the ALT and related variables. This was done for each subject area.

**Reading.** Allocated time (AT), engaged time (ET), student engagement rate (ER), uncommitted time (UCT), high success (HS), medium success (MS), low success (LS), focusing on task (FT-R), and concern for correctives (CR-R) were regressed on residual scores (see Table 7). A significant regression equation was obtained using three success variables, HS, MS and LS; one process variable, FT-R, and one time variable, ET. The single best predictor of residual scores in reading
Table 5

Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Reading Achievement Gain

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Multiple R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Simple r</th>
<th>F*</th>
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</thead>
<tbody>
<tr>
<td>FT-R</td>
<td>.72</td>
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<td>.49</td>
<td>.72</td>
<td>17.52**</td>
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<td>MS</td>
<td>.74</td>
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<td>.49</td>
<td>-.09</td>
<td>8.77**</td>
</tr>
<tr>
<td>ER</td>
<td>.75</td>
<td>.56</td>
<td>.47</td>
<td>-.10</td>
<td>5.94**</td>
</tr>
<tr>
<td>CR-R</td>
<td>.76</td>
<td>.57</td>
<td>.44</td>
<td>.17</td>
<td>4.39*</td>
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<td>UCT</td>
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<td>.42</td>
<td>.18</td>
<td>3.44*</td>
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<td>.59</td>
<td>.37</td>
<td>-.17</td>
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<tr>
<td>LS</td>
<td>.78</td>
<td>.60</td>
<td>.32</td>
<td>.16</td>
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</table>

** p < .01
* p < .05
Table 6

Stepwise Multiple Regression Summary Table for the Regression of the ALT Related Variables on Mathematics Achievement Gain

<table>
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<th>Predictors</th>
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<th>Adjusted R Square</th>
<th>Simple r</th>
<th>F*</th>
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<td>3.28</td>
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<td>LS</td>
<td>.57</td>
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<td>.18</td>
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<td>2.25</td>
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<td>.35</td>
<td>.15</td>
<td>.02</td>
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<td>.12</td>
<td>.16</td>
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<tr>
<td>PF-M</td>
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<td>.38</td>
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<td>1.13</td>
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</tbody>
</table>

* p<.05
Table 7

Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Reading Achievement Residual Scores

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Multiple R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Simple r</th>
<th>F*</th>
</tr>
</thead>
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<td>.55</td>
<td>.76</td>
<td>21.45**</td>
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<tr>
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<td>.53</td>
<td>.14</td>
<td>10.47**</td>
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<tr>
<td>ET</td>
<td>.77</td>
<td>.59</td>
<td>.50</td>
<td>-.10</td>
<td>6.75**</td>
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<tr>
<td>HS</td>
<td>.77</td>
<td>.59</td>
<td>.47</td>
<td>-.17</td>
<td>4.84*</td>
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<tr>
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<td>.61</td>
<td>.45</td>
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<td>.36</td>
<td>.10</td>
<td>2.35</td>
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</tbody>
</table>

** p<.01  
* p<.05
was the process factor which measures the teacher's ability to focus students on task (FT-R), $R=.76$, $F(1,16)=21.45$, $p<.01$, ($R^2=.57$, Adjusted $R^2=.55$). The second variable that contributed significantly to the prediction of standardized achievement residuals was the rate at which students were observed to be engaged with instructional materials with low success (LS), $R=.76$, $F(2,15)=10.47$, $p<.01$, ($R^2=.58$, Adjusted $R^2=.53$). The third variable that contributed significantly to the prediction of achievement residuals was engaged time (ET), $R=.77$, $F(3,14)=6.75$, $p<.01$, ($R^2=.59$, Adjusted $R^2=.50$). The rate at which students were observed to be engaged with instructional materials with high and medium success were the fourth and fifth variables that contributed significantly to the prediction of the residual scores, $R=.77$, $F(4,13)=4.84$, $p<.05$, ($R^2=.59$, Adjusted $R^2=.47$) and $R=.78$, $F(5,12)=3.79$, $p<.05$, ($R^2=.61$, Adjusted $R^2=.47$) respectively. The sixth and seventh variables to be entered were UCT and CR-R in that order. Neither contributed significantly to the prediction equation.

