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The Ohio State University

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Pupil Substantive Task Time: A Causal Analysis

Dissertation

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

By

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* * * * *

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1980

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I dedicate this to my father and mother: their quiet patience was deeply appreciated.
ACKNOWLEDGEMENTS

I have been extremely fortunate to have encountered many special people during the years of preparation and writing. To be sure, there are many similarities between writing this document and running a long distance race. In both, the support, understanding, and stimulation of others is extremely important for determining the quality of race run, but the actual running or writing is a very lonely task in which the person is constantly engaged in a battle with himself, fighting mental and physical fatigue and the often overwhelming desire to stop. Like most runners who have put in their time training, I persisted to the end and I owe many people much for the accomplishment.

Prior to and during this experience, Jack Hough has been a very special person to me - mentor, colleague, friend - who had the patience and wisdom to let me run my own race and to give me emotional and intellectual sustenance along the way. In many ways, he was an important, positive force in my completion of this work.

I am also deeply indebted to him, Kelly Duncan, and John Belland for collecting the data upon which this study
is based. Their intellectual contributions and encouragement helped stimulate my thinking on this topic and my willingness to take it on.

To Phil Smith, I owe much for his intellectual stimulation, patience, friendship, and, at times, his prodding. Fortunately for me, our friendship has survived this experience.

While some of this work was completed prior to my coming to the University of Alabama in Birmingham, substantial portions were completed during my time here. For that, I have to thank Sam Brown. His patience and encouragement were appreciated.

A special note of gratitude is due my wife and daughter, Sheila and Stacey, who had to live with me during these many months. I know it was not easy for them at times, and I love them both for their understanding. While all shared in my slow struggle, may you share in my joy.

I am finished.
VITA

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CHAPTER I
INTRODUCTION

Any frequent observer of elementary classrooms has to be impressed by their diversity in organization and accomplishment. While there is diversity, there is also commonality. Typically a group of up to 30 children who assume the role of pupils is led by an adult in the role of a teacher through a variety of daily tasks for the purpose of bringing about prescribed changes in the children. They all work in a bounded physical setting called a classroom with limited time, material, and human resources that are organized and managed by the teacher. While these statements are representative of fundamental commonalities, they are also packed with theoretical meanings that can help an observer understand the complexity and diversity of classroom life. Such concepts as school, pupil and teacher role, classroom management and organization, learning tasks, limited resources, and learning goal accomplishment are just some of the ones that provide an understanding of the classroom.
Problem Context

Time and Pupil Achievement

Those researchers who have been interested in what goes on in the classroom and its impact upon the participants have recently turned their attention to studying the relationship between the amount of time pupils spend engaged in learning tasks (substantive task time) and pupils' achievement. This interest is part of a long history of research on the complex relationships between teaching and learning (Dunkin and Biddle, 1974). Studies by Wiley (1973) and Wiley and Harnischfeger (1974) demonstrated a statistically significant positive relationship between time allocated to pupils in school and their achievement. Recent studies by Bennet (1976), McDonald (1976), Stallings and Kaskowitz (1974) have supported the positive relationship between the amount of time a pupil spends on learning tasks and his achievement. Recent reviews of research of this relationship by Bloom (1976), Medley (1977), and Berliner and Rosenshine (1978) express to a similar conclusion, that is, that a significant positive correlation (.40 or greater) exists between pupil time engaged in substantive tasks and academic achievement. Rosenshine (1976) has summarized the results this way: "The educational implications of the results in content covered and time spent are that what is taught and
how long it is taught are at least as powerful as how something is taught" (p. 352).

While this relationship makes intuitive sense, since it is hard to conceive of much learning occurring without attending to the instructional stimulus and practicing the new response, few theoretical explanations of this relationship exist. In an attempt to specify the necessary conditions for mastery learning, Carroll (1963) and later Bloom (1976) proposed that time on substantive task is a necessary condition for learning. They hypothesized that similar levels of learning could occur between pupils whose intellectual capabilities varied if time on any one substantive task was variable, rather than the same for all pupils. While neither Carroll nor Bloom argued that time on substantive task is a sufficient condition for learning, they would argue—and the previously cited research seems to support—that substantive task time is a necessary condition for learning.

If one accepts the research on this relationship as possessing both theoretical and practical importance, then another question can be asked about substantive task time that has not received much theoretical or research attention. It would seem that a crucial empirical question would be related to the determination of the conditions that increase or decrease pupil substantive task time. The
theoretical issue would be to try to explain the relationship between these conditions and substantive task time. Such explanation, of course, would require careful description of the phenomena. While the implication of these issues would seem to raise substantive task time almost to a level of theoretical importance equal to constructs like learning, retention and transfer, it is recognized that substantive task time may only be as important as the psychological and behavioral processes that occur during that time. Even so it would still be important to understand the conditions managed by the teacher that keep pupils engaged in these processes.

Classroom Management Research

With the advent of group instruction, teachers have been faced with the complex task of martiaaling diverse resources and pupils toward the accomplishment of goals. This conception suggests that maintaining pupils on substantive tasks is a classroom management process involving many of the specified teacher tasks and resource manipulation in order to further pupil goal attainment and operational efficiency, among others. Johnson and Brooks (1979) developed a conceptual model of classroom management involving teachers in planning, organizing, coordinating, directing, controlling, communicating, housekeeping, and nurturing tasks that involve the manipulation of resources in differing
Over the years, educators have utilized insights from psychological and social-psychological research and theory as well as various social philosophies to develop many prescriptive strategies for effectively carrying out classroom management tasks. Brophy and Putnam (1979) attempted to organize these strategies into four groups. One group, classroom climate and rules techniques, stressed the insights from the social psychology of group leadership and structure (Lewin, Lippit, and White, 1939) and research on successful parenting skills with consideration for the different developmental levels of the pupils involved. The second group, group management techniques, especially stressed the research findings of Kounin (1970) showing the value of teacher behaviors termed "withitness", "overlappingness", "transition smoothness", and "group alerting" for maintaining the pace of the lesson and a pupil's attention. A third group of techniques cited by Brophy and Putnam is derived from the counseling and psychotherapy techniques, many of which have been recently popularized (Glasser, 1969; Gordon, 1974), as well as some not so well known (Dreikurs, 1968; Redl, 1959). These techniques have their roots in individual psychological and
psychiatric theory and represent counseling techniques that have found applicability in the classroom.

The fourth group, behavior analysis and modification techniques, represents insights from the theory and research on learning in social contexts. Generally speaking, when applied to the classroom or other institutional settings, these techniques involve exacting specifications of inappropriate behavior and their frequency, the application of rewards and punishments such that the inappropriate behavior is replaced by appropriate behavior, and the development of appropriate behavior maintenance procedures (O'Leary and O'Leary, 1977). When applied to classrooms, these techniques have usually been applied remedially to the problem behavior of individuals, rather than to groups. While these techniques have been shown repeatedly to modify undesirable behavior, problems like reward satiation, low response transfer, and rewards with differing reinforcement value have been shown (Emery and Marcholin, 1977).

The different groupings developed by Brophy and Putnam reflect both the theoretical diversity for understanding human behavior and the complexities of doing that in the particular social context, the classroom in this case. It is likely that all the techniques derived from the different theoretical perspectives work under certain conditions. Further research may help educators understand the conditions
under which different techniques work best in keeping pupils actively and meaningfully involved in their school work.

While this study does not propose to develop a theoretical integration emerging from these diverse groupings of management techniques, this study proposes to examine the naturally occurring behavior consequences that tend to control behavior, rather than examining leadership processes, group management processes, or counseling techniques. Several pre-research assumptions and agendas held by the investigator resulted in this choice.

First, it has been hard for the investigator to deny the evidence that most behavior seems to be controlled by the anticipation or receipt of some consequence, usually structured into the social context. Second, as the symbolic capabilities of the person develop, even moral behavior seems amenable to explanation through the specification of its consequences. Third, if these first assumptions are true, then teachers may profit from an understanding of the naturally occurring consequences over which they have the greatest control and their effects upon pupils. It is the investigator’s hunch that for a variety of reasons many teachers plan and organize resources without understanding the controlling consequences that their decisions ultimately have on pupils. When teachers better understand the relationship between their management decisions and their effect upon
behavior-controlling consequences, then there is greater possibility that teachers may be more effective in reaching the goals and promoting the values of importance to the class and larger community.

School Context

Any social science research study not only exists within a larger theoretical context and research tradition, it also occurs in a particular context, in this case an elementary school. For a variety of reasons, such as generalizability and interpretability of findings, it is useful to examine the social context in which the research occurred. More specifically, some understanding of the history, prevailing norms and goals, and people mixture would be useful. Most of the information for this section comes from an ethnographic study (Sanders and Schwab, undated) of the learning climate of the same school from which data were collected for this research.

The Elementary School

Sanders and Schwab described the elementary school as a modern, open-space school that at the time of their study had a reputation for being a good, innovative school in a middle-class, white suburban community near an old college town which was becoming a bedroom community of the capital city in a midwestern state. As an open-space school, three large open instructional areas that could contain up to six
class groups surrounded the teachers' lounge, media center, and administrative offices. A gym and large multipurpose room were also part of the building. The instructional areas contained kindergarten, first and second grades in one, second and third grades were in the second area, and third and fourth grades were in the third. The teaching staff was judged by Sanders and Schwab to be skilled and experienced with eight of 19 having master's degrees and with a mean of 4.3 years' experience in that school. More importantly the teachers, pupils, and parents judged themselves and the school as successful and good. Additionally, the teachers were judged to be enthusiastic about teaching and to share a common set of pedagogical beliefs stressing continuous pupil progress and thoughtful pupil decision making through a balance of independent learning experiences and group experiences based on academic and social needs and pupil interests. Opportunities for pupils to pace themselves in their work, to motivate themselves, and to diagnose, prescribe, and evaluate their own performances were stressed. Educational goals stressed that pupils should experience success, maximize their feelings of self-worth, maximize their basic skills competence, and be able to work well with other pupils.
The school began in spring, 1970 with a nucleus of seven teachers selected by the principal who shared his belief in individualized, personalized instruction. As the new school grew and teachers were added, the new ones were quickly socialized into those pedagogical beliefs. In addition to taking on and socializing staff, tremendous effort was spent on developing individualized and personalized reading and math curricula and on collecting the tremendous amounts of materials needed to support those curricula. The staff saw themselves as developing an individualized program in an open-space school. The science curriculum was somewhat different in that each teacher within an instructional area developed four, three-week units and each pupil had the opportunity to choose whichever units he was interested in studying for the three week period. By 1973 the school had established a symbiotic relationship with a group of professors of education from a nearby state university. One product of that relationship was a three-year, state-funded project to continue development of an individualized, personalized program to help pupils become "rationally autonomous".

During the first year of the project, Open Time emerged. This was conceived as periods in the mornings and afternoons when pupils had control over the use of their time and
could work independently or in groups on previously assigned tasks. In addition, pupil evaluation and reporting forms were developed, a materials classification system was started, an analysis of teacher problems and school climate was undertaken, and an in-house news-letter was started, all through a process of staff decision making and team effort. By the third year of the project, someone from outside the school was contracted to assess its distinguishing characteristics. The report stressed such qualities as a nurturing environment, high pupil and staff moral, high staff and pupil cooperation, planned instructional flexibility, and rich learning environment.

As a result of the years of struggle with the project and the grading philosophy described earlier, teachers had grown to be sensitive to and respect the complex lives of their pupils, especially as those complexities affected pupils' learning, responsible action, and reflection. Given the educational environment created by the staff, pupils had come to know, accept, and be successful in completing their work in a responsible, independent way.

A possibly crucial element to understanding pupils' substantive task time in this school is the history just summarized that helped mold and reinforce a set of common values, attitudes, and behavior patterns that guided the everyday
experiences of both teachers and pupils. From a class management standpoint, it is important to note that before the Title III project, behavior modification techniques were tried but dropped after less than a year. As a system of classroom management, Sanders and Schwab noted that teachers were selective in their approach and kept what worked, like reinforcing pupils' positive behaviors (p. 26). It is quite possible that pupils' and teachers' common experiences molded a common set of expectations about what pupils were supposed to do—progress individually in math, reading, spelling—and how they were supposed to do it—individually, if that was appropriate, but always responsibly. These tasks seemed to occur within a social atmosphere characterized by material support, respect, valuing, sharing, and concern within and across class groups. Any findings about the day-to-day conditions that maintain pupils on task have to be interpreted in light of this history and the common set of expectations it created that make the findings applicable only to this group.

Open Education

Since the Sanders and Schwab study described the school as consisting of three large areas with few dividers, the question needs to be answered as to whether or not the program in this school is representative of open education.
In trying to respond to this issue, some determination needs to be made as to what open education is. The term has been used ambiguously. It has been described as a set of shared psychological, pedagogical, and philosophical assumptions (Silberman, 1970), while other conceptualizations have stressed the open-space architecture (Barth, 1972; Rathbone, 1971). Burris and Chittendon (1970) identified eight distinguishing characteristics. These included: (a) flexibility in organizing instruction and materials; (b) less attention to objectives and more attention to the pupil's thinking process; (c) much individual instruction that encourages initiative, choice, and interdisciplinary pursuits; (d) establishment of individual standards for pupil evaluation; (e) teacher respect for children, openness, and warmth; (f) extensive use of external resources; (g) shared assumptions about pupils' innate curiosity and trust in pupils' ability to make good decisions; (h) teacher's perception of himself as sensitive, responsive resource for helping children develop. A problem with this conceptualization is its vagueness since, for example, it is not impossible for an authoritarian teacher who spends much time in front of the whole class as perceiving himself in these ways.

Despite the ambiguity and vagueness of the term, as well as numerous different open education programs, what seems to cut across most of the definitions include classrooms rich
in resources, pupil choice—usually of task, space flexibility, and more individual and small-group instruction than large-group and whole-class instruction (Horwitz, 1979). However, because of the conceptual vagueness in the defining characteristics, it is possible to include many gradations of classrooms under the conceptual umbrella called open education. The Sanders and Schwab study gives evidence that the instructional areas and the classes in them possessed all the previous characteristics. While the form of open education that this school takes is not the same as the forms taken by other programs in this country or England, it seems fair to judge that the classes under study possess the characteristics of open education classes to some degree and when taken together could fit into the wide band of the pedagogical spectrum labeled open education.

Individualized Instruction

Evident from the Sanders and Schwab study was the emphasis placed on individualized instruction by the staff, especially in reading and mathematics. As a more recent curricular innovation, curricula that individualize instruction have been produced by several educational research organizations, e.g., PLAN, I.P.I., I.G.E., and disseminated nationally (Weisgerber, 1971). While there are many organizational strategies and material forms these programs take, they do share certain commonalities that are distinct from
curricula geared to whole-class and group instruction. First, individualized curricula recognize and attempt to more fully accommodate the many important differences between pupils, like learning rate, motivation, past achievement. While teachers and curriculum developers have recognized these before and made some accommodations, the difference between the two is one of degree. A curriculum, like Individually Prescribed Instruction (I.P.I.) mathematics, attempts to accommodate differences in each pupil's learning rate, prior achievement, and motivation through the administration of materials, time, and tasks that may be unique to him (Cooley and Glaser, 1971). Another way of putting this characteristic is that individualized curriculum developers take seriously the "old saw" that teachers should start where a pupil is and work from there.

A second distinguishing feature of individualized curricula is precise specification of a sequence of discrete and, presumably, more cognitively demanding content objectives stated in behavioral terms. Various schemes have been developed to fractionate curriculum content into discrete, sequenced levels (see Gagne, 1977). This is necessary so that precise decisions can be made about what a pupil can or cannot do.
A third feature is utilization by the teacher of a formalized diagnostic-prescriptive decision-making model. Thus, the teacher, given the sequenced, discrete curriculum, has to make valid and reliable assessments of what the pupil can and cannot do in that curriculum. Then, given that information, the teacher selects appropriate instructional tasks and supportive resources which are prescribed for the pupil in order to move him to the next higher objective. After the pupil works through the tasks, his performance is assessed to determine if he has satisfactorily learned. If not, he is recycled through more tasks and materials. If he has, he is assigned to new tasks and materials representing a new content objective (Cooley and Glaser, 1971). One of the requirements of this process is a testing system—usually multiple choice—that gives valid and reliable information about a pupil's performance for each content objective since it is the pupil's performance on these tests in relation to some performance standard that determines whether a pupil is recycled or continues to the next learning task. (Weisgerber, 1971).

Implicit in the second and third features is a fourth common feature, the existence of a great variety of instructional materials and media that match the different objectives of the curriculum and that can be used for initial or remedial follow-up learning. Often the material
is varied by sensory modality so that the pupil can hear and read, or see and read, or see and hear, or touch and see, or other combinations. The variety, therefore, is necessary not only because different pupils will likely be working on different objectives but also because they learn better through one type of sensory input than another.

A fifth feature is a systematic procedure for organizing, storing, and retrieving the information that is collected frequently about each pupil's performance. Pre-assessment and post-assessment tests are one frequent type of information that needs to be stored and retrieved. Materials with which pupils have worked during the period are often collected daily to assess progress. With at least these three sources of information being stored and retrieved by the teacher multiplied by the number of pupils, a tremendous volume of paper and information has to be frequently processed by the teacher (Gronlund, 1974). One of the implications of this requirement is a change in the teacher's role from instructional leader to instructional manager of pupils, tasks, materials, and information. As managerial tasks related to information flow increase, time for teaching decreases. In other words, pupils in individualized classes receive fewer instructional stimuli from the teacher and more from materials (Deep, 1971).
A sixth feature which is optional and dependent, in part, upon the social philosophy of the teacher or the curriculum developer is the opportunity for pupil choice in the entire process. Programs can be structured so that pupils can have none, or they can be structured so that they have the opportunity to select from options related to objectives, tasks, and materials (Grounlund, 1974). As Sanders and Schwab (undated) discovered, one of the characteristics of the school under study was to provide opportunities for pupils to make responsible choices about the instructional programs, especially the pacing of their assigned independent work and selection of science units.

**Implications for Classroom Management.** The Sanders and Schwab study makes it clear that the staff was committed to individualized instruction and to pupils' exercising responsible choices. Their study also indicated that the math and reading programs followed a diagnostic-prescriptive model for individualizing instruction. It can be inferred, therefore, that for any classroom group teachers will spend time in frequently testing pupils to assess progress, storing and retrieving this information, finding and organizing a variety of materials, and teaching pupils. It is clear that if the teacher is not teaching or is teaching fewer students than the whole class, then the pupils may neither be under the teacher's direct surveillance nor her overt direction.
Thus, other accountability mechanisms are required to encourage pupils to remain engaged in their tasks. There are a variety of ways to build in pupil accountability, two of which are for the teacher to require and check daily work or to have frequent conferences with the pupil.

While the management tasks specified by Johnson and Brooks (1979) may not be different in classrooms utilizing curricula requiring only whole-class and group instruction, a critical difference is the typical number of pupils with which the teacher works. In individualized curricula, the teacher engages in these tasks with individuals or many small groups daily, while in less individualized classes the teacher engages in those tasks with classes and fewer but larger groups.

**Statement of the Problem**

Prior sections have attempted to provide a brief theoretical and research context surrounding pupil substantive task time and classroom management techniques. It was noted that a significant positive correlation has been found between pupil time on substantive tasks and achievement. It was also noted that few studies have explored the conditions that optimize or depress this relationship. Those that have, fall into one of the four groups related to classroom management techniques. It was noted that an expanded social learning theory would be developed to explain and predict
the conditions related to pupil substantive task time. This theory is used to guide the interpretation of elementary classroom data obtained by a prior investigator.

Since these data were collected in fourth and fifth-grade classes in one of the instructional areas of an innovative, open-space school in a white, middle-class suburban elementary school, some contextual information was given about the school based on an historical and ethnographic study of its innovative history. A brief analysis was made of some of the probable characteristics of their individualized curriculum that may have implications for explaining pupil substantive task time. Given this contextual information, there is one research question addressed in this study.

What were the conditions that maintained pupils on-task during Open Time in one of the classrooms for which data were previously collected?

Based on this question, the proposed research has two objectives. First, in order to develop an explanation of pupil substantive task time in the observed classroom a theoretical framework will be developed. This framework will consist of the integration of two broader social learning theories and of some of the special conditions of the elementary classroom (limiting conditions) that presumably affect the regulatory efficacy of variables posited by the two social learning theories. Second, a modus operandi
analysis (Scriven, 1974) of the previously collected data will be undertaken to develop an explanation of the conditions related to the high levels of pupil substantive task time, by identifying the operative causes and the process and procedural linkages connecting the cause with the behavior. This ex post facto analysis will utilize constructs and relationships derived from the theoretical framework to develop the explanation.

Definition of Terms

Many theoretical constructs will be defined in Chapters 2 and 3. Chapter 2 will examine the theoretical constructs related to the regulatory conditions of behavior and propositions of Homans' (1961) social exchange theory, Bandura's (1977) social learning theory, and Milgram's (1976) theory of obedience to authority. Chapter 3 will specify and define the limiting conditions existing in the classroom context that are hypothesized to be related to pupil substantive task time. Questions guiding the later analysis of the descriptive data will also be stated in that chapter. There are some key constructs that are frequently used and need defining at this point.

1. Substantive Tasks--any sequence of pupil behavior intended to accomplish the teacher-approved learning goals of the classroom which have reward and cost consequences.

2. Substantive Task Time--the amount of time a pupil
spends engaged in a substantive task.

3. Managerial Tasks--any sequence of pupil behavior intended to create the conditions for the occurrence of substantive tasks which have reward and cost consequences.

4. Non-functional Tasks--any other pupil behavior whose purpose is neither managerial nor substantive which has reward and cost consequences.

5. Non-substantive Tasks--term used to refer to both managerial and non-functional tasks.

6. Resources--the time, human, and material objects used by a pupil while engaging in substantive, managerial, and non-functional behavior and used as a consequence of that behavior.

7. Rewards--any valued or need-fulfilling symbolic or material consequence or punishments avoided that are externally or vicariously received or self-administered and that have informative, motivational, and reinforcement functions.

8. Costs--any aversive symbolic or material consequence or rewards foregone that are externally or vicariously received or self-administered that have informative, motivational, and punishment functions.

Delimitations

While data were collected on four teachers and their pupils, the focus of this study has been delimited to an
analysis of the conditions related to substantive task time during the Open Time period of one teacher for five consecutive days. This delimitation was motivated by the fact that a fine-grained analysis of four teachers' data was most possible for only one teacher for whom the data was complete, i.e., data for all five days of the week exist. As such, it is a process-process study that falls under the more general heading of classroom management and control (Dunkin and Biddle, 1974). The theoretical basis derived from Bandura (1977) and Homans (1966) is more comprehensive than the data collected. Thus, only a subset of all possible questions about regulatory conditions is assessed because the study is an ex post facto analysis of data collected prior to the development of the proposed theory. More specifically a limited set of questions is stated for three sets of conditions theoretically related to pupil task time. They include the conditions related to the tasks, environmental conditions, and pupil characteristics. While the theory has applicability for explaining substantive task time of older or younger pupils in a variety of contexts, the use of available data presently dictates an analysis of only the data that was collected on the four teachers and pupils in a middle-class, suburban school district.