**Mathematics.** Allocated time (AT), engagement rate (ER), uncommitted time (UCT), high success (HS), medium success (MS), low success (LS) and the general process factor, PF-M, were regressed on residual scores in mathematics (see Table 8). No significant regression equation was obtained. None of the variables were found to contribute significantly to the prediction of residual scores. Although not significant, the single best predictor of residual scores was the amount of time a teacher allocated for instruction in mathematics (AT), $R=.37$, $F(1,16)=2.53$, $p<.05$, ($R^2=.14$, Adjusted $R^2=.08$).
Table 8

Stepwise Multiple Regression Summary Table for the Regression of ALT and Related Variables on Mathematics Achievement Residual Scores

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Multiple R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Simple r</th>
<th>F*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>.37</td>
<td>.14</td>
<td>.08</td>
<td>.37</td>
<td>2.53</td>
</tr>
<tr>
<td>PF-M</td>
<td>.44</td>
<td>.20</td>
<td>.09</td>
<td>-.28</td>
<td>1.84</td>
</tr>
<tr>
<td>HS</td>
<td>.48</td>
<td>.23</td>
<td>.06</td>
<td>.22</td>
<td>1.39</td>
</tr>
<tr>
<td>UCT</td>
<td>.50</td>
<td>.25</td>
<td>.02</td>
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<td>-.15</td>
<td>.82</td>
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<td>ER</td>
<td>.51</td>
<td>.26</td>
<td>-.14</td>
<td>.10</td>
<td>.64</td>
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</table>
Commonality Analyses

A commonality analysis (Pedhazur, 1975) was performed on the data to determine the unique and joint contribution of each group of variables, time, success and process for each subject area, reading and mathematics. This was done by calculating the proportion of the variance attributable to the unique and joint contribution of each group of predictor variables. Negative commonalities are obviously difficult to explain. According to Kerlinger and Pedhazur (1973) they can result from two conditions: when the two variables are negatively correlated or when one variable acts as a suppressor over the other. It is difficult to ascertain which of the above two conditions caused the negative commonalities in this study.

Reading. Table 9 presents the results of the commonality analysis for predicting reading achievement gain. The process variables accounted for 21.0 percent of the variance in achievement gain uniquely. The time variables accounted for 4.0 percent of the prediction of gain uniquely. The success variables accounted for 1.7 percent of the variance. The proportion of variance attributable to a combination of time and process variables was 25.7 percent. A combination of the three independent variables, time, success and process accounted for 28.8 percent of the variance in reading achievement gain. It is clear from the analysis that process variables are the best predictors of achievement gain in reading for this sample.

Mathematics. Table 10 presents the results of the commonality analysis for predicting mathematics achievement gain. The time variables
Table 9

Explaining Variance in Reading Achievement Gain Using Commonality Analysis of ALT and Related Variables

<table>
<thead>
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accounted for 33.2 percent of the variance in achievement gain uniquely. The success variables accounted for 6.4 percent uniquely, and the process variables accounted for less than 1 percent (.25 percent) uniquely. The proportion of variance attributable to a combination of time and process variables was 1.9 percent. The time variables are more valuable in predicting mathematics achievement gain for the sample.

A second commonality analysis (Pedhazur, 1975) was performed on the data to determine the unique contribution of each group of predictor variables on achievement residualized scores.

**Reading.** Table 11 presents the results of the commonality analysis for predicting reading residualized achievement. The process variables accounted for 19.4 percent of the variance in achievement gain uniquely. The time variables accounted for 3.7 percent of the variance and the success variables accounted for 2.5 percent of the variance uniquely. The proportion of variance attributable to a combination of time and process variables was 27.8 percent. A combination of the three independent variables, time, success and process accounted for 49.6 percent of the variance in achievement residuals. It is clear from the analysis that process variables are the best predictors of residualized achievement for this sample.

**Mathematics.** Table 12 presents the results of the commonality analysis for predicting mathematics achievement residual scores. The time variables accounted for 11.8 percent of the variance in achievement residuals uniquely. The success variables accounted for 4.2 percent of the variance and the process variables accounted for 2.9 percent of the
### Table 11

**Explaining Variance in Reading Achievement Residual Scores Using Commonality Analysis of ALT and Related Variables**

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Table 12

Explaining Variance in Mathematics Achievement Residual Scores Using Commonality Analysis of ALT and Related Variables

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variance. As is the case in the prediction of achievement gain, the time variables again are more valuable in predicting residualized achievement in mathematics than either process or success variables.
CHAPTER 5

DISCUSSION

This study was predicated on a real need of school systems to (a) develop simple instrumentation that can be used with (b) observers that received minimal training in order to (c) identify classrooms that are at-risk in any particular school year. Although the correlational design of this study does not lead to conclusions of the cause and effect type, attempts to explain the results necessarily involve causal reasoning.

These data support the notion that with this population, in these settings, both time, success rate and teacher variables are important factors in the prediction of at-risk classrooms. In reading, the best predictor of achievement gain was the process factor focusing on task (FT-R). Being actively engaged (ER) with medium success (MS) were two additional variables found to predict reading achievement gain. The second process variable identified for reading, concern for correctives (CR-R), also predicted significantly. In the prediction of reading residual scores the process factor, FT-R, again was the best single predictor. Interestingly enough, working on tasks with low success (LS) was the second best predictor of reading residual scores. It may be that in reading, actual moment-to-moment accuracy is less important than just being engaged in the task at hand. Other factors that significantly predicted reading residual scores were engaged time (ET) or the amount of
time two-thirds of the class were involved in the task (involved time) and working on tasks with high (HS) and medium success (MS).

The results of the commonality analysis for the three groups of ALT and related variables for reading showed the process variables to account for the largest portion of achievement gain and residual scores (21.5 and 19.4 percent respectively). The joint combination of time and process variables accounted for 25.7 percent of the variance in achievement gain. The joint contribution of all three groups of ALT related variables (time, process and success) accounted for 28.8 percent of the variance in achievement gain.

In mathematics, the single best and only significant predictor of achievement gain was allocated time (AT). Although there were no variables that significantly predicted mathematics residual scores, allocated time (AT) was again the single best predictor.

The results of the commonality analysis using the ALT and related variables to predict mathematics achievement gain and residual scores found time to account for the largest portion of the variance (33.2 and 11.8 percent respectively).

It is interesting to note that the process variables were the best predictors of achievement gain in reading and also had the most consistent, moderate interrater reliability coefficients. The opposite is true in mathematics. Time variables were the best predictors of achievement gain in mathematics and had the strongest interrater reliability coefficients. For reading and mathematics combined, the reliability coefficients were higher for the time variables than either the success or process variables. Although there is some subjectivity
involved when judging the amount of time a student is engaged, coding time variables is obviously less subjective than making judgements about students' success rate or teachers' behaviors.

In total, these data clearly indicate that although process factors are the best, single predictors of achievement gain in reading, reading achievement is influenced by a combination of process, time and success factors. In contrast, time factors alone are the best predictors of mathematics achievement gain.

Because this was a prediction study, understanding why or how specific variables predicted was not a purpose of the study. Nevertheless, these results appear reasonable insofar as reading can be seen as a more interactional subject area than mathematics which is more concrete. Because of the interactional nature of reading, teacher behaviors such as stating objectives, reviewing and summarizing, and providing clear directions may be more vital to the overall achievement process than in mathematics where students may be spending more time working individually on worksheets or in a text. Similarly, when working individually on mathematics problems, allocated time may be more important for achievement than it is for a more interactional and possibly group-oriented subject area such as reading. It is also important to note, that data were not acquired on curriculum-test congruence. It may be that in the majority of classrooms the mathematics curriculum-test congruence was greater than in reading. If this were the case, time factors in mathematics would obviously be a more important determinant of achievement than in reading where the curriculum and test items were not as well aligned.
The use of validity coefficients in identifying "at-risk" classrooms can increase the efficiency of selecting those classrooms in need of scarce staff development resources. Taylor and Russell (1939) indicated that when variables are used for selection of specific cases (employees or students), correlation coefficients within the range of .20 to .50 may represent considerably more than 2 to 13 percent of the effectiveness of an $r$ of unity (1.00).

Figure 2 illustrates a typical scatter diagram, or normal regression surface, with the independent variables (i.e., test scores) along the abscissa and the criterion scores along the ordinate. This chart is intended to illustrate the usefulness of observational data with validity coefficients in targeting at-risk classrooms. All classrooms that are above line SS' (area A + area B) are not considered to be at-risk.

Line TT' represents the division between classrooms selected for remediation and those not selected. The selection criterion is derived when observed values of the independent variables are entered into the least squares equation resulting in a predicted $Y$ (mean classroom achievement score). Those classrooms with observed values to the left of Line TT' would be selected for remediation.