Limitations

Several limitations are inherent in this study. Since it is an ex post facto study of one teacher's class working
under natural conditions, the data do not permit a rigorous, controlled test of the theoretically derived relationships between behavior and regulatory consequences or the hypothesized relationships between the limiting conditions and pupil substantive task time. To make such a test would require, in part, a simultaneous assessment of all possible regulatory consequences that would be analyzed by a series of causal models or time series statistical designs. The data were not collected in a way to make this a hypothesis-testing study. However, if one assumes the validity of the theoretical relationships between behavior and external, vicarious, and self-consequences based on the empirical work cited by Bandura (1977, 1968), then a useful ex post facto analysis can be made with these data by laying an integrated and expanded theory of behavior over the data. The theory becomes a guide for examining and interpreting the data. Scriven's modus operandi approach (1974) becomes the method for maximizing the validity of an ex post facto causal analysis.

To do this the data have to be examined in order to identify the consequences and limiting conditions operating in the observed classroom. Then, these data would be used to try to determine the nature and frequency of the relationships between the specified consequence or limiting conditions and pupil substantive task time by enumerative,
logical, and correlational analyses. Studies cited by Bandura (1977, 1989) and Leventhal (1976) indicate that these limiting conditions (see Chapter 4) affect the efficacy of regulatory consequences. However, because this is an \textit{ex post facto} study, the enumerative, logical, and correlational analyses of the hypothesized relationships between a limiting condition and pupil substantive task time would be an initial investigation resulting in probabilistic conclusions of some of the conditions in an upper elementary classroom that may affect the regulation of pupil substantive task behavior.

Another potential limitation is that the scope and depth of the analysis is limited by the kinds of data that were collected. It is quite likely, in other words, that the proposed theoretical framework will specify constructs for which no corresponding operational representation exists because it was not foreseen by the initial investigator. This possibility—as it relates to conducting a modus operandi analysis—will be explored in the final chapter.

Related to this potential limitation is the recognized limitation that any \textit{ex post facto} study has questionable internal validity because of the likelihood of committing a \textit{post hoc} fallacy. It is always possible that other researchers will develop a more parsimonious analysis of the same data. Scriven's modus operandi analytic approach is an
attempt to maximize the internal validity in just such a situation.

As to the external validity of the study, the descriptive information on regulatory conditions and the analyses may be representative only of fourth grade pupils working in an open-space classroom arrangement with individualized curricula in suburban, middle-class schools. Great care was taken to minimize the reactive effects of the observer and his equipment. Six pupils in each class were purposely selected to represent maximally different subsets of two with specified characteristics. The observer was kept ignorant of the pupil groupings so as to minimize observer bias. Thus, it will be assumed that the reported correlations are minimally contaminated by observer reactive effects.

Finally, while observations of pupils and teachers were each supposed to be 10 minutes in length, some observations were shorter because of uncontrollable circumstances that were natural events in the classroom and/or because of technical problems in the recording equipment used for audio taping teachers, making their verbal behavior impossible to code. Frequency counts were transformed to percentages to equate observations. Even so, while the total amount of time of observation lost due to these reasons was very low, it is possible that significant occurrences were lost.
CHAPTER II
GENERAL THEORETICAL PERSPECTIVES

If an observer enters an elementary school classroom, he is likely to notice that pupils engage in educational tasks and that pupils differ in the amount of time they spend engaged in those tasks. If these observations are accurate, they raise three questions. First, why do pupils engage in educational tasks at all? Second, why does a pupil persist in engaging in educational tasks? Third, why are these variations among pupils in the time they spend on tasks? While these questions are phrased in a way that implies answers of a psychological nature, that will not be the tack taken here. Rather, a social-psychological perspective will be taken that assumes fundamental social forces affecting the individual and presumably impacting upon an individual's action. To be accurate, the three questions need to be rephrased to reflect the importance of the social nature of the classroom upon the individual. Thus, what are the psycho-social forces that account for a pupil's task engagement? What psycho-social forces account for a pupil's
task engagement over time? What psycho-social forces help explain the variations in time spent on tasks?

Three theoretical perspectives will be brought to bear upon these questions. The first, social exchange theory, emerges from the works of Homans (1961, 1967) and Thibaut and Kelly (1959). The fundamental proposition of this theory is that a person engages in one activity instead of another with another person if one is more profitable or less costly to him than the other activity. The second, Bandura’s social learning theory (1977), analyzes the internal and external control mechanisms of behavior and enables social exchange theory to be applied to single and multiple-person activities. The third perspective derives from the work of Milgram (1969, 1972) on obedience to malevolent authority. The fundamental proposition of Milgram’s position is that persons in organized, social hierarchies undergo a psychological change that results in the person becoming the agent of a greater authority. All three perspectives explain individual behavior in a social context. Bandura’s theory is the most general since it applies to all social contexts while Homans’ applies to dyadic person contexts and Milgram’s to hierarchical social groups. All make reference to constructs about group life. Since these constructs will be woven into the later discussion, they will be introduced here.
It is assumed that class groups are sufficiently similar to the adult groups upon which much of the theoretical and empirical work on social behavior has been done that those theoretical constructs and findings are relevant. Following the definitions of the group life constructs, the applicable theoretical assertions of social exchange theory, social learning theory, and obedience to authority will be given. An application of the theoretical positions will be made to the specific social context of the elementary school classroom group. From this application, a series of questions will be derived from the integrated, expanded theory to guide the analysis and interpretation of the data.

**Group Life Constructs**

First, schools are organizations. As educational organizations they are characterized by a division of labor working to achieve goals, a formal, often rigid authority structure, a staff whose functions and authority are legitimized by society and its laws, and a clientele, the pupils, whose participation is required and which varies considerably in its capability to perform satisfactorily (Corwin, 1964; Moeller and Charters, 1966).

Second, members of the organization exhibit desired behavioral regularities which are manifestations of social norms. "Social norms" are defined as "... behavioral expectations shared by group members against which the validity
of perceptions are judged and the appropriateness of feelings and behavior are evaluated" (Secord and Backman, 1964, p. 323). Since these expectations are shared, they tend to make group life predictable, orderly, and efficient. Norms develop for insuring cooperative action and attitudes for goal achievement and for insuring emotional support (Secord and Backman, 1964, p. 336). They function to control group behavior since deviation from a norm tends to result in the application of a punishment and compliance often results in the application of a reward. Over time such shared expectations take on a stronger, obligatory quality, that is, a person should behave in a particular way (Secord and Backman, 1964, p. 455). For example, there is usually a classroom norm prohibiting cheating on tests that a pupil probably encounters in every class during his schooling, and not cheating, therefore, becomes obligatory behavior.

Third, persons in groups can be differentiated by their roles, e.g., principal, teacher, pupil, etc. A "role" is defined as the normative expectations defining the appropriate behavior of the occupant of the role toward occupants of other roles (Secord and Backman, 1964, p. 455). For example, occupants of the role of teacher are both expected by parents and pupils and obliged to plan and lead educational activities.
Fourth, one of the role expectations held for teachers and pupils is that teachers provide daily leadership for engaging pupils in activities to accomplish educational goals, while pupils are expected to comply with the leadership demands by accomplishing tasks. "Leadership" is defined as an influence relationship between two or more persons who depend upon one another for the attainment of mutual goals within a group situation. While this definition does not preclude others from engaging in leadership behavior, it is traditionally the teacher who is given the authority and expected to be the leader of the classroom group, especially in the planning, initiation, monitoring, and evaluation of classroom tasks (Schmuck and Schmuck, 1971, p. 27).

Fifth, the success of a teacher's leadership efforts depends upon, in part, the teacher's authority. "Authority" is defined as the legitimate right to influence others which is vested in a person or position and which is accepted as appropriate by all those under his influence (Katz and Kahn, 1966). It is part of the role definition of teachers that they possess the authority to lead pupils toward accomplishing educational goals. This legitimized role helps establish the belief among the group that the teacher has the right to demand pupil compliance to a request, to make requests of pupils, and to expect compliance.
Sixth, classroom groups engage in activities as a means to achieving some intended end which is termed a "goal". Pupils might say that they are doing a reading activity in order to learn to read. Being able to read, then, is the intended end. Pupils and teachers usually have many classroom goals, and they may not be all academic. They may be related to classroom management. For example, it may be that the teacher's goal for an activity is to keep pupils occupied and quiet. Both the activity and the goal may or may not reflect the values of the individuals in the group. "Value" is defined as a person's judgment of worth about something (Secord and Backman, 1964). For example, the teacher and pupils may have learning to read as a goal because reading is highly valued by them. However, it is not a contradiction to say that a teacher or pupil is pursuing a goal that is not valued.

At this point no attempt will be made to weave these constructs into a coherent theory since they are part of the theoretical background from which the three previously mentioned perspectives emerge. In order to begin the synthesis of these constructs with the three theoretical perspectives, it would be useful to establish three plausible situations derived from ordinary language expressions to which these constructs and perspectives could be applied. If the observer in the classroom asked a pupil why he was engaging in
an academic task, he might typically respond in one of three ways. He might say that he agreed to do it. He might say that he wanted to do it, or he might say that he was told by the teacher to do it even though he preferred not to.

Case 1--he agreed to do it--implies a negotiation process, either implicitly or explicitly, between pupil and teacher. In negotiations there is give and take until a mutually acceptable settlement is found. Why did the pupil agree to do it? The exchange theory proposed by Homans (1961) and Thibaut and Kelly (1959) provides an explanation based on the economic metaphor of exchanging profits and losses for different alternative activities.

Case 2--he wanted to do it--implies that the pupil chose without external pressure or other constraints to engage in that activity. Why did he want to do it? One explanation suggested by Bandura's theory, would be that the pupil saw the activity as a means to achieving some self, external, or vicarious rewards that were highly valued by the pupil.

Case 3--he was told to do it--implies that the teacher exercised her authority in order to get the unwilling pupil to comply to the request. Why did the pupil comply? Milgram's work (1969) on obedience to malevolent authority provides an explanation. He complied because he had become psychologically transformed and was an agent of the teacher. The theories that possibly explain these situations will be
summarized in order.

**Case 1: Social Exchange Theory**

Homans' social exchange theory (1961, 1967) is based on an analogy between economic transactions and other kinds of social interactions. It assumes that humans tend to seek rewards and avoid punishment. It conceives of human groups as analogous to economic markets in which a variety of valued things are exchanged. While Thibaut and Kelly (1959) first developed the position, Homans (1961) formalized the definitions of key constructs and propositions. First, the definitions of key constructs are given.

1. Activities--behaviors aimed at obtaining rewards.
2. Sentiments--communications to Person B of Person A's approval or disapproval of him. They represent Skinner's generalized reinforcer construct.
3. Interaction--behavior in which people direct their activities at each other so as to obtain rewards from each other.
4. Rewards--anything someone receives, or any activity directed at him that is valuable to him and or satisfies a need, including escaping punishments.
5. Cost--any intrinsically punishing experience undergone, or an alternative reward foregone in order to get a reward. A punishing experience refers to any physically or psychologically painful consequence that inhibits future
performance of the prior behavior.

6. Profits--rewards minus costs.

7. Investments--a person's evaluated activities in the group, e.g., number years of service. With these definitions, Homans stated a series of propositions that explain the behavior between persons.

1. The Stimulus Proposition--An event preceding a behavior by Person A that is followed by a reward becomes a stimulus so that the more similar a present event is to the original stimulus, the more likely Person A will repeat the behavior. Additionally, stimuli that become associated with punishments will result in Person A's avoidance of the intervening behavior or of the situation.

2. Frequency of Reward Proposition--The more often Person A is rewarded for a behavior, the more likely he will repeat it as an activity.

3. Value of Reward Proposition--The more valuable a reward is to Person A, the more often Person A will engage in activities to evoke the reward. How valuable a reward is depends upon his reward hierarchy, satiation, and scarcity.

4. Satiation Proposition--The reward value of an act tends to decrease over time since the reward becomes less valuable. As Person A becomes satiated by an act, the frequency of the act tends to decrease.

5. The Scarcity Proposition--The scarcer something
rewarding is, the higher its price. If A controls something highly valued by B, then B is dependent upon A for it, and A can control B's activity.

6. The Fatigue Proposition--The cost of an activity increases with its frequency, resulting in the termination of the activity.

7. The Frustration-Anger Proposition--A reward expected but not given results in frustration and the expression of anger.

It should be evident that Homans conceives of human interaction as an exchange of rewards and costs. Thus, two persons will engage in interdependent activities as long as they are mutually profitable. Activity will terminate when costs are greater than the rewards or when an activity with greater profit is known and available to one or both persons. For any activity, profit decreases as the value of the reward decreases because of satiation or because costs increase through fatigue. The reward value of a task can be kept high by keeping rewards scarce and/or by giving rewards at a frequency that minimizes satiation.

Given these propositions, the answer to why the pupil agreed to engage in the task is fairly easy to explain at a very general level. The pupil agreed because the calculated potential for profit was great. As to why the pupil persists on the task, the response would be that the environment is
structured such that rewards remain high relative to costs, that satiation and fatigue are minimized, and that expected rewards are consistently given. This explanation is sufficiently general that it could be applied to social contexts other than the classroom. Obviously, there are contextual givens for each social situation that must be understood if one is to understand, for example, why pupils in a particular class engage in a task and persist in that and other tasks. Specifically an observer of a classroom would have to know:

1. the nature of the tasks and the capability of the person to do them,
2. the predominant goals and values of pupils,
3. the operative rewards and costs for participants,
4. the way the teacher controls and structures the environment to keep rewards greater than costs while minimizing satiation and fatigue,
5. the role of expectations and norms that support the reward/cost exchange.

If variability exists both within and between classrooms in pupil time on academic tasks, then it can be hypothesized to be the result of the variations in the ways teachers control and structure the classroom activities, rewards, and costs, as well as the differing values, goals, and capabilities of the participants.
Case 2: Bandura's Social Learning Theory

While Exchange Theory focuses upon explaining social behavior through a reward/cost exchange calculus, some theoretical issues are ignored or incompletely addressed that have application to classroom behavior. For instance, why do pupils engage in independent work? Why do they do independent work for long periods of time without benefit of external reward? How do people learn what behavior is rewarded? How do rewards function to influence behavior? Bandura's social learning theory (1977) provides a theoretical response to these questions.

Bandura asserts that behavior patterns are learned through direct experience conditioning or observational modeling processes (p. 16). Further, he stresses the importance of cognitive mediation in learning and in regulating complex, rule-governed behavior through observation and symbolic coding (p. 21). While learning occurs through direct experience conditioning or observational modeling, performance of learned behavior is presumed to be a function of the type and structure of rewards and punishments. Bandura expands Homans' conception of reward as a valued consequence of behavior and costs as any intrinsically punishing experience in order to accommodate the cognitive role in learning and behavior regulation. It is the expanded
conceptualizations of the reward and punishment constructs that permit exchange theory to be more widely applied.

**Consequence Functions**

Rewards or punishments or, more generally, response consequences are believed to have three functions. The first, the informative function, represents the information derived from observing different outcomes in the same or different social settings. On the basis of such information, the person develops hypotheses about which responses are rewarded and punished. For example, a pupil who observed the teacher praise another pupil for working quietly can hypothesize a relationship between the pupil's quiet behavior and the teacher's praise. These hypotheses serve as cognitive guides for future action and can be revised as experience dictates. The second function, motivational, represents the symbolic representation of future consequences. Such anticipatory thoughts function as incentives for current behavior since it provides both the stimulus for appropriate action and the sustaining incentives. A pupil's belief that getting good grades in school will result in a high paying job after graduation is often a stimulus for long hours of study in order to obtain the high paying job which is the reward incentive.

The third function, reinforcement, represents the maximizing effect of consequences upon the re-occurrence of
antecedent behavior. Thus, each time a pupil is praised (rewarded) by the teacher for his effort the more probable that effort will be repeated in the future. However, rather than conceiving of this as a mechanistic response strengthening, Bandura suggests several theoretical positions that have empirical support. Rewards may be reinforcing because they may reduce a physiological need (Hull, 1948), because they reduce needs for novel and complex stimuli (Berlyne, 1960), because they are a higher value behavior than the antecedent behavior (Premack, 1965), or because they maintain the cognitive hypotheses about appropriate behavior and their incentives (Bandura, 1969). Studies by Spielberger and DeNite (1966), Dalany (1968), and Postman and Sassenroth (1961) have supported Bandura's view that cognitive representation of the contingent relationship between behavior and consequence is important for regulating behavior. Essentially, these studies found that reinforcement contingencies were ineffective in modifying behavior as long as subjects were not aware of the link between behavior and consequences. Thus, in the previous example, in order for the teacher's praise to be reinforcing to the pupil, the pupil must know what antecedent behavior is being praised. Teachers often do this by praising and specifying the antecedent behavior in the same sentence, as, for example, the statement, "I like the way Johnny is working quietly in his
chair".

Consequence Sources

While Bandura's functional analysis of rewards greatly expands Homans' conception, Bandura extends the analysis further by positing three sources of rewarding or punishing consequences that regulate behavior. For example, if the occurrence of behavior was controlled only by external rewards, then explaining the repeated occurrence of solitary behavior might be difficult. While solitary behavior, e.g., independent study, homework, reading, etc., can be regulated by the incentive value of expected external consequences (Baron, Kaufman, and Stauber, 1969), other rewards, vicarious and self-rewards, are also possible.

External Consequences. These rewards or punishments are defined as the valued or aversive symbolic and material objects and behavior received from an external source following a behavior. While learning experiments with animals have demonstrated the efficacy of material external rewards, e.g., food, water, for controlling behavior, Harris, Wolf and Baer (1964) present several cases demonstrating the efficacy of symbolic, external rewards in regulating children's behavior. Premack (1965) demonstrated the regulatory efficacy of making high probability behavior contingent upon low probability behavior as when a teacher allows pupils to play a game if and only if they complete
their school work.

Bandura (1977) asserts that not only external, social symbolic rewards like expressions of approval can be reinforcing in themselves, but they may also be predictive of other rewards to be obtained, either material, symbolic, or behavioral. Thus, a worker may know that if his boss approves his work enough times, then the approval is predictive of a future salary raise. Bandura hypothesizes that as the number of possible rewarding or punishing consequences of a behavior increases, the greater the influence those predictive consequences have upon behavior.

The frequency with which rewards need to be applied is asserted by Bandura to be a function of the person's capability to successfully perform the prior behavior and the person's cognitive developmental level. Performing new, complex behaviors may require application of frequent rewards, especially if no observational learning has occurred. Second, as the symbolic skills develop so that one cognitively links behavior with the reward, the reward has incentive value. As incentive value increases, the same level of behavior is hypothesized to require fewer rewards over a unit of time. Thus, the symbolic skill of the person and the incentive value of rewards permit the administration of rewards in social exchanges to occur less frequently. This is one explanation for the high regulatory efficiency attained
by variable ratio reward schedules.

While external rewards administered infrequently may not adversely affect performance, there are some social advantages to regular, even if infrequent, reward schedules. First, the environment is made more stable and predictable (Bales, 1950) and better synchronization can be attained between the reward allocation and the recipient (Thibaut and Kelly, 1959). The result is to reduce frustration and aggressive behavior when expected rewards are not obtained and to make reward expectations more realistic and satisfying (Porter and Stars, 1973).

Vicarious Consequences. A vicarious reward consequence is defined as observed material, symbolic, and behavioral consequences of a behavior that increase the tendency of the observer to behave in a similar way (Bandura, 1977, p. 117). "Vicarious punishment" is observed aversive consequences that tend to inhibit behavior. Observation of others' behavior consequences in a social context suggest the relational characteristic of vicarious reinforcement between the observed and the observer. Thus, the same outcomes can have either a punishing or rewarding function depending upon the"...type, frequency, and generosity with which behavior was previously reinforced" either directly or vicariously (p. 118). Bachevallel (1959, 1960) showed that persons interpret a consequence as rewarding if it occurs in a
non-reward or punishment context and as punishing if perceived in a context with more rewarding alternatives. While observed consequences may or may not be perceived as rewarding by the observer depending on other alternatives, observed consequences also permit judgments to be made by the observer of the equitability of reward distribution in a social context.

**Reward Equitability.** This construct represents the standard the observer uses to judge the fairness of the distribution of rewards to others in contrast to himself. Thus, a reward may or may not be rewarding depending on the discrepancy between what others are receiving in relation to what the observer is receiving (Bandura, 1977). When this standard is shared by a group, it becomes a reward distribution norm or "distributive" norm.

In a review of theory and research on distributive norms, Leventhal (1976) discussed several distributive norms and their relationship to behavior in social contexts where one or a minority has greater power over the administration of rewards and punishments than others, e.g., a teacher of a group of pupils. One distributive norm, the equity norm, is the shared belief that rewards should be differentially administered according to performance differences. Thus, those who perform well would receive more rewards than those who perform poorly. When rewards are allocated according
to this norm, productivity of all tends to be maximized (Barnstein, 1969; Collins and Guetzkow, 1964; Lawler, 1971; Steiner, 1972). The less productive members have been observed to change their behavior to obtain greater rewards (Kelly, Thibaut, Radloff, and Mundy, 1962), terminate their membership in the group (Lawler, 1971; Thibaut and Kelly, 1959), attempt to alter or disrupt the behavior of more productive others to make them less productive, e.g., the "rate buster" (Leventhal and Michaels, 1969), or compare themselves to someone with whom the discrepancy between productivity and reward is not as great (Patchen, 1961). Which method(s) is (are) used depends upon which are possible and which will have the greatest possibility to maximize rewards at the lowest cost (Adams, 1965). However, a necessary condition for the equitable norm to affect performance is the belief by participants based on their observations that rewards can be increased by working harder and by improving performance (Porter and Lawler, 1968; Lawler, 1971).

There are demonstrated exceptions that an equitable reward distribution always fosters high productivity. For example, Lawler (1971) and Steiner (1972) demonstrated that equitable distribution can be counterproductive if individual performance is difficult to assess accurately. Miller and Hamblin (1963), Goode (1967), and Goldner (1965) showed
that when performances required cooperation and the available resources or rewards were limited, the competition for rewards and the resultant antagonism and tension can disrupt individual performances, especially if task resources are unequally distributed.

While the participant whose productivity and rewards are comparatively low can attempt changes in the distribution of rewards, the person allocating the rewards can modify the norm, resulting in changed allocations. First, persons controlling external rewards may judge someone's productivity not only in relation to others but also in relation to the person's capability. Studies by Lanzetta and Hannah (1969), Taynor and Deux (1973), and Weiner and Kukla (1972) demonstrated in different social contexts that, when performances are similar, persons with lower ability received more rewards than those with greater ability. Second, the person controlling external rewards may raise or lower his performance expectations for persons of varying capabilities. Thus, a person with lower capability is not expected to perform at the same level as the person with greater capability, but the more the person with lower capability performs to his capacity, the more reward he is given (Leventhal and Michaels, 1971; Leventhal and Whiteside, 1973).
Whether or not the person controlling the rewards considers a person's capabilities depends in part upon whether or not he wants to maximally motivate all participants. If not, then studies by Kaplan and Swant (1973), Rest, Nierenberg, Weiner, and Heckhausen (1973), and Weiner and Kukla (1970) suggest that rewards are allocated on the basis of absolute differences in performance without consideration for differing capabilities. The risk to the person allocating rewards is that those with low rewards may engage in aggressive, disruptive behavior out of frustration. Sometimes, persons allocating rewards attempt to "buy off" those who have high disruptive potential by giving high, unearned rewards to them (Honnerstein and Honnerstein, 1972). Thus, the potential to disrupt the group is a cost that can be bartered for rewards unrelated to performance when performance expectations and rewards are not adjusted for differing capabilities.

When allocated rewards are unrelated to performance, an equality allocation norm is evident. Equal distribution of rewards regardless of differences in performance tends to maximize group solidarity and harmony (Bales, 1950; Deutsch, 1953; Julian and Percy, 1967; and Smith and Cook, 1973). A person who allocates rewards may adopt such a norm if he believes it helps solve a group's socio-emotional problems (Collins and Geutzkow, 1964). To the degree that
socio-emotional aspects of group life are recognized and valued in addition to task performance, both equity and equality norms will be manifested (Leventhal, Michaels, and Sanford, 1972).

The discussion suggests that the amount of external and vicarious reinforcement one obtains is, in part, the result of the reward allocation norms adhered to by those responsible for doing such, while the degree to which one is satisfied with the distribution of the rewards is the result of what one expects to get, what others are getting, and the reward alternatives that are available. However, the relationship between the amount of reward and satisfaction is reciprocal since satisfaction based on what others are receiving and have received is the result of the particular type of allocation norm in use.

While external and vicarious reinforcement are two different types, they do influence behavior in similar ways. They are differentiated more in the way in which they are administered. Bandura (1977) summarizes their commonality in this way:

Reinforcement conveys information to performers about the types of responses that are appropriate, selective reinforcement directs performers' attention to environmental cues that signify the probable consequences of various behaviors, previously experienced outcomes create expectations that motivate actions designed to secure desired rewards and to avoid painful outcomes; punishing experiences can render persons, places, and things threatening and inhibit responsiveness; repeated
successes and failures can alter peoples' self-evaluations in ways that affect their determination and willingness to engage in conduct that is discrepant with their self-attitudes, and finally, the treatment one receives can alter the effectiveness of those who exercise influence by creating attraction or antipathy toward them (p. 128).

Bandura's quote nicely summarizes the ways in which the reward/cost exchange affects behavior and cognition which, in turn, affects future reward/cost exchanges. The construct of reward allocation norms provides insight into how those controlling the reward/cost exchange can affect behavior by the ways rewards are allocated. According to Bandura, however, persons are not totally dependent upon others for reinforcement. In fact, he argues that behavior is often sustained through self-reinforcement.

**Self-Consequence.** This construct refers to the process by which "individuals maintain their own behavior by rewarding themselves with rewards they control whenever they attain self-prescribed standards" (Bandura, 1977, p. 130). Self-punishment is the self-administration of aversive consequences for failing to attain self-prescribed standards. This implies that behavior performed independently can be maintained by the expectation of obtaining future external or vicarious rewards, by periodic rewards self-administered, or by both means.

The component processes of self-reinforcement are three. The first is performance which can be described on a variety of evaluative dimensions, e.g., quality, rate, quantity,
originality, etc. Second, the performance is self-judged on the basis of standards. These standards can be learned from valued models, learned through external reinforcers, or they can be referentially adopted, that is, behavior compared to some other behavioral reference.

Three types of referential standards are possible. "Normative reference" standards refer to the comparison of self to some representative group for a particular behavior. "Social reference" standards refer to the comparison of self to others in the same social context. Thus, performance judgements can vary greatly depending on the performance level of the group in which one finds himself. "Personal reference" standards refers to those judgments of present behavior with previous self-behavior. Even if a person judges his behavior as meeting or exceeding a particular standard, the reward value of the accomplishment is a function of the value the behavior has to the person and the degree to which the success can be ascribed to his own effort and ability. For example, achieving a self-prescribed standard on a mathematics paper may not be self-rewarding if the pupil feels he received too much help from the teacher.

As a third component process, self-appraisals of behavior establish the possibility of self-produced consequences of a symbolic, material, or behavioral nature. Expressions of self-pride or self-criticism are symbolic
consequences, while awarding oneself food, money, time off, etc. are material consequences. Engaging in games or other pleasant activities are behavioral consequences. As with external reinforcement, self-reinforcement has a motivating function. Studies by Bolstad and Johnson (1972), Glynn (1970), and McLaughlin and Malaby (1974) demonstrated that behavior can be maintained on its own over long periods of time just as well as when external incentives are applied.

From the standpoint of Bandura's social learning theory, his analysis of the regulation of behavior suggests an analytic scheme of the operative rewards and punishments in any social context. Many of these analytic dimensions can be cross-classified with other dimensions. Thus, an analytic matrix can be created that consists of major dimensions and two or more subdimensions within each major dimension. All major dimensions and their subdimensions cross with all the major dimensions and their subdimensions. Such an analytic scheme has both descriptive and theoretical value. Its descriptive value derives from its potential to specify the types of rewards and punishments operative in a social context. Its theoretical value derives from its potential as a starting point for a theoretical analysis of social behavior. Since the matrix is six-dimensional, it cannot be displayed in a geometric figure. Figure 1 lists the dimensions and their subdimensions.
Figure 1. Dimensions and subdimensions of reinforcement analytic scheme.

Theoretically, an instance of a reward would be located in a cell defined by the intersection of the applicable subdimension of each major dimension. The loading of these cells would be a conceptual and figurative representation of the operative reward structure. It is argued that once the reward and/or punishment structure has been described a theoretical explanation can be developed of the reward/cost exchanges that are operating.

The application of this analytic scheme to the classroom would probably result in an explanation of pupil task engagement that stressed the external, vicarious, and self-consequences obtained by pupils. Classrooms in which the reward consequences are maximized would probably evidence high rates of pupil task engagement.
Case 3: Milgram's Theory of Obedience

In Case 3, the pupil engaged in the activity because he was told to by the teacher even though he preferred not to. In order to further differentiate Case 3 from Case 2, the assumption should be made that the costs of engaging in the activity are much greater than the reward for the pupil. How is the pupils' task engagement to be explained? Milgram's pioneering work (1969) on obedience to malevolent authority provides an explanation.

Milgram was interested in identifying the antecedent and binding conditions that both turn and maintain an autonomous individual into an agent of an authority, especially when the authority requests the person to act contrary to common, internalized values. Before summarizing these antecedent and binding conditions for becoming and remaining an authority's agent, both the constructs "agentic shift" and "obedience" need to be defined.

The agentic shift represents the physiological and psychological changes that occur in an individual when that person enters into a relationship with someone of greater authority. Milgram (1969) characterizes the shift this way:

The critical shift in functioning is reflected in an alteration of attitude. Specifically, the person entering an authority system no longer views himself as acting out of his own purpose but rather comes to see himself as an agent for executing the wishes of another person. . . . In this condition the individual no longer views himself as responsible for his own actions but
defines himself as an instrument for carrying out the wishes of others (p. 133).

"Obedience" is behavior in compliance to the command of someone with greater authority. It is distinguished from conformity in that conformity is imitative behavior to others of equal authority status. Authority requires a hierarchical structure.

Milgram cites several antecedent conditions to this shift. To summarize and generalize Milgram's analyses, he states that each individual has a history starting at birth of learning to survive in structures of authority. Such learning implies being rewarded for compliance and punished for disobedience. For example, the family inculcates a respect for and compliance to adult authority. While moral beliefs are learned that lay the groundwork for later autonomous, moral action, they are often learned in the context of at least an implicit command to obey the parents' moral injunction. Thus, when a parent says "Don't hit smaller kids" to a child, the parent is communicating a moral belief as well as an implicit command to obey the parent.

Another significant authority structure in Milgram's view is the school where the child learns of the hierarchical nature of authority in an institution, i.e., the teacher obeys the principal and the pupils obey the teacher and principal. Additionally, obedience behavior continues to be shaped by the application of rewards and punishment. The
result of these learning experiences in these and other authority structures is the eventual internalization of a generalized norm that you do what you are told by someone with greater authority. Milgram is not clear when such internalization occurs. The work of Kohlberg (1963) and of Milgram, Atkinson, and Atkinson (1971) suggests that pupils of ages 9 and 10 are likely to have internalized that social role as part of achieving the conventional level of moral development. Thus, in this study, it will be assumed that these pupils have internalized this role.

In addition to these developmental antecedent conditions, there are several immediate antecedent conditions to the agentic shift cited by Milgram. First, the person expects and must perceive the existence of a legitimate authority in a particular social context. Second, the person must define the authority as relevant to the role requirements the person takes on in that context. Third, how the person defines his presence in the social situation is important. If the person defines himself as being there out of free choice, then commitment and obligation develop and play a role as a binding factor. If the person defines himself as being there by force, then compliance occurs but surveillance becomes an important binding factor.

A fourth immediate antecedent condition is that the person must perceive a link between the role of the person with
greater authority and the commands given. Thus, a policeman probably would not get compliance to his command to kiss a girl since that command would normally be out of his role definition. Fifth, authority is supported by a value system that is broadly accepted. For example, the authority of the teacher is supported by the broadly accepted beliefs that learning is important and schools are a good place to learn. Finally, the utilization of commands by the person with greater authority is the required stimulus that precedes obedient behavior. Milgram argues that a person may be in the agentic state but not behaving obediently since no command has been given. The command communicates two messages at least. It specifies the behaviors to be completed, and it communicates the imperative that the command be carried out.

Once the command is given and the person is behaving in compliance to it, one has to ask why compliance continues. Milgram asserts that several factors bind the subject to obedience to the authority's command. First, he asserts that each social context is held together by a consensual definition of the situation which each participant respects so as to "avoid conflict, embarrassment, and awkward disruption of social exchange" (p. 152). Thus, for example, to disobey the experimenter in an experimental context would be "to reject his claim to competence and authority" which would be
a severe impropriety (p. 150). This consensual definition is not concerned with "the content of what transpires from one person to the next, but rather with the maintenance of the structural relations between them" (p. 152). He asserts that if the relations are hierarchical, then an attempt to alter the defined structure such as by defiance would result in "anxiety, shame, embarrassment, and diminished feelings of self-worth" (p. 152).

A second binding force is anxiety which he defines as the diffuse apprehension created in the subject when contemplating defiance of the authority. Such defiance would be a violation of a basic social norm--the respect for authority. Continuing to obey is presumed to reduce the anxiety created by thoughts of defying the authority. For those not contemplating defiance, it is not a source of anxiety.

Milgram denies that the binding factors represent a rational exchange theory calculus (see p. 148). He cites as evidence the fact that even though many subjects communicated their decision that they should not give more shocks, many were unable to act upon the decision and continued to obey. In defense of an exchange theory interpretation, this may only represent the momentary ambivalence experienced by the subject weighing the rewards and costs of upholding the norm of respect for authority with the reward and costs of upholding the norm of doing no harm to others. While in many
instances, subjects' behaviors belie their words, this could be interpreted as the momentary resolution of the ambivalence. That the decision is alterable is evidenced by the fact that at least slightly more than a third of the subjects in all variations of the experiment disobeyed the authority before reaching the end.

Given the theory of the agentic shift, the answer to why the pupil complied to the request of the teacher would be that the pupil underwent a psychological transformation that made him an agent of the teacher's authority. As to why the pupil persists as long as he does, Milgram would suggest that social binding forces maintain his behavior.

As with Case 2, this explanation is sufficiently general that it could be applied to other social contexts. Again, one must examine the contextual characteristics of the classroom if one is to understand why pupils in a particular class obeyed the teacher. Specifically, some of the questions one would want answered are:

1. Who has/have the greatest authority?
2. How does the authority communicate commands?
3. How does the teacher make her authority relevant to the pupil's role?
4. Does the pupil see himself there by force or free choice?
5. Are the teacher's commands role appropriate?
6. How does the authority monitor pupil compliance?
7. What are the consensual definitions that bind the pupil to compliance?
8. What rewards and punishments are utilized to maintain compliance?

Concluding Remarks

While a complete comparative analysis of the three theoretical perspectives will not be undertaken, some discussion of the commonalities of the theories would be useful in order to better focus the analysis of pupil task behavior in the classroom in the next chapter. Milgram's construct of the "agentic shift" is an especially intriguing one, not only because of the moral issues it raises about schooling processes but also because of the research challenge to try to document such a shift in today's schools.

Even if one assumed that the agentic shift construct had validity for pupils in today's schools, a question needs to be asked about social processes maintaining pupils in that state. Are there more generic theoretical constructs that can be applied to Milgram's binding factors? It seems, in fact, that there may be several of them. For example, Milgram's consensual definition binding factor, although a phenomenological state, lends itself to an exchange theory explanation. The possible costs of defying the authority--shame, disapproval--and the reward for
complying—approval, being a team player, serving humanity through scientific study—are greater than the rewards for defiance for many of his subjects. Another binding force, anxiety, also theoretically represents a high cost of defiance that would make defiance less likely when contrasted with the rewards for obedience. While this interpretation is speculative, it does suggest the possibility that while exchange theory may not be very useful for explaining the agentic shift, it is potentially useful for explaining continued compliance, but Milgram's theory of obedience is not useful for explaining social behavior in social systems not characterized by hierarchical authority. It is suggested, therefore, that Homans' constructs and propositions explain a wider range of phenomena.

The same issue can be raised with a comparison of Bandura's and Homans' theories. Both theories have a strong behaviorist orientation. However, they do not restrict their explanations to just descriptions of behavior. In Homans' theory and, especially Bandura's theory, cognition, i.e., the capability to symbolically represent experience, to think and to imagine, is a central construct in explaining the regulatory processes of behavior. It is Bandura's view that rewarding and punishing consequences in conjunction with cognitive processes are the theoretical components regulating behavior, i.e., maintaining or modifying it or
changing it altogether. Further, while Homans' theorizes that behavior is regulated by a conscious or unconscious calculus between competing activities, each with externally applied rewarding and punishing consequences, Bandura, while not denying this position, takes the analysis of the regulatory processes further by asserting that consequences regulate behavior through their informative, incentive, and reinforcement functions.

Bandura's analysis of reinforcement suggests several fundamental characteristics that can be used to analyze the response contingencies operating in any social context. Such knowledge is theoretically useful, for while Homans' social exchange theory predicts that people will engage in activities that maximize their profits, Bandura's social learning theory greatly expands the meaning of the reward construct by describing the functions and types of rewards and by detailing how cognition functions as a critical aspect of the reinforcement process. By expanding the theoretical meaning of the reward construct, social exchange theory propositions can be expanded so that exchange theory explanations are possible for solitary behavior that is not externally rewarded. Thus, a moderate integration of the two theoretical positions is proposed. This leads to the revision of many of Homans' propositions.
First, Homans' stimulus proposition needs to be expanded to include vicarious and self-reinforcement as consequences that can affect the frequency of preceding behavior. Additionally, Bandura's motivational function and informative function constructs need to be added such that once a contingency relationship has been established and the person knows the relationship, the reward has incentive value that regulates performance. The informative function of reinforcement enables the person to learn the contingent relationship between behavior and consequence. Homans' second proposition, the frequency of reward, is most applicable in Bandura's view to learning new behavior or with performers whose symbolic skills are not fully developed. These rewards can be external, vicarious, or self-administered. Homan's third proposition, the value of the reward, has to be slightly modified to include Bandura's proposition that behavior is often hooked not to just one consequence but to many. This "contingency network" represents the degree to which one reward is predictive of obtaining another. Bandura asserts that the value of a reward is in direct relation to the number of other rewards linked to it. Homans' fourth proposition, satiation, needs to be extended to vicarious and self-reinforcements. Additionally, since behavior may be under the control of two or more of these types of reinforcement and a complex contingency network, it is
hypothesized that the rate of satiation is inversely related to the number of types of reinforcement and the complexity of the contingency network controlling the behavior. Fifth, the scarcity and fatigue propositions need only to be expanded to include all three types of reinforcements. Finally, Homans' frustration-aggression proposition can be further amplified by the work on distributive norms in social contexts in which a minority controls most of the rewards and punishments. Evidence previously cited suggests that the type of norm that is operating has much to do with the degree of frustration experienced by a performer.

This integration of Bandura's consequence constructs with Homans' exchange propositions provides an expanded, comprehensive theoretical framework for explaining the maintenance of pupil substantive task behavior in classrooms. Since most of Milgram's binding factors can be explained in terms of social exchange or social learning theories, it is proposed that the integration of Homans' and Bandura's theories will be the theoretical framework for explaining substantive task behavior. The application and expansion of this framework to the classroom follows in the next chapter.
CHAPTER III
THE CLASSROOM: THEORY AND RESEARCH APPLIED

Chapter 2 outlined three theoretical frameworks that may be useful for understanding the conditions that maintain a pupil on a substantive task. Except for Milgram's obedience theory (1976), Bandura's social learning theory (1977) and Homans' exchange theory (1961) are generalized attempts to explain social behavior in most social contexts. The proposed study is focused on action explaining a type of pupil behavior time spent in substantive tasks, occurring in a particular immediate social context, the classroom, that exists in a larger social institution, the school. The dependent variable of this study represents the clock time that pupils spent engaged in substantive tasks. The independent variables are the conditions that occur in the immediate social context, the classroom, that are hypothesized to affect the amount of time a pupil spends in substantive tasks. These will be specified in this chapter within the integrated theoretical frameworks of social learning theory and exchange theory.
The central theoretical propositions expressed in these two frameworks were that: (a) persons tend to engage in social behavior that maximizes their expected and/or received rewards while minimizing their expected and/or received costs; (b) rewards and costs may take the form of material objects, meaningful symbols, or other behavior; (c) a person obtains a reward or cost externally, vicariously, or by self-award. What these propositions suggest is that a person remains engaged in sequences of goal-directed behavior, i.e., a task, or a sequence of tasks (an activity), because of the expected and/or received rewards from external, vicarious, or self sources which are greater than the costs expected and/or received from those sources. An example may make these propositions concrete.

Many people play bridge once a week as part of an organized club. John Average, one of the members, plays every Wednesday with the same group of 20 members. Why does he play every week? One explanation suggested by the previous propositions would be that the valued rewards of the activity are greater than the costs. While it would be possible but not fruitful to list all the rewards and costs obtained by Mr. Average, some of the more common ones could be stated. First, based on previous experience Mr. Average expects to win a few more games than he loses; he expects to hear some titillating gossip about which he is always
curious, he expects to eat some good, sweet desserts, and he expects that he has a better than 50% chance of winning one of the three prizes in the drawing held every week at the end of playing bridge. These reward expectancies are motivational incentives that Mr. Average cognitively holds that function to maintain his bridge playing behavior. In addition to these expectancies, Mr. Average does win more than half his games, earning him praise from his friends for his playing skill as well as self-praise for the way he fought back in the last games to win. As usual, he ate some sweet desserts which satisfied his craving for sugar, and he heard some scandalous gossip that satisfied his curiosity about one of his neighbors. However, he did not win a prize—a cost, and the time spent playing bridge could have been spent watching the reruns of a football game he missed—another cost. Even so, Mr. Average will be back next week for a pleasant evening of fun, relaxation, and more praise, more gossip, more sugar, and maybe a prize.

While the theoretical interpretation of this example may be superficial, it is suggestive of the type of explanations of behavior derived from Homans' and Bandura's theories. It is this type of theoretical analysis that will be used to explain pupil engagement in substantive tasks. Before this can be done, some description of the nature of classrooms and schools will be summarized.
Classrooms in Schools

If questions are to be deduced from the more general theories stated previously, additional discussion of the social characteristics of the school and classrooms needs to be given, and definitions need to be stated. To summarize briefly what has already been said about schools in Chapter Two, they are organizations that display a division of labor to achieve prescribed goals; tasks and socio-emotional norms to control behavior; principal, teacher, and pupil roles that prescribe various leadership and followership behaviors for the accomplishment of the prescribed goals, a hierarchical authority structure with principals with the greatest authority and pupils with the least, and pupils as clients who are forced to attend and have varying performance capabilities and values (Johnson, 1970).

As a publicly supported organization, the school has limited human, time, and material resources. Schools usually can afford to support one teacher per 20 to 30 pupils.

The classroom is conceived as a bounded physical area. In this area, pupils use limited human, material, and temporal resources at the direction or approval of a teacher in a physical and social environment to accomplish educational tasks that have reward and cost consequences.
The school day and year are limited by law, and funds are available to purchase only a limited quantity of instructional materials. The limited resources characteristic is extremely important since it implies the probability that the scarcity proposition operates in schools. That is, if some scarce resource, like teacher approval, is highly valued by pupils, its cost to the pupils is high, giving the teacher greater control over the type and quantity of payment.

The principal, teachers, and pupils can expend resources engaging in three types of tasks. The first, substantive tasks, are reward/cost potential behaviors directed at accomplishing one or more of the teacher-approved learning goals, like learning to read. Thus, reading a story in a reading circle is a substantive task since it is directed toward achieving the goal of learning to read. The second, managerial tasks, are reward/cost potential behaviors directed at establishing the conditions so that substantive task behavior can occur. For example, a pupil arranging chairs in a circle prior to the reading group is engaging in a managerial task since he is establishing the physical conditions for the substantive task behavior to occur. Third, non-functional tasks are all other purposeful, reward/cost behaviors. For example, two pupils whispering to each other about what games they will play during recess are
engaging in a non-functional behavior since it has no managerial or substantive purpose. Substantive, managerial, and non-functional time is defined as the clock time an individual spends in those respective tasks.

Theoretical Paradigm

As with the example of Mr. Average, the card player, pupils are presumed to engage in a variety of tasks in classrooms with reward and cost consequences that regulate their behavior. A simplified theoretical paradigm is shown in Figure 2.

Figure 2. A simplified classroom task reward/cost paradigm.

Figure 2 suggests that a pupil engages in a task utilizing resources. As a result of prior experience, that task has an incentive value which regulates that task behavior prior to any consequences. For example, a pupil does a math paper, in part, because of an expected satisfactory grade given upon its completion as well as the actual grade received. All tasks require resources. The math task requires paper and pencil materials, pupil attending, and time for completing the task. 
Resources also can have reward and cost potential. For example, the use of a calculator may be rewarding because it reduces the need for novel stimulation. The cost potential of a resource is apparent if it inhibits or makes the completion of a task difficult, thereby jeopardizing receipt of an expected reward. Resources are costly if they are consumed, making participation in other profitable tasks difficult or impossible.

The result of any task is the administration of material, symbolic, and behavioral rewards and costs from the teacher, other pupils, and/or the pupil himself. It is quite possible that consequences from these sources are in conflict. For example, upon completion of a task a pupil may receive approval from the teacher for his superior performance, disapproval from his peers because he is a "curve-buster", and either approval or disapproval from himself depending upon whether his performance standard is similar to the teacher's or pupils' standards. The result is that if the pupil determines that the rewards are greater than the costs relative to the profit from other available tasks, then the task is probably continued. If the costs are greater and other more rewarding tasks are available, then a new task is taken up, assuming that the new task is a viable option.
If one could assume that the reward and cost consequences of a task remained the same in type, amount, and value over time, then it would be a fairly simple matter to explain and predict pupil task behavior by determining the salient rewards and costs for each task. Those with high profit could be predicted to engage pupils more often for longer time than those with less or no profit. On the contrary, it cannot be assumed that the rewards and costs of a task remain the same over time.

Homans' propositions suggest that changes in needs, values, levels of fatigue and satiation, and the frequency of reward are theoretically presumed to be related to changes in the motivational and reinforcing consequences of a task. In addition, environmental conditions such as resource scarcity, the availability of other profitable tasks, and the external reward schedule are theoretically presumed to be related to changes in the motivational and reinforcing consequences of a task. These and other considerations are potential limiting conditions that are presumed to affect the regulatory efficacy of external, vicarious, and self-consequences on behavior since they would alter the pupils' expectations for obtaining a reward and/or they would alter the probability that an expected consequence will occur. Thus, to explain pupil engagement in a task at any one moment in time requires the specification
of salient motivational expectancies and reward/cost consequences for that task and the potential profit of all other competing tasks. To explain continued pupil engagement in a task or a class of similar tasks requires an analysis of the aforementioned salient regulatory consequences and the dynamic interplay between these consequences and the limiting conditions that affect the regulatory efficacy of the consequences. Separate sections will analyze the consequences of pupil tasks in classrooms and the classroom limiting conditions that are presumed to alter the efficacy of these consequences. No attempt will be made to develop a complex theory in which relationships are hypothesized between limiting conditions themselves and between limiting conditions and regulatory consequences. All that is proposed is a specification of theoretical constructs that presumably are related to maintaining pupils on substantive tasks.