The position of line TT' will vary with the availability of staff development resources. In some situations it may be possible to target the lower third of classrooms, while in other situations only the lower tenth may be targeted. Line TT', then, represents the selection ratio.

Prior to the collection of data or test scores, the portion of at-risk classrooms would be represented by $(C+D)/(A+B+C+D)$. 
Figure 2. Scatter Diagram of a Normal Regression Surface Using Validity Coefficients With Observational Data to Predict At-risk Classrooms
Given the information obtained from the least squares solution, the portion of at-risk classrooms will approach $C/(C+B)$. If line $SS'$ and line $TT'$ are specified, the usefulness of observational data may be represented in terms of the ratio $C/(C+B)$. In addition, if the observational data are used to target at-risk classrooms for remediation, the usefulness of observational data with various validity coefficients can be compared in terms of the respective ratios $C/(C+B)$.

The above logic can be applied to the present data set. Suppose that 30 percent of the present classrooms in a large urban school district are hypothesized to be at-risk. In other words, area $C+D$ is 30 percent of the total area, and line $SS'$ is then placed at the 30th percentile of the criterion distribution. Using the single best predictor of achievement gains in reading, focusing on task (FT-R), we have a validity coefficient of .72. In addition, the school district in which the present study was conducted has approximately 3,000 teachers/classrooms and because of limited resources for staff development, only 10 percent of these classrooms can be serviced for remediation. Line $TT'$ would be set so that area $C+B$ would contain the 10 percent of the total area. This is, only 10 percent of the at-risk classrooms or teachers will receive staff development or inservice training. Under these circumstances, 82 percent of those classrooms selected for remediation would be accurately predicted to be at-risk, while 18 percent would be misidentified (see Taylor & Russell, 1939). It is interesting to compare that figure with what would be obtained, under the same circumstances, if the validity coefficient were zero or unity. If the validity coefficient were zero, there would obviously be the same
proportion of at-risk and not-at-risk classrooms, as if we were not using the observational data at all. In other words, 30 percent of those chosen for remediation would be at-risk and 70 percent would not be at-risk. That is, with no information about validity, the selection would result in identifying 30 percent of the classrooms that were in need of remediation. A validity coefficient of unity would result in the selection of 100 percent of those classrooms at risk.

There are several limitations of the present study. First, the small sample and the overdetermination of the regression equation create statistical as well as other problems when generalizing the results to other populations or settings. Second, the correlational findings were based on natural variations in the existing classroom practices. These naturalistic data not only must be qualified by the grade level, type of students, and type of schools, but also reflect the practices prevalent in the time and place where they were collected.

A third limitation of this study is that achievement gain was the only outcome measure used. Teachers vary not only in their success in producing achievement, but in their success in fostering positive peer relations, personal development and academic motivation. Success in one of these areas does not necessarily imply success in another area. Beyond some point success in one area will come at the expense of success in another area. Even ideal teaching involves trade-offs and cannot provide optimal growth in all areas at all times.

Despite these limitations, when using the adjusted $R$ square for all variables that significantly add to the least squares solution in predicting reading achievement, the obtained predictive validity
coefficient is .65. This yields a much better selection proportion than the proportion that would be obtained without the use of the observational data. Under these circumstances 78 percent of those classrooms selected for remediation would be at-risk and 22 percent would not be at-risk (see Taylor & Russell, 1939).

It is also possible to demonstrate the usefulness of observational data with a lower validity coefficient. The validity coefficient for the single-best and only variable that predicted mathematics achievement gain, allocated time for instruction (AT), was .54. Using this as a validity coefficient, 69 percent of the classrooms at-risk selected for remediation would be properly identified while 31 percent would be misidentified. Using the adjusted $R^2$ square, .25, the validity coefficient is .50. Using this validity coefficient, the proportion of properly identified classrooms becomes 65 percent with 35 percent being misidentified. These proportions are obviously better than the proportions obtained without the use of observational data; that is, 65 percent properly identified with 35 percent misidentified as compared to 30 percent properly identified with 70 percent misidentified.

The actual validity coefficients that would be obtained with a larger data set and more refined observational methods might be even higher than those observed in the present study. In general, with a given proportion of the present population being considered at-risk and with a given validity coefficient, the usefulness of observational data increases as one is in a position to accept a smaller proportion of classrooms at-risk for remediation. The smaller proportion of identified
classrooms makes it possible to use staff development resources in the classrooms where there is the greatest need.