**Task Consequences**

It will be recalled that Homans (1966) attempts to explain dyadic social behavior by developing a reward/cost exchange hypothesis in which psychological and/or material rewards and costs are exchanged. As long as rewards remain high relative to costs (profit) and high in comparison to other possible tasks, the behavior will tend to continue. The reward/cost exchange is mediated by the frequency of received rewards and costs, the value of the rewards and
costs, the scarcity of rewards, reward satiation, and physical and psychological fatigue. Each of the mediating conditions represents theoretical propositions that were given in Chapter Two.

When these propositions are applied to the classroom, teachers and pupils are conceived as engaged in tasks in which rewards and costs are exchanged. It is assumed that the teacher has the greatest control over the most human, material, and time resources that can function as rewards and costs in an exchange. It is also assumed that teachers structure these resources in such a way so as to maximize the profit for pupil behavior desired by the teacher (substantive task behavior). Thus, analyzing what resources teachers use and how they use them to maximize pupils' profit for substantive task behavior while minimizing it for non-substantive task behavior is the central question of the study. However, this analysis must go beyond Homans' theory because of its limitations.

Homans limits his theory to dyadic interactions. In the classroom pupils work as a whole class or in groups, too. Homans also limits his conception of rewards or costs to those things or activities frequently, if not immediately, received from the task. However, in the classroom pupils remain engaged in substantive tasks with very infrequently obtained rewards. Finally, since Homans is not concerned
with explaining solitary behavior, other theoretical constructs are needed to explain the continuation of pupils' substantive behavior when they are working independently.

Bandura's social learning theory (1977) addresses these limitations and it expands Homans' conception of reward and cost. Once complex, rule-governed behavior is learned through conditioning and observational modeling processes, he hypothesizes that cognitive processes in conjunction with material and symbolic processes regulate behavior. In this study, the assumption is made that most behavior patterns exhibited by pupils are well learned, except for the small discrete behaviors related to learning goals.

Rewarding and punishing consequences (Homans' costs) have three functions in Bandura's theory. The first, the informational function, involves obtaining information through observation or direct experience about behaviors that are rewarded or punished. These provisional hypotheses are reality-tested and modified on the basis of experience. The second, the incentive function, is the result of repeated observed or experienced occurrences of rewarding or punishing consequences which creates expectancies for future, valued rewards or punishments if the appropriate behavior is demonstrated. The cognitive representation of these rewards or punishment expectancies is termed "incentives" that function to motivate behavior, often
without frequent application of external consequences. The third function, reinforcement, is the application of a reward or punishment which functions to maintain the present behavior or increase the probability of its occurrence in the future, in part because it maintains both the provisional hypotheses and the incentive value of the consequence.

Bandura also posits several types of rewarding and punishing consequences. The first type is material and symbolic consequences that one awards to himself, like self-criticism or self-praise. The second type is the material and symbolic consequences that are vicariously experienced through observation, as when the teacher publicly compliments Johnny for being so quiet and Mary vicariously shares the compliment because she is being quiet, too. The third type, external, is the material and symbolic consequences that someone or something else awards to another, as when the teacher criticizes Billy for hitting or gives a gold star to Mary for her excellent work. Besides material and symbolic consequences, there is another suggested by Premack (1965). His work suggests that high probability activities, like playing games, can motivate low probability activities, like studying, if the former are made contingent upon the completion of the latter. A successful classroom application of Premack's principle has been demonstrated by Homme,
DeBoca, Devine, Steinhorst, and Rickert (1963). Presumably, high reward activities are, like material and symbolic consequences, ones that can be administered to oneself, by another, or experienced vicariously.

**Task Consequences--Classroom Application**

While it is assumed that the teacher has the greatest control over potentially rewarding or punishing resources and has the legitimate authority to use them, it is also reasonable to assume that other pupils are a source of vicarious, material, or activity consequences. For example, pupil A tells pupil B to finish his worksheet so that they can play paper football, illustrating pupil control of a high reward activity consequence that motivates pupil B to complete his work. Thus, pupils can control the consequences received by one or a subset of pupils in any class. Besides the teacher and other pupils, the individual pupil is able to create reinforcing consequences of his own behavior through self-reward or self-punishment.

As defined in Chapter One, three types of tasks having reward/cost consequence potential are engaged in by pupils--substantive, managerial, and non-functional. Given this classification of pupil tasks, it follows that self, vicarious, and external consequences, each of which would be material, symbolic, or activity, can regulate the occurrence of each of these types of tasks. The possibilities are
displayed in Figure 3.

Two other characteristics of consequences related to the way they are administered need to be discussed. First, an external agent like the teacher or pupil can award a reward or punishment either publicly or privately. A private consequence is one known only to the recipient and the person administering the consequence unless it is a private self-consequence. Teachers do this during private, dyadic conferences or communications. It is likely that private consequences occur most often through self-administered consequences, less often with external consequences, and not at all, by definition, with vicarious consequences. A public self-consequence would occur if a pupil announced to a group of pupils that he was playing the game because he had finished his work. Public external consequences frequently occur in whole class or group contexts when a pupil or teacher praises or criticizes another. Not only is it possible for public and private consequences to occur through self and external means, material, symbolic, and activity consequences can be awarded publicly or privately.

Theoretically, a teacher utilizing mostly public consequences is maximizing the vicarious reinforcement function as well as the informational and incentive functions of the consequence. If the teacher used only private consequences, it would be more difficult for pupils to establish
<table>
<thead>
<tr>
<th>Consequence Type</th>
<th>Task Type</th>
<th>Substantive</th>
<th>Managerial</th>
<th>Non-functional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self</td>
<td>Material</td>
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<td></td>
<td>Symbolic</td>
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<td></td>
<td>Activity</td>
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<tr>
<td>Vicarious</td>
<td>Material</td>
<td></td>
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<tr>
<td></td>
<td>Symbolic</td>
<td></td>
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<td>Activity</td>
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<td>External</td>
<td>Material</td>
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<td></td>
<td>Symbolic</td>
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<td></td>
<td>Activity</td>
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</tbody>
</table>

Figure 3. Cross-classification of consequence type by task type.
provisional hypotheses about the consequences of different behavior and, therefore, to establish motivational incentives. It would also be less likely that the pupil receiving the consequence would receive more from pupils since they would not know what and why the teacher had administered a consequence. On the other hand, any additional costs would be minimized for the same reason, and private consequences may reduce the frustration and aggressive behaviors of pupils receiving fewer rewards than expected (Leventhal, Michaels, and Sanford, 1972).

The second characteristic related to the administration of a consequence is its contingency status. A consequence in a classroom is conceived to be contingent or non-contingent. A contingent consequence is one in which it is known to the receiver of the consequence that the occurrence of a prior behavior is a sufficient condition for the occurrence of a consequence. This is known indirectly because of a high regularity and contextual linkage between behavior and consequence occurrences, or it is known directly by being told in some form of a conditional statement. An example of the former is the teacher's appraisals of pupils' responses to questions during a discussion. The regularity of the response-consequence pattern is such that an observer inductively concludes that the appraisals are the result of the prior pupil statements. An example of the latter would
be a teacher telling a pupil that if he doesn't get quiet, he will be dismissed, and then, he is. The teacher's statement establishes the conditional relationship between the response and consequence.

While a non-contingent consequence appears to be a contradiction, it is not in the sense that it is an unexpected consequence for prior task or tasks that occurred. For example, it is not uncommon for a teacher to occasionally decide that the class of pupils could play a game of their choice during the last 15 minutes of the day as a reward for their good behavior but not tell them until just before the end of the day. To an observer or pupil, the activity would appear to be rewarding to the pupils, but since it occurred unexpectedly and with or without an explanation by the teacher of the relationship of the game to prior behavior, it would be non-contingent reward consequence.

The theoretical importance of contingent consequences is that besides reducing prior task fatigue and any prior reward satiation, the regularity and known conditional nature of response and consequence increase the probability that accurate provisional hypotheses and stable incentives develop and are maintained over time by regular reinforcement. Non-contingent consequences, on the other hand, may reduce task fatigue and prior reward satiation, as well as
be reinforcing for the immediate previous task, but it would be a very inefficient way of developing provisional hypotheses and incentives. Contingent and non-contingent consequences seem most characteristic of external and vicarious rewards and least characteristic of self-rewards since it is difficult to conceive of examples in which a psychologically normal person would reward or punish himself without knowing the prior behavior upon which the consequence was contingent.

**Research on Classroom Consequences**

While Homans' constructs and many of Bandura's have not received widespread attention in the research literature on classroom management or classroom processes, there is research literature on the effects of various types of consequences operating in the classroom. Most of the research seems to come out of the behavior analysis and modification tradition. The literature reviewed here will document the regulatory efficacy of self, vicarious, and external consequences that take the material, symbolic, and activity forms administered publicly or privately and contingently or non-contingently. Where studies showed the same results, only illustrative studies will be cited.

**Reward/Cost Exchange.** Homans' hypothesizes that social interaction continues as long as rewards exceed costs and terminates when costs exceed rewards. Hart, Reynolds, Baer,
Browley, and Harris (1968) demonstrated this in a study of a child of five who displayed negative social behaviors as refusal to play, taunts, competitive statements, and foul language. Presumably because of these multiple aversive characteristics (potential costs), pupils avoid her and the teacher judged her to be obnoxious. By making teacher attention both contingent upon positive social behavior and non-contingent, the pupil's cooperative behavior increased most under the contingent teacher attention condition. As the pupil displayed more cooperative behavior, contacts from other pupils increased, implying that the contingent teacher attention treatment reduced the costs other pupils encountered and, at the same time, increased the rewards for interacting with the pupil in play activities. The study also demonstrates the relative superiority of contingent, external, symbolic rewards (teacher attention) to non-contingent, external, symbolic rewards.

**External Consequences.** The efficacy of external, symbolic rewards for modifying pupil behavior has been demonstrated in many studies. Allen, Hart, Buell, Harris, and Wolf (1964) demonstrated that teacher attention as an external, symbolic reward was successful in modifying a pupil's isolate behavior to more social behavior. Similar studies by Allen, Turner, and Everett (1970) and Pinkston, Reese, LeBlanc, and Baer (1973) demonstrated that when
teacher attention became a consequence of desirable preschool aged pupil behavior, aggressive behavior decreased and cooperative behavior increased.

Besides teacher attention, the use of teacher praise as an external, symbolic reward has also been studied. O'Leary and Becker (1969) studied the relative reward efficacy of praise, ignoring, and reprimands with a class of first graders' disruptive behavior. They found that praise and ignoring reduced the disruptive behavior the most, followed by praise only, and no reduction in disruptive behavior when reprimands were used. Similar results showing the relative reward consequence superiority of praise and ignoring to reprimands were found by McAllister, Stackowaik, Baer, and Conderman (1969) with secondary school students, by Wasik, Senn, Welch, and Cooper (1969) with two second-grade girls, and by Becker, Madsen, Arnold, and Thomas (1967) in an urban elementary school. The Wasik et al. study (1969) also demonstrated the efficacy of rewards and costs from peers since the modification of one of the girl's behavior involved both teacher and pupil praise as well as warnings from pupils when the girl's behavior was too disruptive. The efficacy of peer-controlled consequences was also demonstrated by Schmidt and Ulrich (1969) on the noise level in a fourth-grade class. Threatening gestures and facial expressions by quieter pupils directed toward noisier ones were presumed to
be the costs that modified the behavior of the noisier pupils.

That contingent external rewards are more effective in regulating pupil behavior than non-contingent consequences was shown by Allen et al. (1970), Pinkston et al. (1973), Schutte and Hopkins (1970), and Goetz, Holmberg, and LeBlanc (1975). In this latter study, a non-compliant pre-schooler was treated under three conditions: (a) contingent teacher attention and praise for compliance; (b) non-contingent teacher presence and praise; and (c) contingent teacher presence for non-compliance. The results showed that contingent attention for compliance resulted in variable compliance rates, suggesting that the pupil was not successful in establishing accurate provisional hypotheses about desired behavior.

Several studies have demonstrated the regulatory efficacy of material consequences, i.e., tokens that can be cashed in for other desired objects. Bushell, Wrobell, and Michaels (1968) found that giving tokens for desirable behavior resulted in higher rates of study behavior than giving no tokens or given them non-contingently. Betancourt and Zeiler (1971) found that preferences for non-preferred classroom chores would be altered when tokens were awarded contingently for the non-preferred chores. Studies by Risley and Hart (1968), Chadwick and Day (1970) found that a box of
crayons made contingent upon doing well on a spelling test resulted in improved spelling tests with urban, minority fourth graders. These studies suggest that a variety of material consequences can serve as effective regulators of behavior in young children.

Premack Principle. Besides the work of Homme (1966), other studies have demonstrated the regulatory efficacy of using high probability activities as rewards for low probability activities. Miller and Schneider (1970) found that if pupil access to where were highly desirable activities occurred was made a consequence of improved performance on prerequisite writing skills, the test performance of those pupils was much greater than for a control group. Packard (1970) found that the attention level of pupils in third, fourth, and fifth grades could be increased by making various desirable activities, e.g., being a teacher assistant, using a typewriter, sitting next to a friend, a consequence of attention. Osborne (1969) found that the use of free time activities as an activity reward consequence was successful in lowering the rate of out-of-seat behavior for six deaf pupils aged 11 to 13. Lovitt and Curtiss (1969) conducted an interesting variation in that they studied the relative effectiveness of teacher versus pupil determined requirements for desired activity consequences for a 12-year-old pupil in a behavior disorders class. They found
that pupil determination of the requirements for obtaining the reward resulted in higher classroom substantive behavior than when the teacher determined the requirements. Homme et al. (1963) found that the amount of pupil in-seat behavior could be increased if a more desirable behavior (running around) was made a consequence of the first behavior.

**Public Versus Private Consequences.** Within a group, a public display of a reward consequence has been shown to be effective in modifying behavior and improving performance, presumably because of the additional external, symbolic rewards obtained from other members of the group (Clark and Wolberg, 1969; Marshall, 1969; Schmidt and Ulrich, 1969). Panyon, Boozer, and Morris (1970) found that public display of the frequency with which hospital attendants used operant techniques sharply increased the frequency of use of those techniques over the baseline period when no public display was made. In this case the authors speculated that public display of performance increased expectations of aversive consequences which would be avoided only if their performance improved. In a study of the effectiveness of teacher reprimand behavior, O'Leary and Becker (1968) found that private reprimands (an external, symbolic cost) were more effective in reducing the disruptive behavior of a class of first graders than public reprimands. They speculate that private reprimands are more effective because they do not
bring peer attention to the pupil's behavior which minimize peer reinforcement and because private reprimands may not trigger conditioned emotional reactions to public reprimands. O'Leary, Kaufman, Kass, and Drabman (1970) found the same thing in studying two disruptive pupils in each of five second-grade classes. Private reprimands were more effective in reducing pupil disruptive behavior than public reprimands.

Vicarious Consequences. The use of reward models shown in films has been shown by O'Connor (1969) to be effective for increasing the peer interaction of a sample of isolate pre-school children. The film showed pupils interacting with their peers and being rewarded for it. Bornstein and Quenvillon (1976) found similar results in trying to increase the on-task behavior of three, disruptive four-year-old boys by having the teacher model appropriate behavior and being rewarded for it. After the pupils observed the teacher's behavior and consequences, on-task behavior increased to 70% or higher from a baseline level of 14% or lower. Christie (1975) studied the regulatory efficacy of observed material rewards given to some individual pupils in a class. The results showed that the pupils receiving the rewards increased their amount of desired behavior. Those pupils whose base rates of desired behavior were low increased for a day the amount of desired behavior after
observation and then decreased to their base rate. Finally, pupils whose base rates were high prior to observation remained high following it. A possible explanation is that the observed rewards created an incentive which, when not received, resulted in frustration and a return to the previous levels of aggressive behavior. Broden, Bruce, Mitchell, Carter, and Hall (1970) studied the effects of vicarious reinforcement on two second-grade pupils sitting next to each other. They found that when the teacher rewarded one pupil for desired behavior with teacher attention, the rate of desired behavior in the other pupil increased, too.

**Self-Consequences.** Material consequences that are self-controlled have been demonstrated by Bandura and Perloff (1967) to have regulatory efficacy. A group of children aged 7 to 10 selected their own performance standards and rewarded themselves whenever they attained their level. In a second group, a set of performance standards was improved and rewards were externally given. A third, control group performed without rewards. The results showed that both the self-reward and external reward groups were equally efficacious in regulating behavior and that both groups resulted in substantially more responsive behavior than the control condition. Other studies in the classroom have supported Bandura and Perloff’s finding that material self-rewards and
external rewards are equally efficacious in regulating behavior (see Bolstad and Johnson, 1972; Felixbrod and O'Leary, 1973; and McLaughlin and Malaby, 1974).

A necessary condition for self-reward is a self-standard and the capability to assess one's behavior in relation to that standard. Several studies have shown that when pupils are taught to use a self-assessment method, desired behavior increases (Broden, Hall, and Mittus, 1971; Glynn and Thomas, 1974; Santogrossi, O'Leary, Romancyzk, and Kaufman, 1973). As an example, the Glynn and Thomas study (1974) involved nine third-grade pupils on recording whether or not they were on-task whenever they heard a tape-recorded signal. Based on the number of checks they had, they received self-administered material or activity rewards. The combination of self-assessment and self-reward increased on-task behavior by an average 20% over baseline.

An interesting study by McLaughlin and Malaby (1974) on the maintenance of high task completion rates of three sixth-grade pupils demonstrated the relative superiority of self-reward to external rewards for maintaining the high task completion level. During the self-control phase of the study in which pupils completed cards indicating their task progress and then awarded themselves privileges, task completion levels were near 100% and remained that high for the rest of the school year. While the pupils were on a
class-wide token system, task completion levels were low for two pupils and high but variable for one. The authors speculate that the experience with the token system may have been crucial for establishing the incentive expectations that were utilized during the self-reward situation. However, other studies by Glynn (1970), Felixbrod and O'Leary (1973) found no difference in the regulatory efficacy of self-consequences compared to external consequences.

The research literature summarized suggests that external, vicarious, and self-consequences are efficacious regulators of pupil behavior in classrooms, that external, symbolic, and activity consequences have regulatory efficacy, that contingent consequences have more regulatory power than non-contingent consequences, and that private reprimands are more successful than public ones for reducing undesired behavior. In general, the research is supportive of the validity of the theoretical constructs previously defined, thus justifying their use as theoretical constructs guiding the analysis of the data. These constructs and their presumed relationship with pupil substantive task behavior are stated in question form in the next section.

Research Questions--Regulatory Consequences

While the cross-classification of task type by consequence type suggests numerous research questions, only a
very limited set will be stated because of the type of data collected and the way the data were collected. The fundamental limitations are that simultaneous data were not collected on pupils relative to all possible consequence conditions and that no systematic, experimental variations related to response consequences occurred. A purpose of the study from which the data for this study was obtained was to describe the complexity of the instructional operations of the four classrooms by coding teacher and pupil behavior and by ethnographic description. Chapter Four will discuss the data collection procedures. Given these limitations, only those questions will be stated for which data were collected in one or more of the data sets. Questions are stated, rather than hypotheses, to underscore the fact that theory is not being tested, but it is being used to focus the data analysis and to develop an explanation of pupil substantive task time.

Q1: How are external teacher rewards and costs related to pupil substantive tasks behavior during Open Time?

Q2: How are public and private rewards and costs related to pupil substantive tasks behavior during Open Time?

Q3: How are contingent reward and cost consequence related to pupil substantive task behavior during Open Time?
Consequence Limiting Conditions

A consequence limiting condition is defined as any characteristic of the task, person, or environment that affects the regulatory efficacy of external, vicarious, or self-consequences either because they alter the pupil's expectations for obtaining a reward or cost or because they alter the probability that an expected consequence will occur. Limiting conditions represent the processes, procedures and characteristics that link the consequence conditions with substantive task time. They were suggested by Bandura (1969) in his discussion of the variable regulatory efficacy of punishing consequences when he wrote:

In addition to the reward contingencies maintaining the punished behavior, the effects of punishment may vary considerably as a function of many other variables. . . including the intensity, duration, frequency, and distribution of aversive consequences, their temporal relation to behavior to be modified, the strength of punished responses, the availability of alternative behavior patterns that are positively reinforceable, the presence of discriminative stimuli that signify the probability that a given performance will result in adverse consequences, the level of instigation to perform the negatively sanctioned behavior, and the characteristics of punishing agents (p. 295).

Some concrete examples may help clarify this important theoretical construct.

It is not uncommon for teachers to use games as an activity reward for completion of a substantive task. If a teacher has an insufficient amount of game materials for all deserving pupils, then the limited amount of game materials
can be a limiting condition in both ways. Suppose the teacher has only one game that can involve three pupils at a time. If a class is working on a task and three pupils finish and start playing the game, then the incentive value of the game is greatly diminished since the game resources are in use and may remain in use by these three until the end of the period. That the first three pupils may stop playing before the end of the period may be a condition that keeps the incentive value from being reduced to zero for a pupil still completing a task. If that pupil does finish the task and the others are still playing the game, then the limited resources reduce the probability of actual participation in the game to zero at that time. Thus, the regulatory efficacy of the game used as an activity reward is limited by the insufficient amount of materials relative to demand for them.

In another class, a teacher may assign substantive tasks to be completed in an established time period, like a day, period, or week. Completion of the tasks is usually followed by teacher praise and a positive note to parents. Based on past experience, these external, symbolic rewards are incentives typically obtained. However, the next week the teacher starts a new science unit with some very complex concepts to be learned. When the pupil judges the work to be more difficult than usual, the incentive value of the rewards is
reduced since the pupil is less sure he will successfully complete the work on time. The reduced incentive value becomes a cost that may increase as the pupil experiences more difficulty with the task. As this cost and others, like fatigue, increase, then engagement in other available higher-reward potential substantive or non-substantive tasks becomes more probable.

Limiting conditions operating in the classroom have three sources: pupil characteristics, task characteristics, and environmental characteristics. Pupil characteristics are defined as any physical or psychological quality specific to an individual which may vary across individuals. For example, intelligence would be a limiting condition specific to a pupil which may also vary across pupils when measured. Task characteristics refer to all qualities related to how tasks are completed that tend to be specific to individual pupils. For example, the task context refers to the particular type of group arrangement, e.g., class group, dyad, independent, that a particular pupil is in while doing a task. Environmental characteristics refer to the common operational conditions under which pupils work to complete tasks. For example, the resource allocation norm refers to the regularized way(s) in which the teacher allocates time, material, and human resources to complete tasks. Figure 4 displays the proposed limiting conditions.
<table>
<thead>
<tr>
<th>Pupil Conditions</th>
<th>Environmental Conditions</th>
<th>Task Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incentive Hierarchy</td>
<td>Resource Allocation Norm</td>
<td>Difficulty</td>
</tr>
<tr>
<td>Cognitive Capability</td>
<td>Resource Material Novelty</td>
<td>Task Structuring</td>
</tr>
<tr>
<td>Self-Evaluative Standard</td>
<td>Resource Material Availability</td>
<td>Task Differentiation</td>
</tr>
<tr>
<td></td>
<td>Resource Material Complexity</td>
<td>Task Feedback</td>
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<td>Consequence Comparison Level</td>
<td>Consequence Contingency Network</td>
<td>Available Alternative Tasks</td>
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<td>Monitoring System</td>
<td>Task Context</td>
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<td>Task Fatigue</td>
<td>Accuracy and Consistency</td>
<td>Task Completion Proximity</td>
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<td>Consequence Satiation</td>
<td>Pupil Movement</td>
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<td>Knowledge of Self-Reinforcement Evaluation Process</td>
<td>Reward Allocation Norm</td>
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<td></td>
<td>Reward Distribution Norm</td>
<td></td>
</tr>
<tr>
<td>Pupil Control</td>
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</tr>
</tbody>
</table>

Figure 4. Consequence Limiting conditions.
The justification for specifying these characteristics as limiting conditions comes from limited research on some of the conditions in educational contexts and other social contexts and from a logical analysis of the necessary conditions for task completion in the classroom context. The sections that follow will define each limiting condition, explain its theoretical importance, and summarize any relevant research. A question will be stated if data from any of the three data sets permit an assessment of it. Otherwise, other studies collecting different data and utilizing different data collection methods will have to be done.

Task Difficulty

Definition. "Task difficulty" is defined as insufficient necessary human, time, and/or material resources needed for the successful completion of a substantive task. It is conceptualized as a multi-dimensional construct consisting of several other limiting conditions, e.g., cognitive capability, resource allocation norms, and resource availability, that all affect the probability that a task will be successfully completed. For example, necessary human resources for successful completion of a mathematics task would include the prerequisite mathematical skills required by the task. Another human resource would be the pupils' knowledge of the managerial requirements of the task, e.g.,
how to obtain and use any curricular materials. These two human resources, among others perhaps, have to be extant in the pupil or available from another source if the task is to be successfully completed.

**Theoretical Importance.** While self or vicarious rewards may be obtained prior to completing a task, most teacher external rewards are contingent upon completion of a task at a specified level of acceptability. Thus, task difficulty may alter the pupil's expectancy of obtaining a reward as well as the probability of actually receiving one, especially as the difficulty increases. As these task costs increase relative to other rewards, the probability that other rewarding tasks would be taken up would increase.

Kounin (1970) reports in a study of teaching style and children's behavior in recitation and seatwork activities that a moderate significant, positive correlation (.512) existed between seatwork variety and challenge and seatwork involvement. The relationship between recitation variety and challenge and recitation work involvement was a non-significant .24. Since task challenge and variety are confounded, one cannot determine the relative importance of the challenge construct to work involvement, but the findings may be suggestive. Jorgenson, Klein, and Kumar (1977) found that when pupils were working with easy materials, relative to their reading ability, teachers reported more appropriate
student learning behaviors than when pupils worked with difficult materials relative to their reading ability.

Given there related fundings suggesting a relationship between task difficulty and substantive task time, the following question is stated.

Q4: What is the relationship between substantive task difficulty and pupil substantive task time?

**Task Structuring**

*Definition.* This refers to a set of behaviors that are part of a monitoring process operating in the classroom. "Classroom monitoring" refers to the process by which teachers provide information to pupils about tasks, obtain information from pupils about tasks, and assign new tasks and allocate rewards and costs. Each of these represents identifiable phases, task structuring, task feedback, and task follow-through, that in their totality represent the classroom monitoring process controlled by the teacher. "Task structuring" refers to communication to the pupil directly from the teacher or indirectly from a source controlled by the teacher, e.g., self-instructional materials, of what the substantive task is and all the conditions that need to be met by the pupil for successful task completion. For example, the teacher may tell a pupil not only what page in the workbook to complete, but the teacher may also specify how it is to be completed, how long
it should take, and how well it should be done.

**Theoretical Importance.** The monitoring process of which task structuring is a part is presumed to be important for several reasons. First, obtaining valid and reliable information about a pupil's substantive task behavior is presumed to be the basis for decisions by the teacher as to whether additional resources need to be allocated or current ones withdrawn so that an activity's difficulty cost remains low. Second, monitoring a pupil's non-functional tasks and substantive tasks permits the teacher to make decisions about the frequency and severity of violations of task and socio-emotional norms that should be rewarded or punished. Third, from the standpoint of the pupil, Milgram (1969) found that obedience to authority was greatest when the authority was in close physical proximity to the subject and directly observing the subject's behavior. Obedience was lowest when the authority was removed from the room and only in voice contact with the subject. While Milgram does not directly explain this finding, its explanation is implicit in his discussion of binding factors.

As stated earlier, Milgram asserts that a social situation is held together by a consensual definition of, among other things, the hierarchical relations of the participants. For the subject to violate that definition through disobedience in view of the authority is to risk anxiety,
shame, embarrassment, and diminished feelings of self-worth—all significant costs presumably. When the authority has no access to samples of the subject's behavior or cannot adequately assess the validity and reliability of the information obtained, then the risks of disobedience are greatly diminished. In terms of exchange theory, the potential costs of a disobedient act are greatly diminished if the person with the authority to administer punishments does not know of the disobedience. Thus, in the classroom a necessary condition for administering punishments for a disobedient act by a pupil is knowledge of the act.

Teachers rely on several monitoring methods. Direct observation is the most obvious. However, it is practically impossible to directly observe all pupils at all times as the teacher engages in a variety of activities with one or more pupils. As a result, the teacher often relies on observations of products of pupils' behavior after it has occurred. A marked-up desk or a completed worksheet are examples. A third method is to utilize reports of behavior from other pupils and adults. Very often, a teacher utilizes a combination of these methods.

While the task monitoring process is the glue that keeps the class together, the task structuring phase is also theoretically important. If any condition for successful completion of the substantive task is not communicated by the
teacher or not understood, then the pupils' expectancy for obtaining a desired reward would be diminished and the probability of actually receiving one may be reduced if the inadequate task structuring information results in a greater likelihood that the task will not be completed. Finally, task costs would increase as the pupil experiences problems completing the task and task fatigue increases.

A simple example may illustrate this. A teacher may assign a remedial mathematics task to a pupil utilizing a slide-tape machine but fail to explain how the machine is operated. The pupil, working on his own, encounters problems working the slide and cassette tape machine such that the substantive task cannot be completed. Unless the situation is rectified, the probability of engaging in an alternative, high reward substantive or non-functional task increases since the costs for the assigned task have increased while the probability of obtaining a reward has decreased. While this example focused upon inadequate managerial information, it could also have been a situation in which an insufficient explanation was given of the substantive procedures to be followed, e.g., subtraction steps. Given the argument for the relationship between task structuring and pupil substantive task time. The following question is stated.

Q5: What is the relationship between the teacher's task structuring and pupil substantive task time during Open
Task Feedback

Definition. "Task feedback" represents the second phase of the monitoring process in which the teacher obtains information about a pupil's task behavior directly by observation, indirectly through a material product of a pupil's behavior, or by both means. This information is presumed to be part of the teacher decision process about allocation of additional resources and/or administration of external rewards and costs. For example, a teacher often receives completed worksheet papers which are evaluated. Based on the information about the pupil's substantive performance from the worksheet and the teacher's evaluation of it, decisions by the teacher about additional similar work or new work are made.

Theoretical Importance. The teacher is presumed to be the source of, as well as able to control a variety of external material, symbolic, and activity rewards and costs. The feedback information on the pupil's task performance and the evaluation of it is a necessary condition for the administration of these rewards and costs to pupils. Thus, the maintenance of a pupil's incentive expectation as well as receipt of the actual reward or cost assumes that the teacher obtain information about a pupil's performance. Without this information, administration of rewards and
costs would be capricious, resulting in an inability of pupils to formulate stable hypotheses about desired, rewarded behavior or incentive expectancies. Thus, regular task feedback is assumed to be a necessary condition for establishing stable pupil incentive expectancies. Given the previous argument, the following question is stated.

Q6: What is the relationship between teacher task feedback and pupil substantive task time during Open Time?

It is realized that because time is finite there is the logical possibility of increasing task feedback and task structuring time to a level where pupil substantive task time is substantially decreased, resulting in a curvilinear relationship. While this is logically possible, it will be assumed that these variables represent a relatively small division of the total time frame, thereby making a linear relationship probable.

Task Follow-Through

Definition. "Task follow-through" represents the third phase of the monitoring process in which the teacher acts upon the previous decisions by assigning new tasks, allocating resources, and/or administering rewards and costs. For example, after the teacher has examined the pupil's mathematics worksheet, she may award a grade (symbolic reward or cost) and assign a new substantive task for the pupil.
Theoretical Importance. The theoretical importance of the task follow-through phase resides not only in the receipt of external rewards and costs which function to reinforce the prior behavior but also in the information of the incentive expectancies, thereby requiring no alterations in pupils' hypotheses about the relationship between behavior and consequence. At least two factors may affect the regulatory efficacy of any rewards or costs administered during the follow-through phase. The first is related to the complexity of information obtained by the teacher during the feedback phase, and the second is related to the time span between pupil task completion and the follow-through phase.

In a classroom in which pupil substantive tasks are highly differentiated at any one time, the complexity but not necessarily the quantity of the feedback information is likely to be greater than if all pupils are working on the same task. The complexity of the information is presumed to be a function of the number of different task conditions established for pupils at any one time. Thus, in addition to feedback information with imperfect validity and reliability, the teacher is receiving and acting upon more complex information in a class with highly differentiated tasks, e.g., 30 pupil performances on 30 sets of task conditions versus 30 pupil performances on one set of task conditions. As feedback information becomes more complex, it is more
likely that incorrect decisions about task resource allocations and reward/cost administrations will be made, resulting in frustration if expected rewards were not received in and modification of incentive expectancies.

As to the timing of the administration of the reward or cost, one of the principles of learning theory is that a response should be externally reinforced immediately after the behavior is emitted. However, the studies cited by Bandura (1969, 1977) suggest that previously learned behavior does not require immediate external reinforcement because of a person's capability to reinforce his own behavior as well as to hold cognitive reward or cost expectancies. In a classroom with some history, it is likely that pupils not only have beliefs about what behavior is rewarded but also about how often and/or when. This testable assumption implies that the only potential cost between a long period of time between task completion and reward/cost administration would be frustration if the time period was longer than usual. The data collected do not allow these assumptions to be tested.

Pupil Non-Functional Tasks

Definition. This refers to any task in which the pupil engages without managerial or substantive purpose. For example, pupils playing paper football, talking about lunch or recess, writing notes to their friends, all during
substantive task periods. If one accepts the assumption that teachers control most of the resources and the external rewards, then explaining pupils' engagement in non-substantive tasks and the theoretical importance of non-substantive tasks is important.

One explanation for the occurrence of pupil non-functional tasks is that the rewards and costs controlled by the teacher are not as highly valued as those controlled by the pupil. For example, the student who represents a class discipline problem may find peer attention for his behavior much more of a reward than any external reward or punishment controlled by the teacher.

A second explanation is that the monitoring process is imperfect, providing opportunities to pupils to engage in valued non-functional activities with little cost risk and high reward potential. Thus, if the teacher, for some reason, obtained infrequent and/or insufficient amounts of feedback information, the cost risks for non-functional tasks would be low compared to frequent and/or complete amounts of feedback information during which the cost risk of non-functional tasks would be higher. One measure of the effectiveness of the teacher's monitoring process would be the proportion of substantive tasks to non-functional tasks.

**Theoretical Importance.** The question can be raised as to how non-functional task engagement is related to substantive
task engagement. Obviously, if the monitoring process is substantially defective, there might be an inverse relationship between the two. However, if it is assumed that the monitoring process is adequate, then there are theoretical reasons for expecting a level of non-functional tasks to exist.

First, pupils do control some resources for engaging in rewarding non-functional activities. Since the teacher's monitoring process will provide occasional periods of time during which feedback is impossible or less likely, pupils have opportunities to engage in these rewarding tasks. Second, the existence of rewarded alternative tasks would, following Homans' satiation and fatigue propositions, reduce reward satiation for substantive tasks since different rewards would be distributed over different tasks, and the fatigue effects of extended substantive task engagement would be stabilized because of engagement in other rewarding tasks. In short, if this monitoring system is not substantially defective, then pupil time in rewarding non-functional tasks functions to maintain the value of substantive task rewards and stabilize the fatigue costs associated with substantive tasks. Assuming an adequately functioning monitoring system, the following question can be stated.
Q7: What is the relationship between pupil substantive task time and non-functional task time during Open Time?

Task Context

Definition. The "task context" refers to the social arrangement the pupil is in while doing a task. Four task contexts can be defined. The "independent task context" refers to a pupil managerially, substantively or non-functionally, acting alone for an extended but arbitrarily defined period of time. Necessary conditions for acting alone are that the pupil does not require the direct assistance of another in order to complete the task and that the presence of others is not necessary for the completion of the task. The "dyadic task context" refers to two persons, either pupil and pupil or pupil and teacher, interacting together over an extended period of time on a substantive, managerial, or non-functional task. The "group task context" refers to a sub-group of the entire class population with or without materials interacting and with or without the teacher together over an extended period of time on a common substantive, managerial, on non-functional task. Finally, the "class task context" refers to the entire pupil population of the class with or without the teacher interacting together over an extended period of time with or without materials on a common substantive, managerial, or non-functional task. These task contexts are displayed in
### Pupil Task Contexts

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<td>No Materials</td>
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*These classification possibilities do not exist by definition.*

Figures 5. Classification of task contexts by task type and participant.
Theoretical Importance. That pupils work in a variety of contexts of varying sizes with or without materials is theoretically significant because of the relationship between task contexts and rewarding task alternatives and monitoring efficiency. This relationship is founded on the premise that while the teacher may control most of the resources and external symbolic and material consequences which are directed toward the accomplishment of substantive task goals through the monitoring process, the pupil and his peers also control a more limited number of resources and consequences that have a greater likelihood of being utilized in contexts involving ever increasing numbers of people. Because of the self and vicarious reward potential of material resources, tasks in contexts in which materials are in use would be hypothesized to have greater reward/cost potential than those that do not.

If these assumptions are true, then the following assertions would also be true. First, since teachers control most of the resources and consequences and since they are directed toward substantive task accomplishment through the monitoring process, substantive tasks would have greater reward/cost potential than non-functional tasks. Second, as the task context involves more persons, more potential rewards/costs are available for regulating behavior. Third,
task contexts that include the teacher have more potential rewards and costs than those that do not. Fourth, the group or class context with materials, teacher, and substantive task have the greatest reward/cost potential for a pupil while the independent context with no materials would have the least.

If one accepts the premise that achievement is a proxy variable for substantive task engagement, then two recent studies (Soar, 1973; Stallings and Kaskowitz, 1974) summarized by Medley (1977) showed negative correlations between achievement and contexts where elementary school pupils worked alone or with the teacher in very small groups. On the other hand, positive correlations were found when the teacher worked with larger groups. These findings indirectly support the second and third assertions.

If one assumes a moderate to high correlation between potential and actual rewards and costs received, then the following questions can be stated.

Q8: What is the relative proportion of time spent by pupils in substantive, managerial and non-functional tasks during Open Time?

Q9: What is the relationship between work contexts, with and without a teacher and pupil substantive task time?

Q10: What is the relationship between the number of persons in a substantive task context and pupil substantive
task time during Open Time?

Task Feedback Proximity

Definition. This refers to the amount of time remaining before feedback information is required relative to total amount of time allocated for the task when it began. For example, if a teacher assigns a workbook page to be turned in at the end of a 30-minute reading period, then the proximity to task feedback would be the difference between the total amount of time allocated for turning in the work (30 minutes) and the amount of time that has passed since the task was assigned. If the pupil had spent 15 minutes of the allocated time working on the assignment and talking to his neighbor, the task feedback proximity is 15 minutes at that point.

Theoretical Importance. It has been asserted that teachers and pupils, as a group and individually, control non-functional and substantive resources, and rewards and costs, that can be utilized in a variety of substantive, managerial, and non-functional tasks. The teacher, because of her legitimate authority and role definition, structures most of the available time to be used for accomplishing substantive tasks. The monitoring process established by the teacher functions to maximize substantive pupil task time and minimize non-functional pupil task time. Opportunities for pupil non-functional tasks arise because of monitoring
system inadequacies, the context in which the pupil works, and the availability of more rewarding non-functional activities, e.g., talking to a neighbor in a pupil-pupil dyad during reading while the teacher works with another pupil in another part of the room. If more time is allocated for a task before feedback than the pupil judges that he needs based on past experience, then the potential costs for engaging in rewarding non-functional tasks are reduced since the expectations for substantive task completion and receipt of expected rewards have not been altered. However, the potential costs for engaging in a non-functional task during the time period judged by the pupil to be needed to do the substantive task prior to feedback increase because of the potential loss of expected rewards and the greater likelihood of punishment for not completing the task. In short, available rewarding non-substantive tasks have a higher probability of occurring up to the point when a pupil judges that the receipt of expected substantive task reward is jeopardized and the probability of receiving punishment from the teacher is increased.

What is assumed here is a cognitive judgment process involving an assessment of time demand relative to time availability and reward/cost consequences. This assumption is consistent with the role of cognition in the formulation of provisional hypotheses and consequence expectancies in
Bandura's theory and with Homans' reward/cost calculus that assumes judgments by the individual between competing activities with differing reward/cost consequences.

If the theoretical assumptions are true, then the following question can be stated.

Q11: What is the relationship between task feedback proximity and pupil substantive task behavior during Open Time?

This question assumes that the pupil has not been overloaded with substantive tasks such that he judges that an insufficient amount of time exists for satisfactory task work prior to feedback. Teachers create an overload condition by assigning many tasks initially or by making periodic unexpected assignments which would function to invalidate a pupil's judgements about task demand relative to available time. In overload situations, it would be assumed that a pupil would remain engaged in substantive tasks in order to obtain the expected task rewards unless the pupil judged that the rewards could not be received because the tasks could not be completed on time.

Resource Allocation Norms

Definition. A "resource allocation norm" is defined as the shared expectations as to how time, material, and human resources will be allocated to pupils for any substantive task. At least three kinds of norms are possible: equality,
simple adjustment, and complex adjustment. An "equality" norm refers to allocating the same resources to everyone despite important individual differences. Whole class instruction utilizing the same materials over a fixed time period is an example. A "simple adjustment" norm refers to a differential allocation of resources based on a few important individual differences. Group instruction in reading class is an example since the teacher allocates different reading books to different reading groups formed on the basis of their reading skill. The third norm, "complex adjustment", refers to a highly differentiated allocation of resources based on multiple, important individual differences, e.g., capability, interests, learning style, etc. Curriculum materials aimed at permitting individualized instruction is an example.

Theoretical Importance. The way resources are allocated by the teacher affects the match between the human resources demanded by the task for successful completion and the available human resources. As demanded resources and available resources more closely match, the probability that the task would be successfully completed would increase, expectancy incentives would be maintained as well as the probability of actually receiving a reward, and tasks costs would be minimized, thereby keeping actual and potential profit maximized.
Even though there has been much public clamoring for individualized instruction, open classrooms, etc., recent elementary classroom research seems to indicate that much instruction is performed by a teacher teaching a class as a unit in a self-contained setting (Gaye, 1978). This does not mean that the teacher is constantly lecturing or leading a class discussion however. McDonald (1976) and Good and Beckerman (1978) reported that elementary school pupils spent at least half of the school day engaged in independent seatwork, i.e., working alone, and that much of the seatwork is the same across pupils, implying little or no differentiation of resource.

If one assumes that achievement is a proxy variable for substantive task engagement, then a recent study by Coker, Lorentz, and Coker (1976) reported by Medley (1977) found a significant positive correlation between reading achievement and the availability of a variety of materials used by pupils in grades 3 through 8 of low and high socio-economic levels. In addition, if one assumes that task differentiation is a sufficient condition for materials differentiation, then this same study found significant positive correlations between task individualization and mathematics achievement among second-grade pupils from low and high socio-economic levels. Given this partial research support, the following question is stated.
Q12: What is the relationship between differential allocation of task resources and pupil substantive task behavior during Open Time?

**Resource Material Novelty**

**Definition.** "Resource material novelty" refers to new or unfamiliar objects used by the pupil to complete a substantive task. By saying that the material can be new or unfamiliar, a continuum is proposed with new and unknown at one end representing extreme novelty to known but infrequently used materials at the other end of the continuum. Also assumed is a time frame that places the construct in a historical context that is arbitrarily defined. A reasonable time frame may be the current academic year while making the assumption that all resource materials are new and unknown on the first day and from there on become less novel depending upon the frequency of use. For example, a basal reading text would be novel at the beginning of the year, but as it was used weekly or daily, the material would lose its novelty.

**Theoretical Importance.** In Bandura's analysis of the explanation of why a stimulus can be reinforcing, one demonstrated reason he cites is that novel stimuli can be reinforcing (Berlyne, 1960). The material resources pupils use to complete substantive tasks are both a means for completing goals and obtaining rewards or costs and, as the work of
Berlyne would suggest, the use of novel resources may be reinforcing in and of themselves. Thus, a pupil may obtain desired consequences not only from completing the task and receiving a reward but also by using novel resources with reinforcement potential.

In a study of the effects of novel resource materials on reading behavior, Haskett and Lenfestey (1979) found that preschool pupils displayed much more interest in the novel book material than during the baseline period when books were available but not brought to the attention of pupils. In an ethnographic study, Wolcott (1969) described the reinforcing uses of material resources in the classroom. The following question is stated.

Q13: What is the relationship between material resources of varying novelty and pupil substantive task time during Open Time?

**Material Resource Complexity**

**Definition.** "Material resource complexity" refers to the number and configuration of the physical manipulations required to correctly use, either directly or vicariously, the material. For example, by the time a pupil is in upper elementary school, she is usually quite familiar with textbooks and knows how to open them and find the correct page. Another type of book, the dictionary, would probably be somewhat more complex for that pupil since physical manipulations
require alphabetizing skills. Except for first graders, the use of paper and pencil is operationally simple, while the use of an interactive computer terminal is operationally complex because of the number of different key stroke sequences that are required for correct use. Thus, as with resource material novelty, the operational complexity of materials is conceived as a continuum ranging from simple to complex. The most complex would be new materials requiring many complex, physical manipulations. A less complex material would be used materials requiring complex physical manipulations, while the least complex materials would require only simple physical manipulations. Material complexity can be experienced directly by the person actually manipulating the material, or it can be experienced vicariously by observing someone manipulate a complex material.

Theoretical Importance. As with resource material novelty, the theoretical importance of material complexity develops from Berlyne's work (1960) on the reinforcing function of complex and novel stimuli. Thus, as a stimuli source, complex material resources would be assumed to have a higher reward potential than operationally simple materials.

Contrary to expectations, Medley (1977) reports the findings of a study by Stallings and Kaskowitz (1974) that seemingly does not support the proposed relationship between
use of complex materials and substantive task time. If pupil achievement is believed to be a proxy variable for substantive task engagement, Stallings and Kaskowitz found a significant negative correlation between the use of games, toys, play equipment, and audio-visual equipment and mathematics achievement of third-grade pupils. This is not seen as refutation of the hypothesized relationship between the use of complex materials and substantive task engagement since achievement is conceived as a sufficient condition for task engagement, but task engagement is only one necessary condition for achievement. Thus, other factors may have accounted for the negative correlation. The following question is stated.

Q14: What is the relationship between the complexity of material resources and pupil substantive task time during Open Time?

A curvilinear relationship is predicted because new, highly complex materials may result in ineffective manipulations which, if repeated, would diminish the pupil's expectancy of successful task completion and receipt of reward. Frustration would increase, and other, more rewarding tasks would be sought.