The ALT Model of instruction and associated variables from research on teaching focus on classroom variables that may be altered. If those variables predict at-risk classes, remediation might be attempted to improve the educational opportunity for the students in those classes for that year.

For example, observation of ALT and related variables would be conducted in selected classrooms early in the school year. Analysis of the observational data along with the use of validity coefficients will allow the district to target a certain percentage of those classrooms for remediation. The percentage of classrooms targeted will depend on the amount of staff development funds available to the district that year. Whatever the percent targeted, 5 percent or 15 percent, those classrooms will then benefit from specific classroom remediation based on the earlier classroom observations coupled with the findings of this and other related studies.

In this small scale study, there is evidence that sample instrumentation, in the hands of minimally trained observers, can predict achievement gain on standardized tests. Using the information collected from the instruments used in this study, staff development experts could, conceivably, help teachers in the at-risk classrooms make the necessary changes to improve academic performance for any particular year. Remediation can often be accomplished quickly since many of the variables that predict achievement (e.g. allocated time, success rate, etc.) are easy to change. Even the process variables that predicted achievement in
this study are considered alterable by those who follow models of staff development such as those based on the teachings of Madeline Hunter (1969).

The scientific enterprise strives for understanding, prediction and control. In the case of predicting academic achievement it is not always understood why some variables predict well in some instances and not in others. Though our understanding is more limited than is desirable, it is now possible to predict annual classroom performance on standardized achievement tests. It is also possible to alter or control specific aspects of the learning process and classroom activities to yield higher achievement. With further research that includes longitudinal studies with larger data sets across different contexts, it is very likely that a system of identification of at-risk classes could be developed which could then be integrated with staff development programs specifically designed to improve the achievement performance of those classes for that year.
APPENDIX A

DEFINITION OF TERMS
DEFINITION OF TERMS

Academic Learning Time (ALT). The time during which a student is engaged in academic subject matter related to the outcome measure in which the student is observed to experience a high success rate.

Active Learning Time. The time during which a student is actively involved in learning related to a task. See Engaged Time.

Allocated Time. The class time that a teacher sets aside for instruction in a particular subject area.

Aptitude. A measure determined by the amount of time required by a student to attain mastery of a task.

Corrective Feedback. Information relayed to the student, after an incorrect response, with the purpose of guiding the student's behavior or learning.

Content-Covered. The amount of curriculum presented by the teacher and/or studied by students, i.e., pages read, problems worked, or words taught.

Curriculum-Test Congruence. The match between what is taught and what is tested.

Disjointedness. A condition caused by classroom interruptions which disrupts a planned teaching activity.

Engaged Time (ET). Defined in the literature as the time during which a student is actively involved in learning related to a task. See Active-Learning Time. Defined in this study as the time during which the classroom is actively involved in learning related to a task. This
classroom measure begins when two-thirds of the students start working and ends when two-thirds of the students enter transition time. See Involved Time.

**Engagement Rate (ER).** A proportion derived by dividing the total number of students engaged by the total number of students. See Student Engagement.

**Involved Time.** A measure of classroom engaged time. Involved time begins when two-thirds of the class becomes engaged and ends when two-thirds of the class enters transition time. See Engaged Time.

**Momentum.** A teacher behavior composed of being prepared and setting a brisk pace in instructional presentation.

**Monitoring.** A teacher behavior composed of providing supervising behaviors or substantive interactions with students during seatwork. Monitoring consists of tracking students' success, asking questions, and giving academic feedback.

**Opportunity to Learn.** The time the teacher or school system provides for learning a particular task. Opportunity to learn is related in the literature to curriculum-test congruence and content-coverage.

**Overlappingness.** A teacher behavior composed of the ability to manage more than one task at a time.

**Perseverance.** The time the student is willing to spend learning.

**Quality of Instruction.** The degree to which the process of learning and teaching (i.e., presentation, explanation, feedback, etc.) employed by a teacher meets the needs of the learner.

**Structuring.** Teacher behavior that makes clear to the students the purpose of the lesson.
Student Engagement. A proportion derived by dividing the total number of students engaged by the total number of students. Described in the literature as ET. See Engagement rate.

Substantive Interaction. A teacher behavior composed of monitoring a student's success, asking questions, and giving academic feedback.

Success Rate (High-HS). The proportion of time students spend in activities where approximately 80 percent correct responses are made.

Success Rate (Medium-MS). The proportion of time students spend in activities where approximately between 20 and 80 percent correct responses are made.

Success Rate (Low-LS). The proportion of time students spend in activities where approximately 20 percent or fewer correct responses are made.

Task Relevance. Learning tasks that are limited to content categories covered on the outcome measure.

Time-to-Learn. A behavioral measure of the amount of time or the number of repetitions or trials to mastery on a particular task.

Time-on-Task. The instructional time during which students are actively engaged in learning. See Engaged Time.

Transition Time. The time lost when moving from engagement in one area or subject matter to engagement in the next.

Uncommitted Time (UCT). The time lost between the beginning of allocated time and the beginning of engaged time. Allocated time minus engaged time.
Wait Time. The time students spend waiting for teacher assistance.

Withitness. A teacher behavior composed of awareness of the entire classroom through regular monitoring.
Berliner/Rosenshine Classroom Observation Coding Form

I. Observer ____________ Observation Number ____________ Date ____________
   School ____________ Teacher ____________ Grade ____________ # of Students ____________

II. Allocated Time: Start ____________ End ____________
    Instruction/Work Begins ____________ Instruction/Work Ends ____________

III. Interventions (Tally) ____________ Approximate Time (Total) ____________ minutes

IV. Engaged Time (ET: 0 for not engaged, 1 for engaged)
    Organization (Org: I for individual, S for small group, L for large group)
    Success Rate (SR: E for easy, M for medium, H for hard)

*** EVERY THREE MINUTES SHEET CLASSROOM ***

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MAST RAN/510 10/26/63 MATHEMATICS FORM (blue)
Berliner/Rosenshine Teacher Rating Scale

<table>
<thead>
<tr>
<th>Rating Scales</th>
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<tbody>
<tr>
<td><strong>1. Objectives</strong></td>
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<tr>
<td>Instruction characterized by absence of clearly stated objectives</td>
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<td><strong>2. Presentation</strong></td>
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<td>Instruction characterized by absence of clearly stated presentation</td>
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<td><strong>3. Directions</strong></td>
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<td>Instruction characterized by absence of directions to students</td>
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<td><strong>4. Student Opportunity to Practice Under Guidance</strong></td>
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<td>Instruction characterized by absence of student opportunity to practice under guidance</td>
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<td><strong>5. Reviewing and Summarising</strong></td>
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<td>Instruction characterized by absence of reviewing and summarising</td>
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<td><strong>6. Feedback</strong></td>
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<td>Instruction characterized by absence of positive or negative feedback to students</td>
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<td><strong>7. Teacher Monitoring</strong></td>
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<tr>
<td>Instruction characterized by absence of teacher monitoring</td>
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APPENDIX C

OBSERVER TRAINING FORMS
OBSERVER TRAINING PROCEDURES

10 Minutes  -  Discussion of background of study; Berliner's pilot study; previous research in field.

10 Minutes  -  Introduction and explanation of instruments; pass out observer forms and questionnaire.

15 Minutes  -  Role playing using instruments.

10 Minutes  -  Discussion of coding rules. Answer observer questions.

10 Minutes  -  Additional role playing.

5 Minutes  -  Review of coding rules. Answer final observer questions.
PRE/POST OBSERVER QUESTIONNAIRE

Name: ______________________  Course: ______________________

Date: ______________________  No. of Observations: _________

1. What management skills does a teacher need in the classroom?

2. What ways can classrooms be organized for effective reading teaching?

What ways can classrooms be organized for effective math teaching?

3. What skills do you think you will need to develop to be an effective classroom teacher?

4. How will you know whether your students are actively engaged in the instruction or task at hand?
Please familiarize yourself with the following definitions before beginning your observations. You will need these definitions to accurately complete the observation forms.

Allocated Time (AT): The amount of time a teacher has appropriated for instruction in a particular subject area.

Engaged Time (ET): The amount of time students spend actively engaged in a particular subject area. ET begins when two-thirds of the classroom begins working and ends when two-thirds of the classroom stops working or has moved into transition time.

Student Engagement: A student is coded engaged when they are actively engaged in the task at hand. Eye contact, facial expressions, writing and posture should all indicate whether a student is engaged.

Uncommitted Time: The amount of time between AT and ET.

Organizational Structure:

Large group: The entire class or a group of 10 or more students.