Resource Material Availability

Definition. "Resource material availability" refers to the accessibility of adequate materials for use by the pupil
for completing a substantive task. It will be assumed that availability is a function of the absolute quantity of a particular material relative to demand for its use and a function of the restrictions placed by the teacher on how much material is allocated for a task. For example, paper and pencils are typically very available materials since sufficient quantities usually exist and few, if any, restrictions are placed on their allocation. On the other hand, calculators would probably be a low availability material since there are usually fewer of them than potential demand, and their allocation is usually highly restricted. It is possible to scale material availability on a continuum with high amount, low restrictions at the high availability end and low amount, high restrictions at the low availability end.

Another element of availability is the adequacy of the materials allocated. Inadequate materials are the result of an insufficient amount available for use and/or by material unfitness, e.g., equipment will not work correctly, or materials inappropriate for the task are used, e.g., when a pupil's mathematics difficulty is misdiagnosed and inappropriate remedial materials are assigned.

Theoretical Importance. The importance of available materials lies in the relationship between the pupil's expectations to complete a task and receive a valued reward
and actually completing the task and obtaining the reward. Materials that are not sufficiently available are potential barriers to the successful completion of a task, thereby raising its costs as the expectancy for obtaining the reward is diminished and probability of actually receiving it is reduced. As a result, the following question is stated.

Q15: What is the relationship between task material availability and substantive task time during Open Time?

**Consequence Contingency Network**

**Definition.** This refers to the number of task consequences for which the receipt of one is at least the necessary condition, if not sufficient condition, for the receipt of one or more other consequences. For this network to be a contingent one, the pupil must know from prior experience or by being told that the receipt of one consequence increases the probability that another one will be received. For example, when a pupil turns in a worksheet for grading, he usually knows that it will be graded, and if it is good enough, it would be displayed for his peers to view, increasing the probability that other pupils will praise him. Thus, multiple outcomes are connected to the completion of the task.

**Theoretical Importance.** Bandura (1977) asserted that such contingency networks were extremely powerful regulators of behavior when known to the person to whom they are
applied. Multiple contingencies presumably increase the motivational value of incentive expectancies since more is to be gained or lost when multiple contingencies exist than when only one consequence follows. Multiple reinforcements of substantive tasks would reduce reward satiation that would occur if one consequence was repeatedly administered.

Contingency networks can be structured into any task context. For example, the pupil in the independent context may reward himself for completion of a task and know that he will receive a deferred reward of praise from the teacher when told of the pupil's accomplishment. While contingency networks may exist in any context, it is hypothesized that more of them occur in contexts in which the teacher is a participant. This hypothesis again derives from the control teachers have of a disproportionate number of rewards/costs and resources that permit greater opportunity for a variety of contingency networks to be structured. It is also hypothesized that in a task context in which one pupil unknowingly obtains three rewards and another pupil knowingly obtains three rewards, the behavior in the latter condition will be more easily managed with less frequent external rewards because of the combined effects of the incentive and reinforcement functions on the prior behavior. In the former case, the rewards would only have a reinforcing function and similar future behavior would be controlled by the frequency
of applied external rewards. This implies that on examining the reward potential of a task context, one also has to determine the nature and number of operative contingency networks.

Support for the efficacy of consequences arranged into a contingency network is provided by the studies of pupil behavior in which pupils traded contingently awarded tokens for other desirable material objects. Studies by Heitzman (1970), McMains (1969), O'Leary, Becker, Evans, and Sandergas (1969), found that desired performance occurred more frequently under a multiple contingency condition than under a single contingency condition. Thus the following question is stated.

Q16: What is the relationship between tasks with multiple contingencies and pupil substantive tasks time during Open Time?

Multiple Monitoring System Characteristics

Definition. It is not uncommon for pupils to encounter several monitoring systems either with the same teacher over a unit of time or across different teachers encountered by the pupil during a day or week. For example, the task structuring, feedback, and follow-through procedures for individualized math class, group science class, and whole class social studies may be very different for the same teacher or for different teachers. A potentially important
characteristic of multiple monitoring systems is their degree of normative consistency. "Normative consistency" refers to the commonality across monitoring systems in relation to the frequency and types of consequences structured by the teacher for normatively sanctioned substantive, managerial, and non-functional behavior. In other words, do all teachers encountered by a pupil administer the same costs and as frequently for whispering behavior?

Another characteristic of monitoring systems is their "operational accuracy". This refers to the degree to which a teacher or teachers encountered by a pupil make correct judgments during the feedback phase about task assignment, materials allocation, or consequence administration. Because teachers make many decisions of these types on the basis of information with imperfect validity and reliability, it is probable that some of the decisions would be inappropriate. For example, a pretest score may result in the placement of a pupil in a remedial spelling group when, in fact, the test was not a valid sample of the pupil's spelling behavior, and the pupil should have been in the next higher group.

Theoretical Importance. The importance of operational consistency derives from the shaping of a common set of normative and consequence expectancies across all work contexts encountered by a pupil, resulting in internalized normative standards and consequence expectancies that are
shared by school authorities. If, however, the pupil has not internalized a shared set of normative standards, then as Milgram (1969) found, application of rewards and punishments for the same norms by all school authorities encountered by the pupil is important for maintaining a high degree of obedience. It would be hypothesized that as the operational consistency of multiple monitoring systems increased, pupil substantive task time would increase.

The theoretical importance of operational accuracy is related to Bandura's cognitive incentive construct and to Homans' frequency of reward proposition. If one assumes that only a subset of the pupil's total set of substantive task behavior is externally reinforced because of the inability of the teacher to reinforce all pupils frequently, then any characteristic of the monitoring system, like operational accuracy, that could further reduce the subset of reinforced behavior could diminish the pupil's incentive expectancy, reduce the probability that unreinforced behavior would be repeated, and cause a frustration-aggression reaction if expected rewards are not received. Thus, if data permitted, a question would be asked about the relationship between the operational accuracy of the monitoring systems and pupil substantive time.

Pupil Movement
Definition. "Pupil movement", another environmental condition, refers to the amount of time a pupil spends away from his work context for teacher-authorized or non-authorized reasons during substantive, managerial, or non-functional tasks. A pupil getting up from his desk where he has been working to sharpen a pencil, get a book, talk with a friend, is engaged in movement behavior.

Theoretical Importance. The existence of pupil non-functional behavior is considered evidence that pupils have control of some resources and rewards and costs that they can administer. That pupils work in close proximity to each other in the typical classroom would raise the probability of using pupils' resources for engaging in non-functional tasks. If a pupil is allowed to move at will in the classroom, then it is more likely that desired non-functional resources and rewards would be sought out by the pupil. As a result, the following question is stated.

Q17: What is the relationship between pupil movement and pupil substantive task time?

Reward Allocation Norms

A "reward allocation norm" refers to the shared expectations by pupils and teacher of how rewards and costs will be allocated among pupils. The analysis of the reward allocation norm construct derives from the research on reward distribution norms discussed in Chapter 2 in the Bandura
section. It is assumed that the social characteristics of the classroom are sufficiently similar to the social characteristics existing in the studies that similar results would be predicted. The fundamental social characteristics were that one or a minority of persons had more control over administering rewards and punishments than the others. The ways that this was done became expected over time and were termed "reward allocation norms". Also, the contexts were defined in terms of work being done by persons with defined jobs. Analogously, that teachers control a disproportionate number of rewards has been assumed throughout this analysis. That the distribution of rewards and costs by a teacher becomes normative is assumed to be likely because of the extended time period--both in hours and days--that the teacher is with a group of pupils and the desirability to standardize operations to maximize efficiency. It is further assumed that the classroom can be characterized as a working context in which the pupils have the "job" of successfully completing the tasks assigned by the teacher (boss). Payments for successful work by pupils are the rewards administered by the teacher. As in the research of other work contexts, it is the standards upon which judgments of whether or not a reward should be given that are of interest now.
Definitions. Three allocation norms were discussed in Chapter 2. The first, the equity norm, was the allocation of rewards based upon the amount of successful pupil performances where the definition of a successful performance was the same for everyone. The second, equity adjusted for capability, was the allocation of rewards based upon the amount of successful performances where the definition of a successful performance varied for individuals based on their capabilities. The third, the equality norm, was the allocation of rewards based on an equality norm in which everyone obtained the same rewards regardless of how much or how well they performed.

As with the research in industry on reward allocation norms (Leventhal, 1976), classroom tasks can be assessed on the quality and/or quantity of the task. The quality of a task can be judged against a nominal scale, i.e., correct/incorrect or acceptable/unacceptable, or it can be judged against an ordinal or interval scale, that is, one performance is better than another. The quantity of successful performances can either be fixed or variable. It will be argued that the quantity and frequency with which external rewards are allocated by a teacher depends upon such factors as task differentiation, pupil capability differentiation, and the type of scale against which a judgment of quality is made. Different combinations of these factors representing
each of these allocation norms will be analyzed. In relationship to pupil substantive task time.

First, a common situation representing the equity norm is one in which pupil capabilities to successfully perform a task are differentially distributed, the quantity of successful performances is a fixed percentage of total performances, the quality of each performance is judged dichotomously, and all pupils are working to complete the same task. An example would be a class working on the same mathematics worksheet of addition problems for which "successful completion" has been defined by the teacher as getting 80% of the problems correct. Under these conditions, the number of pupils who match the successful completion criterion will be related to the number of pupils who possess the requisite capabilities. Thus, there will often be a percentage of pupils who do not achieve the criterion level and who do not obtain the rewards that the others do. If similar tasks follow, the costs of those not achieving the criterion level would increase, expectations for rewards would diminish or be eliminated, opportunities for self-reward would diminish, and time spent in that task would diminish as other more rewarding tasks would be taken up. For those achieving the criterion level, receipt of external rewards would function to reinforce prior behavior, maintain the incentive value of the task, provide consistent opportunities for self-reward,
and result in high levels of task time. The levels of task
time may vary because of reward satiation and task fatigue,
but they would still be predicted to be higher than those
not achieving the criterion level.

The previous situation defined the criterion of accep­
table performance as the same for all, but there are sit­
uations in which the criterion is defined relatively, such
that each pupil's level of performance acceptability often
remains the same. This occurs when teachers judge pupils' performances on the same task using a normative performance standard.

Using a normative performance standard assumes that pupils in a class perform differently on the same task and those that perform best obtain the greatest rewards and
least costs while those that perform worst obtain the least
rewards and greatest costs. Thus, pupils are competing
against each other for desired rewards. The normative stan­
dard may be classroom referenced in which each pupil is com­
peting with everyone else in the class. In such a case best
and worst performances are always defined by the best and
worst performances that occur in the class.

A second normative performance standard is one that is
externally referenced. This is one in which best and worst
performance is defined independently of the group but defined
in reference to some other group, like another class, grade,
all pupils in the state or country, etc. Thus, while pupils' performances may be arranged from low to high within the class, it is possible that all performances fall within the worst, average, or best sections of an externally defined distribution. If the class arranged itself in the "worst" section, then rewards might be few and costs great. Pupils would be competing for rewards against an external group.

Various complications exist for the reward/cost exchange for these two normative performance standards. For the classroom referenced standard, whether or not a pupil obtained fewer or more rewards for succeeding performances than he did previously would primarily depend upon the requisite capabilities needed for successful completion of future tasks and the distribution of those capabilities in the class. Thus, even if a pupil could better perform a future task than a present task because of greater capability, his standing in the distribution of performances may not change if everyone else's capabilities are also greater for that task. The result is that the richly rewarded stay richly rewarded and the poorly rewarded stay that way. Assuming an initial equality of effort but an inequality of capability among pupils, then performances will be arranged in a constant way. For those that are highly rewarded constantly, Homans' satiation would occur with a resultant drop
in performance unless alternative rewards are administered by the teacher. Additionally, those pupils would come to expect that level of reward which, if not received, would result in frustration, anger, and manipulative or rebellious behavior. In short, anything less than the most would be predicted to be unacceptable and upsetting. Even so, those at the top of the performance distribution would be predicted to show a high rate of substantive task time relative to the other pupils.

For those pupils locked in at the middle of the distribution, profit from a task is less than those above them but greater than those below. Satiation probably does not occur since rewards are obtained less frequently and/or in lesser amounts. Thus, the rewards are more scarce for them and continue to have incentive value especially if their incentive expectancies are not diminished by the unchanging reward allocations. Again, because of the constancy of the distribution, an expectation level is likely to develop about the minimum level of reward that is acceptable for their effort. Task time is predicted to be high or highest relative to the others as long as that level of reward is maintained.

For those at the bottom, continued effort brings little or no profit while costs increase. Positive consequences have no incentive value while the costs represent aversive
conditions that alternative tasks will avoid. If substantive or non-functional tasks are available that have greater reward potential, these pupils have nothing to lose by seeking them out. Thus, substantive task time is predicted to be the lowest for these pupils. If none is available, a psychological failure has been created, and psychological and/or physical escape will follow.

The performance consequences of the externally referenced standard are somewhat different depending upon where the class’s performance distribution arrays itself against the external performance distribution. If the two distributions are congruent in both performance and capability, then reward allocation and performance outcomes are likely to be similar to the classroom-referenced standard previously discussed as long as future tasks require similar capabilities. However, effort for increased rewards is likely to be high for those in the middle and lower ranges since their performances are being assessed against a constant performance distribution. Thus, there is the possibility of moving up or down in relation to that constant distribution with increased effort. If the class distribution arrays itself toward the top of the external distribution, then all pupils would tend to receive the same rewards. Satiation would tend to occur, resulting in a decrease of task time unless sufficient reward alternatives were provided to minimize it.
Generally, profit would remain high, rewards would have incentive value, and task time would be high. Additionally, all would develop an expectation of a high level of reward for their comparative success.

If the class is arrayed in the middle of the distribution, profit and reward satiation are likely to be less than the previous situation because rewards are obtained less frequently or less valuable rewards are obtained. Since there is the possibility of moving up the performance distribution and obtaining greater rewards, effort and task time are likely to be maximized because of the incentive value of these potential rewards and the belief in the likelihood of obtaining more rewards with more effort. If the teacher wants to maximize performance, then some variance in the performance and reward distribution is desirable, since the person receiving greater rewards would serve as a model to be imitated by the others.

If the class distribution was arrayed toward the lower section of the external distribution, then costs would be higher, rewards lower and the risk of pupils engaging in alternative rewarding tasks greater. However, since the external distribution is constant, increased effort on the part of pupils has the potential for raising performance, increasing rewards, and serving as a model for others. Of the four situations discussed with an external standard, this
one is predicted to have the lowest task time.

Teachers are not usually blind to the differing capabilities of pupils, and many are aware of the motivation value of providing increased rewards for increased effort and performance. A second major reward allocation norm, "equity adjusted for capability", is possible then. This one rewards pupils for their performance, but the teacher allocates rewards on the basis of performance adjusted for the person's capability for completing the task. Thus, if pupil capabilities are differentially distributed and the performance distribution correlates highly with the capability distribution, then rewards are allocated according to the degree to which each pupil worked to his capability. Instead of being compared to his classmates, his performance is compared to his previous performances. It is possible that a pupil at the bottom of the class performance distribution would receive the same number of valued rewards as someone at the middle or top as long as all were judged by the teacher to be performing at their maximum capability. It is also possible that a pupil at the bottom of the distribution would obtain greater rewards than others above him if they were judged to be performing less than their maximum capability.

A common example of a class operating under an equity adjusted for capability is represented by the situation in
which the acceptability level is the same, but different pupils have different tasks in the same general subject area, as when some pupils might be working on one-digit subtraction, others on two-digit subtraction with no borrowing, and others on two-digit substraction with borrowing. Assuming that assignments to these differentiated tasks more closely matches requisite capability with actual pupil capability, then the probability of success would be more equally distributed across pupils. It would be predicted that rewards would be more evenly distributed across all pupils, resulting in high levels of substantive task time for all pupils since most pupils would have prior behavior reinforced, consistent opportunities for self-reward would exist, and the incentive value of the task would increase or be maintained. If the same rewards were administered, variations in task time would be related to individual variations in satiation and fatigue. Another reason why variation in task time may exist, especially among those with high capability, is the cost due to loss of status differentiation since they are doing more difficult tasks relative to the others for the same rewards.

A norm based on this individualistic standard tends to maximize task time and performance levels for all since the opportunity to maximize one's rewards is more equal. However, research in business summarized by Leventhal (1976)
has demonstrated that such maximization does not always occur. It seems not to occur when participants do not accept this individualistic standard for doing the same task, but accept a constant normative standard in which those that do best receive the most rewards regardless of whether or not they are working to maximum potential. The reward expectation is that those who perform best should always receive the most rewards. The individualistic standard removes status differentiation as a reward and incentive, thereby increasing the costs of the task. Additionally, anger and frustration are likely to occur among those who expect to obtain more rewards but do not than others whose performances are lower. The predicted result would be that for pupils toward the middle and top of the performance distribution who believe in the normative standard, task time may decrease and aggressive, hostile, disruptive acts may be directed at the teacher or pupils performing at a lower level but obtaining the same rewards for the same task.

A third allocation norm, the equality norm, is one in which everyone receives the same rewards regardless of performance level. Previously cited research by Leventhal (1976) suggests that this distribution norm tends to maximize group solidarity and harmony. In a social context in which both socio-emotional and performance outcomes are
valued, then both equality and equity norms are likely to be operative. Different tasks and their activities are rewarded differently depending upon the allocation norm deemed appropriate for that task.

**Theoretical Importance.** While the theoretical importance of specific manifestations of a particular reward allocation norm was discussed in the previous section, the theoretical importance of reward allocation norms lies in the relationship between the way the teacher structures same or different tasks for pupils of same or different capabilities assessed against same or different performance standards and the way rewards and cost are allocated. The previously described structures seem related to one of three types of reward allocation norm. Each of the allocation norms is hypothesized to have a profound effect upon the actual rewards a pupil receives, the incentive expectancies he develops, the evaluative standards he develops for his own self-rewards, and the amount of frustration and aggression displayed.

Recent research on classroom reward structures has shown that when individuals compete for rewards (the equity norm), average task performance was greatest but interpersonal attraction was lowest in comparison to a group equality reward norm (Julian and Percy, 1967; Scott and Cherrington, 1974). These studies are taken as support of similar
findings reported by Leventhal (1976). Thus, the following question is asked:

Q18: What is the relationship between the operative reward allocation norm(s) and pupil substantive task time during Open Time?

Pupil Cognitive Capability

Definition. "Pupil cognitive capability" refers to the fluid and crystallized mental abilities described by Cattell (1971). Briefly, fluid ability refers to the person's ability to reason abstractly, as with spatial relations. The ability is presumably least affected by cultural or educational influences. Crystallized ability refers to a variety of specific symbolic reasoning skills which are most influenced by cultural and educational experiences. Reading comprehension tests and mathematical reasoning tests are two examples.

Theoretical Importance. That prior achievement predicts future achievement well is commonly known and, for most, an accepted relationship. If task performances are demanded of pupils for which no or inadequate prior experiences have been had, then the probability that the pupil will be able to successfully perform a specified substantive task will decrease, resulting in a decrease in the probability of receiving an external or self-reward for the failed task. Measures of crystallized abilities are measures of prior
achievement to a great extent. A pupil who obtains high scores on crystallized ability scores would be predicted to obtain high scores on any current achievement test while persons with low scores would tend to obtain low scores on the same test. High scores would likely result in receipt of external and self-rewards and maintenance of reward incentives and expectancies; low scores would probably result in few external and self-rewards and diminished reward expectancies, especially in classes where tasks are not differentiated by capability. The following question can be stated.

Q19: What is the relationship between cognitive capability and pupil substantive task time in Open Time?

**Pupil Incentive Hierarchy**

**Definition.** This refers to the hierarchical organization of valued incentives that change over time. Bandura (1977) describes the developmental evolution of valued incentives that begin with immediate physical consequences that satisfy physiological needs and are replaced by social and other symbolic incentives. The final stage represents self-reinforcement cued by information that permits self-assessment of the person's response. The order within the incentive hierarchy is presumed to change with time.

**Theoretical Importance.** The theoretical importance of the incentive hierarchy derives from the differential salience of incentives as motivators of behavior. If a
particular environment, like a classroom, provides primarily external, symbolic rewards, like praise, but that type of reward is not part of the incentive hierarchy of the person, then those rewards will have minimal motivating effects and receipt of them would presumably function minimally as reinforcement. The implication is that the greater the mismatch between available rewarding consequences and valued incentives, the less regulatory control the environment will have.

Research on the developmental incentive hierarchy hypothesis has produced mixed results (see Schultz and Sherman, 1976, for a review). Most studies reported by Schultz and Sherman (1976) were ones studying the effects of social class upon reward hierarchies, rather than tests of the existence of hierarchies themselves. In these studies where subjects came from different ages that presumably represented different levels of incentive hierarchy development, the results of 35 studies showed no consistent support for the hypothesis. What is not at issue in this research or with Bandura (1977) is whether or not individuals develop incentives with differential motivational and reinforcement value. That different consequences motivate different people is accepted by Bandura. What is at issue is whether or not there is a predictable developmental sequence to the evolving growth of a person’s incentive hierarchy. Even if age
does not predict a set of salient incentives, for any individual it can still be assumed that some consequences will have more regulatory saliency than others. Thus, matching reward availability with an individual's incentive hierarchy would still be important for maximizing regulatory control in a particular social environment. The collected data do not permit an analysis of questions derived from this construct.

Pupil Cognitive Components

Several theoretically important cognitive conditions related to knowing have been implied or directly expressed in previous sections. For example, self-reinforcement is, in part, a function of the self-evaluative standard and self-reinforcement evaluation process known to the individual. The "self-evaluative" standard refers to the criteria against which a person judges the merit of his own performance. For example, in the classroom utilizing a common performance standard, e.g., 80% correct on any paper, this standard may be adopted by the pupil as his own for self-evaluating the merit of his own performances. It is not uncommon, of course, for some pupils to adopt higher standards than the common one, as when a pupil accepts only a performance of 90% as acceptable even though the class standard is 80%. In this situation, if the pupil received 80%, he may rebuke himself for not doing better
(a self-administered cost) while, at the same time, he receives several external, teacher-controlled rewards. Rewards would still be greater than costs, and substantive task engagement by the pupil would probably continue.

In situations where evaluation of a performance is not done by someone other than the performer, like the teacher, then the pupil has to know how to evaluate his own performance so that a self-judgment of merit can be made. For example, in classes where tasks are individualized, it is not uncommon for pupils to check their own work. In these classes, then, pupils would have to know the managerial procedures for obtaining the answer keys so an assessment can be made of the correctness of the work. Then, a judgment of merit can be made. Studies by Broden, Hall, and Mitts (1971) and Glynn and Thomas (1974) described the training process used to teach elementary school pupils techniques for evaluating their own behavior in self-management programs.

A third crucial cognitive component is the pupil's knowledge of consequence contingencies, either singly or in a network. Bandura (1977) argues that regulatory efficacy of consequences resides in the person knowing that a consequence is the result of a behavior. Knowing the consequences of behavior permits the person to develop provisional hypotheses about acceptable and unacceptable behavior and develop incentive expectancies. A person new to a social
environment would probably behave according to provisional hypotheses and incentives learned in other social contexts until experience in the new context resulted in modifications of the old hypotheses and incentives. For a contingency network to be maximally effective as a regulatory mechanism, the person would have to know all the consequences that would follow or probably follow as a result of previous behavior. Since no data were collected on these cognitive components, no questions will be stated. However, it would be reasonable to assert that pupils' substantive task time would be greater for pupils when they had a self-evaluation standard, knew how to evaluate their own task performance, and knew all the consequences that followed from their behavior.