Small group: A group of less than 10 students working together on a task. Small group work requires joint effort or interdependence of the group members. Four students sitting together working independently on a small worksheet is considered individual rather than small group work.

Individual work: The student, whether sitting in a group or alone, is working independently on a task.

Success Rate (SR): The degree to which the student correctly processes and understands the learning task.

High success rate (coded easy): The student works fluently, appears comfortable, and is working at or above the 80 percent accuracy level.
Medium success rate (coded medium): The student demonstrates partial understanding but does not appear to be working automatically. Error rate is more frequent. When in doubt about a SR, code the student "medium."

Low success rate (coded hard): The student appears frustrated and labors at the task. The accuracy level may be as low as the chance level with 20 percent or less correct responses.

Classroom Interruptions: An event that interrupts the instructional or learning process. Two kinds of interruptions are coded: Outside -- if the interruption occurs from outside the classroom (e.g., principal enters room, announcement over speaker); Inside -- if the interruption occurs within the classroom (e.g., student is disruptive; teacher makes a classroom announcement).
TO: All Observers
FROM: Michelle Ellis
DATE: February 28, 1984
SUBJECT: Rules for Observations for MALT Study

1. ARRIVE ON TIME: The major variables of this observation are time in reading and math instruction. You must, therefore, be in the classroom and ready to begin marking the observational record when reading or math instruction begin.

2. CHECK IN AT THE OFFICE: When you arrive at the school, please check in at the office. They will be expecting you and will direct you to the classroom you are to visit.

3. DRESS APPROPRIATELY: Remember you are now a professional and trained observer. Please dress appropriately.

4. BE UNOBTRUSIVE: Please try to remain as unobtrusive as possible during the observations. You may have to move around the classroom, but do so quickly, and quietly. Remember, you are not in the classroom as an aide, but only as an observer.

5. SIT IN A PLACE WHERE YOU CAN EASILY SEE ALL THE STUDENTS AND WHERE YOU CAN MAKE A JUDGEMENT WHETHER THE STUDENT IS ENGAGED IN THE TASK: Remember, for the first observation form you are looking only at student behavior. For the second form, you are looking at the interaction between students and teacher; therefore, it is more important that you can see the students than it is that you can see the teacher at all times.

6. BE ACCURATE IN YOUR RECORD: Please remember that you are making the only record of that classroom that will be made for that day. This makes it vital that you are careful and accurate in your judgements and markings.

7. RETURN TO US IMMEDIATELY ALL OBSERVATION SHEETS: Please return your observation sheets to me as promptly as possible after you have completed your observations. This will help me to maintain accurate records for each classroom.
APPENDIX D

OBSERVER CORRESPONDENCE
TO: Observers
FROM: Michelle Ellis
DATE: February 28, 1984
SUBJECT: MALT Observations

Attached is a list of the schools where you may be observing. I have included their addresses and phone numbers.

Everyone will be assigned randomly to schools but hopefully will receive an equal number of far-away and close-in schools.

Please bring your folders back to me as soon as possible after the observation, preferably that afternoon or at the latest the next morning. Some of you completed an observation on Wednesday, February 22, and I still have not received your folders back.

Finally, please answer the following questions and return to me.

Name ________________________________

1) Did you sign up for credit? (399, 1 hr.)
2) Do you plan to sign up for credit?
3) Are you bilingual?
4) Are you willing to go out during Spring Break? Please circle the days you are available:

TO:       Elementary Education Student Teachers
FROM:     Michelle Ellis
DATE:     March 6, 1984
SUBJECT:  Observers for a Study of Academic Learning Time

We're involved in an exciting project investigating time variables in the teaching of math and reading in elementary schools.

We need additional volunteers to help us by conducting observations of the classrooms enrolled in our study.

This would give you an opportunity to see how teachers in a variety of classrooms organize and manage their classrooms during instruction in math and reading. If you participate in this study, you may want to sign up for one hour of independent study credit. This study would require from five to seven mornings through the next two months.

If you are interested, please sign up on the door of Education 511 or contact:

   Michelle Ellis
   Office:  621-7856
   Home:  622-2709
APPENDIX E

TEACHER FORMS AND CORRESPONDENCE
MANAGING ACADEMIC LEARNING TIME

MALT SIGN UP SHEET

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<th>NAME</th>
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TO:                 FROM: Michelle Ellis
DATE:              February 28, 1984
SUBJECT: Observations for MALT (Managing Academic Learning Time) Study

Thank you for joining our study. I appreciate your willingness to let us observe in your classroom.