Pupil Task Fatigue and Consequence Satiation

Two other important individual characteristics with theoretical importance are the degree of physical and psychological fatigue experienced by a pupil during a task and the degree of reward or cost satiation that occurs when physical and psychological needs are satisfied. Fatigue and satiation have the same meaning stated for them in Chapter 2. Their theoretical importance to understanding pupil substantive task engagement in classroom follows from the propositions stated in Chapter 2. Thus, one could hypothesize that difficult tasks are more costly than easier ones
because of greater fatigue. As task fatigue increases, other more rewarding, less costly tasks would become more probable. Teachers intuitively understand this and prevent fatigue from increasing too much by frequently changing tasks throughout the day and by allowing pupils to engage in extended rewarding tasks, like recess, lunch, gym, etc.

Consequence satiation reduces the regulatory efficacy of an incentive. This is summed up by the old saying that "too much of a good thing can be bad." If a pupil frequently receives the same reward for the same or different tasks, it would be predicted that reward satiation would increase, and unless other valued rewards are awarded, the pupil would seek out other rewarding tasks, resulting in lower substantive task time. Since no data were collected on pupil task fatigue and consequence satiation, these questions cannot be answered.

Pupil Control

**Definition.** The final construct related to pupil conditions is "pupil control". This refers to the degree of opportunity provided by the teacher to the pupil for determining what the task is and/or how it is to be done, and/or the consequences for doing it. Teachers frequently provide pupils some freedom of choice--usually choosing from among alternatives that have been determined by the teacher. For example, pupils may choose the material they will work with,
the time of day they may do the task, and the rewards for doing the task.

Theoretical Importance. Assuming the validity of the incentive hierarchy hypothesis, then different pupils will be externally, vicariously, and self-rewarded by different consequences. While a teacher may know what some of these are, it is unlikely that the salient reward consequences for each pupil are known. However, if one can assume that elementary pupils know what psychologically and/or physically satisfies them, then if they are provided reward alternatives from which they can choose, it is more likely that a match between valued incentive and received reward will occur. If no alternatives are provided, then the probability of a mismatch increases. In short, the opportunity for pupil select, even if from limited alternatives, the task, the task conditions, or the task consequences would tend to maximize the probability that rewarding tasks and symbolic and material consequences would be obtained, that satiation would be minimized because of the existence of alternatives, and that task fatigue may be minimized if pupils have control over task conditions. Therefore, the following question can be asserted.

Q20: What is the relationship between tasks and resources chosen by pupils and pupil substantive tasks time in Open Time?
Theoretical Analysis

Many of the previous sections on consequence and limiting conditions have stated questions that can be assessed with the data collected for this study. They will be restated here.

Analysis of Consequence Conditions

As part of the modus operandi analysis classificational enumeration of the types and frequency of occurrence of consequences regulating pupils' behavior will be undertaken. When the data permit, correlational analysis in addition to logical analysis will be used. The following questions will be used, then, to guide the analysis of the data.

Q1: What are the rewards and cost consequences of pupil behavior in the observed teacher's class, and how are they related to pupil substantive task behavior?

Q2: How are public and private records cost related to pupil substantive task behavior during Open Time?

Q3: How are contingent reward and cost consequences related to pupil substantive task behavior during Open Time?

These questions suggest that the probability of a pupil's remaining engaged in substantive tasks is directly related to the number of different types of external reward and the frequency of application in relation to the number of different types of external costs and the frequency of
their application. The questions assume that the count of the types of external rewards and costs and their frequency of application is a representative estimate of all rewards and costs applied to a pupil. They further assume that even though the number and types of tasks will change over any unit of time, the mean reward/cost ratio defined by the analysis is a reasonable estimate of the reward/cost ratio for any one task. Theoretically, the questions are derived from Homans' frequency of reward proposition which states that the more a person is rewarded for a behavior, the more likely he is to repeat it, from Bandura's assertion that rewards can be experienced both directly and vicariously, and from Premack's work (1965) on high reward tasks as reinforcement.

Analysis of Limiting Conditions.

Q4: What is the relationship between substantive tasks difficulty and pupil substantive task time during Open Time?

Q5: What is the relationship between the teacher's tasks structuring and pupil substantive task time during Open Time?

Q6: What is the relationship between teacher task feedback and pupil substantive task time during Open Time?

In order to attempt to explicate the linkages between regulating conditions and substantive task time, the limiting conditions will be examined. This will involve
classification, enumeration, and logical analysis. To guide this examination, the following questions are given.

Q7: What is the relationship between pupil substantive task time and non-functional task time during Open Time?

Q8: What is the relative proportion of time spent by pupils in substantive, managerial, and non-functional task during Open Time?

Q9: What is the relationship between work contexts with and without the teacher upon pupil substantive task time during Open Time?

Q10: What is the relationship between the number of persons in a work context and pupil substantive task time during Open Time?

Q11: What is the relationship between task feedback proximity and pupil substantive task behavior during Open Time?

Q12: What is the relationship between differential allocation of task resources and pupil substantive task behavior during Open Time?

Q13: What is the relationship between material resources of varying novelty and pupil substantive task time during Open Time?

Q14: What is the relationship between the complexity of material resources and pupil substantive task time during Open Time?

Q15: What is the relationship between task material
availability and substantive task time during Open Time?

Q16: What is the relationship between task with multiple contingencies and pupil substantive task time during Open Time?

Q17: What is the relationship between pupil movement and pupil substantive task time during Open Time?

Q18: What is the relationship between reward allocation norm(s) and pupil substantive task time during Open Time?

Q19: What is the relationship between cognitive capability and pupil substantive task time during Open Time?

Q20: What is the relationship between task and resources chosen by pupil and pupil substantive task time during Open Time?
CHAPTER IV
RESEARCH METHODOLOGY

This study reports data on one fourth grade teacher and her pupils for five consecutive days during morning and afternoon Open Time periods. The data for this study came from a prior study of the activities of four teachers and their pupils conducted by another investigator during the 1975-76 school year. This original study was conducted to develop a multiple observation methodology and to apply that methodology to a complex instructional system to try to describe it as fully as possible. Five sets of data were generated in the original study: a.) observational data focused on the teacher; b.) observational data focused on the pupil; c.) questionnaire and test data focused on the pupil; d.) participant observation data from the perspective of a pupil; e.) and informant interview data. This chapter will include summary information about the original study and the school in which it was conducted. The next major section will be a discussion of the methodology used to generate the observational data focused on pupil and teacher.
and participant observation data used for this study. This will also include discussion of the methods used by the original investigator to collect the raw data and records used to generate the data for this study. The last major section will be the operational definitions of theoretical constructs related to maintaining pupil substantive task time and the data analysis strategies will be discussed for this study.

The Original Study

As was indicated, the data for this study were originally collected primarily by an Ohio State University professor with assistance from two other Ohio State University professors during the mid-1975-76 school year in order to test the capability of a multiple observation methodology to describe complex instructional settings. This information and much of the rest that follows were obtained from project records made available to this investigator by the original principal investigator.

The original study did not attempt to test specific hypotheses. Rather, it was focused on the following purposes: (a) providing a rich description of complex instructional settings; (b) identifying conditions related to pupil substantive task time; (c) developing a theory from the study explaining pupil substantive task time. Original
purposes (b) and (c) coincide with the purposes of this study.

instructional strategies requiring a variety of human, material and temporal resources and; (d) characterized by teachers and pupils that were experienced in those settings and that were not threatened by the presence of the observer.

While the original investigator collected information and records on four different teachers and selected pupils in each of their classes, this study reports the results of an analysis of only one of the four observed teachers. While later sections describe the methods used by the original investigator to collect information on the four teachers, the reader should remember that only the data for Teacher D was used in this study. This investigator assumed the task for this study of coding the audio tapes of the teacher made by the original investigator, of coding the participant observation notes made by the original investigator, and of using the test data in ways consistent with the questions asked in the study. Except for the Focus on Pupil data set, which represented live coding of selected pupils by the original investigator, the analysis of the audio tapes of the teacher's verbal behavior and the participant observation notes were done using categories of behavior devised by this investigator.
The School

An elementary school that met the criteria was selected. The school served predominantly white, middle-income, suburban families. The building was an open-space facility with a gymnasium/multi-purpose room, instructional resource center, and three open-space instructional areas, each capable of accommodating six class units. Teachers in the school, including the four that were observed, were judged to share a common pedagogical philosophy, stressing individualized instruction and tasks aimed at enhancing pupils' feelings of self-worth and at developing pupils' capabilities for engaging in responsible choice making and independent task. The sample in the original study included four of six volunteer, experienced teachers from one of the open-space instructional areas. Two taught fourth graders and two taught fifth graders. For the present study, only the data from one fourth grade teacher's class will be analyzed.

In each of the four classes, the curricula were similar. Diagnostic-prescriptive curricula existed for reading, spelling, and mathematics. Science and social studies tended to be organized into common, group or whole class tasks, but numerous opportunities were made for pupils to pursue their individual interests. Language tended to consist of common tasks that pupils did independently. Finally, each teacher
provided opportunities for pupils to read self-selected books.

An interesting feature of the time schedule in each class was morning and afternoon Open Time during which pupils usually worked independently or in very small groups to complete the language, mathematics, reading, and social studies tasks assigned on Monday and Tuesday of each week for completion by Friday.

Data Set 1: Observational Data Focused on Teacher Subject Sample

In the original study four experienced teachers working in one of the openspace instructional areas volunteered for observation. Two taught fourth-grade classes, and two taught fifth-grade classes. The original investigator judged that the four shared a common set of pedagogical beliefs about what they would like pupils to become and how those ends could be achieved. Upper elementary classes were selected in order to minimize reactive effects of participant observation that were judged to be more probable in primary classes. From the original study's sample of four teachers, the audio tapes of one fourth grade teacher were used for this study.

Data Collection

The mechanics of obtaining the audio tapes on the original study involved having each teacher wear a wireless
microphone from the beginning of the day through the end of the day for five days, Monday through Friday. At particular points in time a tape recorder located in the same instructional area and operated by the original investigator was turned on for 10 minute intervals of time to record the teacher's verbal behavior. The original investigator listened with headphones, timing the recording at 30-second intervals until 10 minutes had passed and turned off the recorder until the next sampling time. This procedure was followed throughout the day for all subject matter classes for each teacher. The teacher was not recorded when pupils were at lunch, recess, physical education class, art, or other special events that took the pupils from her. To minimize reactive effects, the teacher was not told the periods during which her behavior was being recorded. In this study, only the audio tapes of one of the four teachers in the original study were used.

**Time Sampling**

At the most general level, the week was the sampling unit since instructional tasks typically were assigned on Monday and typically completed that Friday. Guiding the sampling of teacher behavior was the desire to obtain representative teacher behavior throughout the day in all subject matter areas for five consecutive days. During a particular subject matter period on a particular day, the
decision to record the teacher's behavior at a particular time was a function of natural conditions and not of any a priori time sampling schedule. In addition to the recording of the teacher's behavior, the principal investigator alternately live-coded pupil behavior. Thus, during each subject matter period the observer sampled both teacher behavior and pupil behavior in 10-minute units. Natural events plus consecutive samplings of teacher and pupil behavior necessitated a sampling schedule of convenience but it was guided by the desire to obtain representative teacher behavior by periods in the day and days of the week. Table 1 shows the number of observations made of each teacher by subject matter periods and by days of the week.

Inspection of Table 1 reveals that Open Time any day, Science and Random House on Tuesday, Wednesday, and Thursday were sampled for all teachers at those times.

Category System for Encoding Teacher Data

OSIA IV with modifications was used to encode the teacher behavior tapes. OSIA IV is a multidimensional category system consisting of nine major dimensions and their categories. The major dimensions include: (a) the observation focus; (b) observational setting, e.g., class, group, etc.; (c) the communication strategy, e.g., expository, interactive, etc.; (d) 13 basic instructional
Table 1

The Distribution of Teacher Observations by Subject Matter and Days of the Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>Teacher</td>
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<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>Reading</td>
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<tr>
<td>Opening of the Day</td>
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<td>1 1 1 1</td>
<td>1 1 1 1</td>
<td>1 2 1 1</td>
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<tr>
<td>Closing of the Day</td>
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<td>1 1 1 1</td>
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<tr>
<td>Open Time AM</td>
<td>1 1 1 1</td>
<td>2 1 2 1</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
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<tr>
<td>Open Time PM</td>
<td>1 2 1 1</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
</tr>
<tr>
<td>Science</td>
<td>1 1 1 1</td>
<td>1 1 1 1</td>
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<tr>
<td>Class/Group AM</td>
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<td>Class/Group PM</td>
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</tr>
</tbody>
</table>

159
Observation Focus

T-Teacher  
S-Student  

Communication Strategy

R-Interactive  
E-Expository  
P-Private  

Context

C-Class  
G-Group  
D-Dyad  
I-Independent  
O-Other  

Subfunctions

A-Substantive Arrange  
A-Managerial Admonish  
A-Accentuated Judgment  
M-Use of Materials  
U-Choice by Pupil  
  Combinations of A, U, M  

Behavior Categories

1-Thinking  
2-Sensing  
3-Manipulating Artifacts  
4-Initiation of Information  
5-Response to Question  
6-Clarification  
7-Solicitation  
8-Judging Correctness  
9-Positive Personal Judgment  
10-Acknowledgment  
11-Judging Incorrectness  
12-Negative Personal Judgment  

Behavior Subscripts*

A-Learning Goal  
B-Work Quantity  
C-Work Quality  
D-Task Specification  
E-Task Materials  
F-Task Progress  
G-Time Frame  
H-Task Procedures  
I-Cue or Prompt  
J-Diagnostic Probing  
K-Testing  
L-Reason Giving  
M-Class Management Rule  
N-Reward  
O-Punishment  
P-Interests  
Q-Sharing  
R-Pupil Choice  

Figure 6. Category Names and Coding Labels of the Observational System for Instructional Analysis used in this study.  

*Developed by the investigator for this study.
event categories, e.g., solicitation, response, acknowledgment, etc.; (e) 16 subfunctions that are user defined; (f) 20 subscripts that are user defined; (g) the instructional event source; (h) the instructional function; (i) communication mode. By coding behavior within each dimension one is able to reconstruct who was being observed, in what work context, engaging in behavior that can be subcategorized in two different ways. Figure 6 lists the dimensions and categories used for this study. Since the subscripts and subfunction categories were defined specially for this study, a discussion of the rationale guiding their development, the procedures used in developing them, and their definitions follows in order.

Rationale. The development of subscripts was based on several assumptions. First, it was assumed that the teacher, because of her role definition and authority, had primary responsibility for creating the conditions for the initiation and continuation of pupil substantive task time. Thus, the OSIA categories and the subscripts were applied to the verbal behavior of the teachers and any person with whom they interacted.

Second, an assumption was made about the initiation of substantive task behavior. It was assumed that a necessary condition for task behavior was knowledge by the pupil of what he is expected to do and how he is expected to do it.
In other words, categories of teacher behavior were sought that functioned to communicate to the pupil the nature of the task structuring events.

Third, an assumption was made about the continuation of pupil substantive task behavior. It was assumed that pupil task behavior continued because of the consequences of that behavior. Thus, subscripts of teacher behavior categories were sought that related to consequences of pupil task behavior controlled by the teacher. While the basic 13 OSIA categories incorporate appraisal behavior categories that can be conceptualized as symbolic reward and punishment consequences, other types of consequences than those contained in the appraisal behaviors were sought. The teacher's promise to a pupil that he/she may select an interesting game or other task after completing an assigned task is an example that would not be categorized as an appraisal behavior. These subscripts were termed task consequence categories.

Finally, another assumption was made about the continuation of pupil substantive task time. It was assumed that the teacher's behaviors to keep pupils engaged in substantive task required an exchange of information between pupil and teacher at various time intervals. Not only does the pupil have to know what the task is and how to complete it, the teacher also has to know how much the pupil knows about
the task and/or the pupil's task progress in order to make instructional adjustments. Thus, categories of teacher behavior were sought that functioned to provide the teacher with knowledge of the pupil's progress and the pupil's knowledge of the task. These subscripts were termed task monitoring categories.

Procedures. These theoretical assumptions guided the specification of subscript categories for this investigation. Subscripts relating to task structuring, task consequence, and task monitoring were defined. Specification of these subscripts followed an in situ process in order to mirror the complex reality of the sample teacher. It cannot be assumed that the subscripts are an exhaustive list for all classrooms, but they appear to be those of greatest frequency and/or importance for the behavior samples of this teacher.

In September, 1977, the audio tapes of this teacher were listened to by this investigator who had been contracted to encode the tapes using the OSIA category system and the subscripts. Prior to this initial listening and the later encoding of the tapes, this investigator and the original investigator conferred on the assumptions guiding subscript specification and on possible subscripts that had been generated by the original investigator at a previous time. With this information, this investigator listened for and
wrote down specific instances of behavior related to task structuring, consequences, or monitoring. Based on these specific instances, groupings of verbal behavior were made within each of the three dimensions. The groupings were made on the basis of a common defining characteristic which became the subscript categories. For example, the task structuring dimension contained many teacher statements about how well a pupil was expected to do or had done on a particular task. The defining characteristic of these statements was that they all related to task quality which then became one of the subscripts. Figure 7 lists the subscripts by task structure, monitoring and consequence.

<table>
<thead>
<tr>
<th>Task Structuring</th>
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<th>Task Consequences</th>
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<td>F-Task Progress</td>
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<td>B-Task Quantity</td>
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Figure 7. Subscript Names and Coding Labels listed by task structuring, monitoring, and consequences.

In addition to these subscripts, subscripts were also used to facilitate the coding of other situations encountered in the tapes. First, in order to differentiate between contacts that a teacher made with a different pupil or group, one subscript was used in conjunction with the Z
symbol to designate a different pupil interacting with the teacher. Another subscript was used in conjunction with the Z symbol to designate a different group with which the teacher was interacting. Thus, if and only if the teacher was working in an independent context, the different student subscript was used to differentiate between students interacting with the teacher. The use of the new group subscript was used under the group context sign when the teacher interacted with more than one group of pupils.

Finally, subscripts were used to differentiate between utterances from sources other than pupil or teacher. These were used in conjunction with the Q symbol and included utterances from the public address system, teacher aides, a resource person, another teacher, secretary, or audiovisual material.

Subscript Definitions. What follows are the definitions of each of the subscripts and examples to provide greater clarity.

"Learning Goal" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the learning (s) pupils are working toward achieving.

Examples: Teacher: "Have you finished with skill 41A in Random House?"
Teacher: "Today, we are going to continue working on trying to learn what we started yesterday."

Teacher: "When we complete these tasks, we will all know how to divide two-digit numbers into three-digit numbers."

"Work Quantity" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the amount of task work a pupil has done, is doing, or will do.

Examples: Teacher: "I want you all to do five Skill Pacers today."

Pupil: "How many math problems were we supposed to do?"

Teacher: "You all know by now how many vocabulary words you are supposed to find."

"Work Quality" refers to any behavior by the teacher or pupil directly stating or indirectly referring to a judgment of the quality or acceptability of the pupil's work (often some product). This subscript was not used during reciprocal substantive or managerial interaction in a class or group context since the appraisal categories were used in these contexts. This subscript was used in independent or dyadic contexts when the teacher was examining the product of a
pupil's work. It was also used when the teacher scanned pupils' work to judge its quality.

Examples:
Teacher: "You got 80% right on this worksheet."
Teacher: This was a hard page. No wonder you got many of them wrong."

"Task Specification" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the substantive or managerial tasks a pupil has done, is doing, or will do.

Examples:
Teacher: "I want you all to read the story on Spain in your News Explorer."
Teacher: I want you to spend the next few minutes arranging your desks for the science experiment."

"Task Materials" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the specific task materials pupils were using, are using, or will use.

Examples:
Teacher: "You will use your Random House cards today."
Pupil: Do you want us to use the same cassettes we used yesterday?"
"Time Frame" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the time limits for completing a task.

Examples:

Pupil: "How much time do we have to complete this?
Teacher: "I want you to spend the next 30 minutes doing your work."

"Substantive Task Procedures" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the substantive procedures to be followed for correctly completing a task.

Examples:

Teacher: "You recall that the first step in division is to do what?"

Pupil: "Mrs. Jones, will you help me do this problem? I don't understand how to do it"

"Task Progress" refers to any utterance by the teacher or pupil directly stating or indirectly referring to the degree or amount of task work completed by the pupil.

Examples:

Teacher: "Billy, how many skill cards have you done?"

Pupil: "I have done five of them."

"Cue or Prompt" refers to any utterance by the teacher usually in reaction to a pupil's silence or incorrect response to the teacher's question that provides additional
information to the pupil to increase the likelihood of a correct response. This is classified as a monitoring sub-
script since it is a teacher behavior that both helps the pupil overcome confusion or misunderstanding but also helps provide information to the teacher about the pupil's knowledge based on the reaction to the cue or prompt.
Example: Teacher: Following a pupil silence in response to a question the teacher says, "Do you remember last week when we studied the pioneers, we said they were traders. Now do you know?"

"Diagnostic Probing" refers to a clarification question by the teacher which functions to provide the teacher with information about what the pupil did, knows, or could do.
Examples: Teacher: "Tell me what you know about the Aztecs."
Teacher: Can you show me how to solve this problem?"

"Testing" refers to any utterance by a teacher or pupil directly stating or indirectly referring to a testing situation for assessing a pupil's substantive knowledge.
Examples: Teacher: "I want you to do the last five problems in the chapter as your test."
Teacher: "The first spelling word to write down is wait. The boy will wait for me until I'm done. Wait."

"Reason Giving" refers to any utterance--usually by the teacher--that directly states or indirectly refers to the reasons a response, task product, or other behavior is correct/incorrect or good/bad. This is a task consequence subscript since it follows a behavior and its appraisal. The relationship between the antecedent behavior and the consequent reason giving is a logically necessary one.

Examples: Teacher: "Can you tell me the reason why you missed that problem?"

Pupil: "I left out the third step, didn't I?"

Teacher: You were wrong because you deliberately tried to disrupt, Billy."

"Class Management Rule" refers to any utterance directly stating or indirectly referring to the rules of conduct expected by the teacher to be followed by pupils during substantive class tasks. This subscript category could also fall under the task structuring heading if the teacher states such rules in order to establish behavioral limits on pupils' conduct prior to a task. However, the category was placed under the task consequence section since class
management utterances were almost always preceded by pupil behavior that represented compliance to or violations of the rule.

Examples:  
Teacher: “Remember, I said no talking when we take the test.”
Teacher: “Billy, you know you’re not supposed to disturb your neighbor in here, when he is working!”

"Reward" refers to any utterance directly stating or indirectly referring to the actual or promised receipt of something presumably valued by the pupil(s) response to the pupil's(s') doing, saying, or completing something valued by the teacher.

Examples:  
Teacher: “When you complete this and get 80% correct, you can play paper football at your desks.”
Pupil: “Now that I have my work done, can I read a library book?”

"Punishment" refers to any utterance directly stating or indirectly referring to the actual or promised receipt of something physically or psychologically painful or presumably not valued by the pupil (s) in response to the pupil's(s') not doing, saying, or completing something valued by the teacher.
Examples:    Teacher:  "If you don't stop fooling around, you're not going to receive your Happy Gram on Friday.
Teacher:  "You will have to stay after school if you don't finish that math exercise before three o'clock."

"Interests" refers to any utterance by the teacher or pupil directly stating or indirectly referring to something of value, concern, or curiosity to that person. While this subscript category could be classified under the task feedback subscripts, if the teacher questioned the pupil about his substantive task interests, it was not used this way. It was almost always used in non-substantive communication between the teacher and pupil and functioned as an inducement for further task behavior since it reduced task behavior fatigue.
Examples:    Pupil:  "I'm really interested in the Super Bowl. Who do you think will win?"
Teacher:  "What types of games do you like to play outside?"