At this time, I need some information from you so that our observers can move efficiently into and out of your classrooms. Please indicate below the times you have allocated for reading and math in your classroom for each day of the week?

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Please also indicate below if you are interested in signing up for one hour of credit for participation in this study.

YES      NO

Finally, are there any dates when you are going to be away from your classroom or that for any reason may not be good days for our observers to visit between February and the end of March? Please indicate below:

____________________________________________________________________
____________________________________________________________________
MEMO

TO: All Secretaries
FROM: Michelle Ellis
DATE: February 28, 1984
SUBJECT: MALT Study

Some of the teachers in your school are participating with us in a study of Academic Learning Time. Their participation means that observers will be visiting their classrooms. The attached memos will inform the teachers about when the observations will occur.

Will you please put the enclosed memos in the mailbox of the teacher to whom the memo is addressed.

Thank you.
MEMO

TO: FRCM
FROM: Michelle Ellis
DATE: February 28, 1984
SUBJECT: Observations for MALT (Managing Academic Learning Time) Study

This memo is to let you know that we have scheduled an observation for your classroom on ____________________.

If you have any questions, please call Michelle Ellis at 622-2709 (Home) or leave a message with the Education Psychology Department at 621-7825.

I appreciate your willingness to participate in this exciting study.

Thank you.
MEMO

TO: All Teachers
FROM: Michelle Ellis
DATE: March 9, 1984
SUBJECT: MALT Observations

We are now about halfway through the observation part of the study. We have 25 observers that are making seven observations each. We are observing in 27 classrooms.

We would like to take a minute to thank you for your participation and patience. As you can imagine programming 25 observers across 27 classrooms, while trying to accommodate everyone's schedule, is not an easy task. We have attempted to notify you of each observation in advance. There are times, however, when observers are unable to make their observation and are unable to get ahold of us. We are now asking that they let you know when they are not coming and reschedule another observation with you individually.

Again, thank you for your patience. And a special thanks to those of you who let me know that there is no school on March 30th. It is those kind of scheduling problems that makes the administration of a study like this one an unavoidably confusing task!

Thank you.
TO:  
FROM:  Michelle Ellis  
DATE:  March 29, 1984  
SUBJECT:  MALT Observations

We appreciate your participation in the study of Managing Academic Learning Time (MALT).

As you know, we planned to complete all observations before the CAT testing the week of April 9. Unfortunately, because we have had difficulty getting enough morning observers, some classrooms will not have had five to seven observations in both math and reading. Yours is one of those classrooms.

Since we feel that we should have five to seven observations in each classroom, we need to do a few more observations in your classroom after the date of the CAT tests. We hope this will not inconvenience you. As soon as these observations are scheduled, we will notify you of the days.

Again, thanks for your patience with us and for your participation in the MALT study.
TO: All Teachers
FROM: Michelle Ellis
DATE: March 31, 1984
SUBJECT: MALT Observations

I wanted to drop you this quick weekend note to inform you about the final batch of observations. I trained 15 new observers yesterday (Friday). Most of these observers will be starting their observations on Tuesday of this coming week. Hopefully you will receive this letter on Monday, but just in case I plan to call everyone who has a Tuesday Observation scheduled. We will not be training any more observers, so except for specific conflicts, which may occur, this final schedule should be accurate.

Again, I want to thank you for your patience. We now have 50 observers going out daily which, at times, creates confusion.

We have tentatively scheduled a seminar for Thursday, May 3, 1984 in Education 302. This seminar, conducted by Dr. David Berliner, will be a discussion of the study and the concepts underlying it. Attendance is required for anyone participating for credit. We do, however, encourage all of you to attend to answer any questions you may have and to schedule any further meetings to discuss individual data. We will let you know the final day and time of the seminar as soon as it is scheduled.

Finally, your observations for the next several weeks have been scheduled for: ________________________________.

Most of these observations will be for Reading, however, we are encouraging the observers to stay for Math if their time allows. A few of the observers may be coming for Math only.

Thanks!
REFERENCES


Griffin, G., Hughes, R. Jr., & Martin, J. (1982). Knowledge, training and classroom management. Austin: University of Texas at Austin. The Research and Development Center for Teacher Education.