"Sharing" refers to any utterance by the teacher or pupil that directly states or indirectly refers to the public revelation of information of interest to the one revealing it. The subscript was used only with responses to solicitations to share something. As with the interests
subscript, sharing behavior was a delayed consequence of pupil substantive task behavior that functioned to reduce task behavior fatigue.

Examples:
- Pupil: "I want to share the new toy I got over the weekend with you."
- Pupil: "I want to tell you about the accident I saw yesterday."

**Encoding the Teacher Data**

In September, 1977 the audio tapes of the teacher were encoded utilizing the categories and procedures of the Observational System for Instructional Analysis (Hough and Duncan, 1980). The encoding procedures followed OSIA IV conventions. The signs for instructional contexts and strategies were used as defined by Hough and Duncan (1980). The basic 13 category symbols were used as specified by Hough and Duncan, permitting coding of substantive and managerial, teacher and pupil private and interactive behaviors, and the coding of teacher and pupil appraisal behaviors. In addition, three basic subfunctions and their combinations were used. Finally, 19 subscripts were defined especially for this study in order to code task structuring, task feedback, and task consequence dimensions of the interaction. Five subscripts were also defined to code verbal behavior from sources other than the teacher or pupil, e.g., aides, resource persons, etc.
Approximately four weeks were used in September, 1977 to encode the tapes. Because of the complexity of the coding system and the variable audio quality of the tapes, each session was listened to several times with frequent stops and starts of the tape. While rare in occurrence, sections of a tape that were unintelligible were not coded. The beginning and ending of each 10-minute session was indicated by the words "Begin" and "End", recorded live by the observer and recorded simultaneously with the teacher on another audio channel.

In most encoding work, some special conventions are developed for the particular situation under study. In this study, a frequently used convention was developed to code task structuring statements by the teacher that contained more than one task structuring category in the same utterance. For example, a teacher might say, "John, I want you to do four Skill Pacers in your reading book and get 80% of the questions correct." Since reference is made to a task (doing Skill Pacers), the amount of work to be done (four), the materials to be used (reading book), and the expected quality of the work (80% correct), this statement was coded T4A$D*, T4A$B, T4A$E, and T4A$C (*see Figures 6 and 7 for the coding labels used for the subscripts).

*The $ symbol is used in computer processing of encoded data to designate that a subscript follows that is associated with the preceding behavior.
Another frequently used convention involved the Arrange subfunction during Open Time. It will be recalled that Open Time was a block of time during which pupils worked independently or in groups with or without the teacher on a variety of tasks in several subject areas. The teacher often instructed or checked the work of individuals or groups of pupils. During Open Time much substantive interaction between the teacher and pupil was coded with an Arrange subfunction symbol since the context made it clear that the teacher was arranging conditions for future successful independent work by the pupil. For example, when a teacher was going over a substantive task procedure, like division steps, with a pupil or small group, this was coded with an arrange subfunction since the teacher was arranging instructional conditions so that the assigned task could be completed later with a minimum of teacher intervention. Typically, after interacting with one pupil like this, the teacher went to another, leaving the first to complete the work independently. The key to the use of the Arrange subfunction was that the teacher momentarily intervened to establish or modify the instructional conditions as a necessary condition for the successful completion of a task being done independently by a pupil or being done in a small group in which the teacher was only momentarily a member.
The Arrange subscript was also used in pretest situations. For example, when the teacher gave an oral spelling pretest at the beginning of the week, this was coded T7A$K where the A indicates the arrange subjunction and the subscript K indicates pretest behavior. Pretests were judged to be an Arrange behavior because they represented one instructional step, determining pupils' deficiencies, that was a necessary condition for the successful completion of later instructional tasks. The decision to code this and the previous situation as an Arrange behavior was heavily dependent upon the contextual cues that indicated the behavior was a means to an end. When contextual cues made it clear that testing or substantive task procedure behavior was the end in itself, then the Arrange subfunction was not used.

The use of one of the subscripts, Work Quality, needs to be distinguished from the use of appraisal behaviors. The Work Quality subscript was used in two situations. The first situation occurred when the teacher established an expectation in pupils about an assigned task that had not been started. For example, the Work Quality subscript was used when the teacher was making a task assignment that included a statement like, "I expect you all to get at least 90% of the spelling words correct." The second situation occurred when the teacher was checking a pupil's work to determine the quality or correctness of the work. Both the nonverbal
checking behavior (inferred by contextual cues) and teacher statements like, "you got 50% correct," were coded using the Work Quality subscript. If, however, a pupil(s) and teacher engaged in reciprocal substantive interaction, a teacher judgment of correctness or incorrectness was not used with a Work Quality subscript. Thus, the key to the use of this subscript with appraisal behaviors was that it was used during Open Time when a pupil brought the results of his work to the teacher to be judged.

A final convention needs to be mentioned. Teacher managerial solicitation, T07, was used after the teacher asked a question and called upon a specific student.

**Code Reliability and Validity.** A check of coding consistency and accuracy was made by another investigator skilled in OSIA coding who had worked with the original investigator when the data were first collected. The procedure used was to identify up to three behavior sequences within each 10-minute observation period. Behavior sequences on the code sheet evidencing complex behavior patterns or coding difficulties were selected first. If neither of these was in evidence on the code sheets, then one randomly selected behavior segment was checked. Once the segments were selected, the tape was listened to in order to check the accuracy of the coding. Coding consistency was assessed by comparing 10-minute samples that were coded first by this
investigator with 10-minute samples that were coded later. There was over 90% agreement between the two investigations for both individual behaviors and sequences.

The method used for checking the accuracy and consistency of coding and the high degree of agreement found suggest that the coding was done reliably. Since the correctness of individual category judgments were checked and a high level of correctness found, this evidence suggests that the category definitions were clear, unambiguous, and referentially "real" for this study. Thus, there is reason to believe that the categories possessed construct validity for this study. The high degree of inter-rater agreement for both individual categories and sequences across observations is evidence of reliable coding across different observations. Since coding was reliable across observations and since there is evidence for the categories having unambiguous meanings and referents, it is argued that the category system possessed concurrent validity.

Data Set 2: Observational Data Focused on Pupil Subject Sample

A colleague of the original investigator was given the task of selecting six pupils in each of the four classes to represent three different types representing high, medium, and low capacity to achieve. These classifications were
based upon scores on standardized achievement (Towa Test of Basic Skills) and IQ tests (verbal, non-verbal and quantitative sub-tests of the Cognitive Abilities Test) and upon locally constructed pupil motivation and capability instruments that were completed by the teacher on each pupil. The distribution of scores on each of these tests was divided into fifths. Each pupil's raw score on each of the tests was converted to a score from one to five, reflecting the score's position in the distribution. The converted scores were then summed across all tests. Observed pupils were selected from the distribution of summed, converted scores with the two each high and low pupils coming from the two extremes of the distributions and the two middle level pupils from the middle of the distribution. Only the names and pictures of these pupils were given to the original principal investigator. He was not given information about their capacity to achieve although he did know the pairs without knowing which were high, medium, and low. The pupils were not aware that they had been selected for specific observation and that their behavior was being coded.

**Time Sampling**

As with the teacher observational data, the week was the most basic time unit since in general, tasks were assigned and started on Monday and ended on Friday. Since the week could be divided into days and each day divided into subject
matter periods, days of the week and subject matter periods were sampling variables. The principle guiding the sampling of pupil behavior was to obtain representative information of pupil behavior in 10-minute units by days of the week, by subject matter periods, and by pupil type. Within any subject matter period, the decision to observe one pupil instead of another was a function of natural occurrences, including the pupil's presence and whether or not a pupil of his type had been observed in that subject matter period that day. It was possible to obtain observations of each pupil each day for Open Time.

Data Collection

Coded pupil behavior was obtained by the original investigator during the same week that the teacher's behavior was audio-recorded. While being stationed in a part of the class area giving full view of the area, the original investigator alternately either coded one of the six selected pupils or audio-recorded the teacher's behavior. Both the pupils and the teachers were observed for 10-minute time periods as determined by a stop watch. A record was kept of which pupil was observed during a particular subject matter period in order to assure that there were observations of the different types of pupils during the different subject matter periods. Since Open Time accounted for the greatest amount of time each day in each teacher's class, it was
possible to obtain at least five observations of each pupil during the week, usually one each day. For Reading period and Class/Group period, at least four observations were made in each class. Of the four, there was at least one observed pupil from each group of achievement capacity. At least four observations were made in Science period and three in Random House period during the week in each class. However, the pupils in these latter periods were not the sampled pupils for reasons explained above in the section on the sample.

Category System for Encoding Pupil Data

During the pilot phase of the original study in December, 1975, the original investigator developed a modified version of the OSIA IV category system. The system that was developed coded what the pupil did, with whom or what the pupil was doing something, the characteristics of the materials being used, the type of instructional context, the characteristic of the curricular content and task. Figure 8 shows the categories within each of these dimensions.

In addition to these categories, any interaction the pupil had with the teacher was coded using OSIA IV. This was possible because of the microphone the teacher was wearing that was capable of picking up both her voice and the voice of any pupil with whom she was speaking.
Pupil Behavior

Thinking
Sensing Instructional Materials or Events
Manipulating Materials
Moving from One Place to Another
Waiting for the Teacher
Engaging in Personal Management
Engaging in Expository Communication
Engaging in Instructionally Non-Functional Behavior

Expository Communication with Teacher
Expository Communication with Another Pupil
Expository Communication with Teacher Aid or Other Person
Reciprocal Teacher-Pupil Communication
Reciprocal Pupil-Pupil Communication
Reciprocal Pupil-Other Communication
Private Communication with Self
Using Instructional Materials

Materials Characteristics

Language
Representational
Realia
Any Combination of the Above Materials Form--audio, visual, audio-visual, tactile-manipulative

Instructional Context

Class
Group
Dyad
Independent Setting
Other

Curricular Content Characteristics

Task Completion Time Is Fixed
Task Content Is Fixed (predetermined)
Task Completion Time Is Variable
Task Content Is Variable (pupil's choice or open-ended)

Figure 8. Categories for Focus on Pupil Observations
Since the categories used for coding pupils represent minor modifications or combinations of those used in OSIA IV and since definitions are found in Hough and Duncan (1980), definitions will not be given for them.

**Encoding Pupil Data**

Pupil data were coded live in the classroom for 10 minutes each 15 seconds for a total of 40 tallies in each dimension for that 10-minute period. Since no other observer was in the room and since no other recording of pupil behavior was taken, no assessment of coding consistency and accuracy could be made. The principal investigator, however, is an extremely skilled, much experienced coder and developer of OSIA IV. In other contexts, checks of intra-code reliability have been very acceptable.

Reactive effects of having an adult observer and his equipment in a class were judged to be minimal for the following reasons: (a) pupils did not know who was being observed; (b) pupils were desensitized to the observer presence because of prior pilot study and the observer’s presence in the class as a participant observer prior to the collection of these data; (c) the principal investigator tried to be as inconspicuous as possible; (d) because it was an innovative school and received many visitors, teachers and pupils were probably used to observers; (e) interview information with the teachers after all observations were
completed suggests that after the first day there was little awareness of the observer by the teacher or pupils as noticed by the teacher.

Data Set 3: Participant Observation Records

The Participant Observation Process

One of the roles assumed by the principal investigator was as a participant observer taking the role of a new pupil in the teachers' class. The purpose was to experience what it was like to be a new pupil entering mid-year in each of the four classes by observing and doing the things that every other pupil did. Thus, the teacher was instructed to treat the observer like any other pupil. The principal investigator did not participate with students in activities held outside of the instructional cluster, physical education, art, music and recess.

Notes were made during periods of the day when the rest of the class was at gym, art, music, recess, lunch, other school functions, and after school. Questions were also asked of informant pupils during observation periods when the observer was not sure of the meaning, intentions, or procedures of some task. When the notes were made, the events in which the observer engaged were recounted in sequence and speculative notes or questions were written down. The latter were indicated by the word "Note" before the statement or question. These written records represent
documentation of the tasks in which the observer engaged during a five-day period, Monday through Friday, on each of the four classes under study with the exception of lunch, recess, music, art and gym.

Analysis of Participant Observation Records

The analysis of participant observation records poses special problems because of their qualitative nature. Analysis requires identifying the fundamental elements and the relationships between elements that explain a phenomenon (Bollens and Marshall, 1973). Depending on the degree of analytic precision desired by the investigator, a continuum of analytic strategies exists. The least precise analysis would be intuitive interpretation based on reading the records. The most precise analysis would be to apply a carefully defined coding system to the records in order to obtain counts of the occurrences of whatever constructs are being coded. A coding system can range from a predefined, theoretically based one to an atheoretical, emergent system that develops from the data and the investigator's insight (Bogdan, 1972). For this study, a predefined, theoretically based set of categories was developed because of the theoretical nature of the study. In general, then, a series of categories was defined that was derived from the theoretical constructs of task consequence conditions and classroom limiting conditions. These categories were used to analyze the content of the participant observation records.
Content Analysis. Berelson (1952), one of the pioneers in the field of content analysis, defined content analysis as a "...research technique for the objective, systematic, and quantitative description of the manifest content of communication" (p. 18). According to Selltiz, Wrightsman, and Cook (1976), content analysis is carried out under certain controls that render the process systematic and objective. These controls include the following: (a) clear and explicit definitions of the analysis categories such that others could apply them to the same content to verify the same findings; (b) a methodical classification of all relevant material; (c) a quantitative procedure that permits comparison between samples of material. Some recent notable attempts to use content analysis in research in teaching are Smith and Geoffrey's ethnographic study (1968) of teaching in an urban, slum school and Lortie's study (1975) of teaching as a type of work. The first study emphasizes hypothesis and theory generation grounded in the data while the second stresses systematic interpretation of questionnaire information.

Development and Definition of Content Analysis Categories

The development of analysis categories followed from the theoretical constructs related to consequence conditions and limiting conditions discussed earlier. In addition, categories were defined such that any set was exhaustive and
mutually exclusive and logically derived from a theoretical construct. In general, categories were established for the tasks in which the observer engaged, the context in which the observer worked, the materials the observer used, and the reward/cost consequences encountered by the observer. Tasks were also classified by subject matter focus, e.g., math, science, language, etc.; the block of time in which the task behavior occurred; and the class in which it occurred. Since many categories are related to the construct "task", it needs to be defined. A "task" is defined as any sequence of purposeful behavior which has reward and cost consequences. The working definitions for the categories are explained below.

**Task Contexts.** These refer to the contexts in which the observer worked. They are differentiated by how many persons are in the context, by who is in it—teacher or pupil, and by the type of task. Except for two categories, they have the same definitions as those used in the OSIA IV observational system. The definitions follow.

"Class" refers to all pupils and the teacher working together to accomplish a common goal. If a class context, no pupil of the teacher's is working in another context.

"Group with Teacher" refers to a subset of three or more of the entire set of pupils working with the teacher to accomplish a common goal. Except for the "class" context, other contexts are possible at the same time.
"Group without Teacher" refers to a subset of three or more pupils working without the teacher to accomplish a common goal.

"Dyad with Teacher" refers to a subset of one pupil working with the teacher to accomplish a common goal.

"Dyad without Teacher" refers to a subset of two pupils working together to accomplish a common goal.

"Independent" refers to a subset of one pupil working alone to accomplish a goal.

**Task Type.** These categories refer to a purposeful sequence of behavior. They are consistent with the definitions given about tasks in an earlier chapter. The definitions follow.

"Substantive Task" refers to any pupil behavior intended to accomplish the teacher-approved learning goals of the classroom which have reward/cost consequences. Doing a math exercise, a language station, or writing a story are examples.

"Managerial Task" refers to any pupil behavior intended to create the immediate necessary conditions for the occurrence of substantive tasks which have reward/cost consequences. Finding and arranging science experiment materials, organizing books and chairs for later use, and sharpening a pencil are examples.
"Non-functional-Other Initiated Task" refers to any other pupil behavior the purpose of which is neither substantive or managerial and which is in response to a stimulus from someone else. This behavior has reward/cost consequences. Playing paper football, hockey, or talking about recess at the request of someone else are examples.

"Non-functional-Self-Initiated Task" refers to any other pupil behavior with reward/cost consequences that is neither substantive nor managerial and which is not the result of a solicitation from another person. Watching pupils play a game, thinking about recess, soliciting others to play football are examples.

Substantive Task Function. These categories refer to the learning function served by the particular substantive task. The definitions follow.

"Structuring" refers to any substantive task in which the pupil is obtaining necessary information for the successful completion of the task. Specifying the learning goal of the task, explaining the substantive procedures to be followed later when the pupil is working in a context without the teacher, specifying how much, how well, how long and with what materials the task is to involve are examples. These examples follow directly from the task structuring subscripts developed for the teacher data set.
"Initial Learning" refers to any substantive task whose purpose is to bring about a new psychomotor, cognitive, or affective behavior pattern. Completing math, language, or Random House dittos, a class discussion on the meaning of a story, making a creative drawing of types of fish are examples. The distinction between an initial learning task and a task-procedures structuring task is that in the latter the pupil is being introduced to the new behavior so that it can be practiced or repeated later during an initial learning task.

"Feedback" refers to a task which functions to provide evidence to the pupil and/or the teacher as to whether or not the new behavior has been successfully learned. Pre-tests, post-tests, diagnostic probing by the teacher are common examples. Again, these examples of the category derive from the set of task monitoring subscripts developed for coding teacher behavior.

"Follow-up" refers to any substantive task following initial learning and feedback that functions to maintain new behavior through occasional practice or to remediate incorrect behavior. Playing a mathematics game that requires the use of previously learned behavior and being cycled into remedial work because of inadequate posttest performance are examples.
**Task Control.** This refers to the person who makes the decision as to whether or not a future task occurs.

"Teacher Control" refers to a decision made by the teacher with or without student input as to whether or not a pupil will engage in a task. Examples are a teacher assigning a workbook page, telling the class to write a story, or having pupils take a spelling test.

"Pupil Control" refers to a decision made by the pupil either from task options generated by the teacher, or other pupils, or himself as to whether or not he will engage in a task. Examples are self-initiated looking around the room, selecting to do a language task from a list of five possible ones, or selecting the words to be studied for spelling.

"Joint Control" refers to a negotiation process between the pupil and another in which alternative positions are assessed and a mutually acceptable compromise is reached. An example of a joint control task would be the negotiation of a supplementary, independent task.

**Time Frame.** This refers to the unit of time allocated for the completion of a particular task.

"Same Period" refers to the unit of time in which the task occurs as indicated by the participant observation notes. The day is divided into several periods, e.g., Random House, Open Time, Science, Silent Reading, and Language, which constitute one type of time frame.
"Same Day" refers to a time frame in days in which the task is expected to be completed prior to the end of the day in which the task is initiated.

"______ Days Ahead" refers to a time frame in days in which the task is expected to be completed. For example, many tasks are started on Monday and have a completion date of the next Friday.

**Performance Standard.** This refers to the public standard by which a task is judged to be successfully completed.

"Same" refers to a common standard applicable to all pupils for a particular task. Having everyone receive 80% correct for a particular task is an example.

"Class Norm" refers to a standard in which the distribution of all pupils' scores is arrayed and pupils' performances are ranked relative to each other. Grading on the curve is an example.

"External Norm" refers to the comparison of the distribution of performances of the class to the distribution of performances of a group of pupils external to the class. Standard scores of a pupil's performance on a norm referenced reading test is an example in which the pupil's performance is compared to the national sample of pupils who took the test.

**Substantive Material Novelty.** A substantive material is defined as any necessary physical object used by the pupil to
accomplish a substantive task. The novelty of the material refers to the frequency of its use. Materials were classified by function and then their use was tallied. For example, paper and pencil function as implements for responding; a ditto functions as a self-contained stimulus source and response record; a dictionary functions as a word information source; and a workbook functions as an elaborated stimulus source and response record. Once tallies were made, each material was rated as being high, middle, and low in novelty. Ratings of each material were a function of their absolute frequency and their use pattern.

**Substantive Material Complexity.** This refers to the number and configuration of the physical manipulations required to use, either directly or vicariously, the material. Again, materials were rated on an ordinal scale in relation to this variable. For example, the physical manipulations required to correctly use a movie projector, cassette recorder, and an audiometer machine were judged to be greater than a dictionary or encyclopedia which were judged more complex than using a textbook, ditto sheet, or library book.

**Substantive Material Availability.** This refers to the characteristic of material related to its being had or its accessibility. Availability is a function of its amount relative to demand and of the restrictions placed by the teacher on how much is allocated. In terms of ordinal
judgments, high availability materials were conceptualized as low restriction, high amount materials relative to demand. Low availability materials were conceptualized as high restriction, low available materials. Materials falling into the other combination of characteristics were judged to be middle availability group. High availability materials included paper and pencils, ditto sheets, math texts, etc. Low availability materials included films and filmstrips since their use was highly restricted by the teacher and their quantity relative to demand was low.

**Resource Sufficiency.** This refers to the fitness, suitability, or adequacy of the materials for accomplishing the task. There is a relationship with resource availability. If a material's availability was judged to be low restriction, low amount, then the low amount implies an insufficiency of materials, making them inadequate for accomplishing a task. Some materials were inadequate because they were not fit as when machines broke down, or cassette tape materials proceeded too quickly for comprehension or dittos could be read only with great difficulty. Some materials were not suitable for the task as when a math problem was misdiagnosed and remedial materials were assigned that were not appropriate for the real problem. Since resources are broken into three categories, time, material, and human, adequacy judgments were made for each of these for any substantive task.
**Self Rewards and Costs.** These categories of consequences are derived from the theoretical constructs of Homans (1961) and Bandura (1977). A "reward" is defined as any valued or need-fulfilling consequence or punishment avoided that has informative, motivational, and reinforcement functions. A "cost" is any aversive consequence or reward foregone that has informative, motivational, and punishment functions. A "self reward or cost" refers to any reward or cost administered to oneself.

"Material Self" rewards/cost refer to physical objects like food, toys, money that are administered to oneself.

"Symbolic Self" rewards/cost refer to consequences administered to oneself that are mediated by symbols. Self-criticism or self-praise are examples.

"Substantive Task Self" rewards/costs refer to the use of any substantive task administered to oneself as a consequence. An independent study project would be an example of a reward, while doing an extra math ditto because the pupil judged he had done poorly on the previous one is an example of a cost.

"Non-substantive Task Self" rewards/costs refer to any non-substantive task administered to oneself as a consequence. Gazing around the room after completing a substantive task is an example of a reward. Removing oneself from a rewarding game is a cost example.
Vicarious Rewards and Costs. These categories of consequences represent ones that are experienced indirectly through observation, cognitive mediation, and emotional arousal. Thus, a person vicariously experiences the effects of being reprimanded by the teacher when he observes the teacher doing it to a classmate for a rule violation. As with "Self" rewards/costs, "Vicarious" rewards/costs can be categorized into material, symbolic, substantive, and non-substantive task types. The only difference is that these are vicariously experienced.

External Rewards and Costs. These categories of consequences represent ones that are administered by someone or something directly to the pupil. For theoretical reasons, a distinction is being made between "public" and "private" external rewards/costs. A "public" reward/cost is one that is administered and witnessed by one or more persons other than the one administering it. A "private" reward/cost is one that is administered without witness. In addition, a distinction is made between contingent and non-contingent consequences. A contingent consequence is one in which the recipient knows that the occurrence of the response is a sufficient condition for the occurrence of a particular consequence. A non-contingent consequence is one in which the recipient does not know that the occurrence of a response is a sufficient condition for the occurrence of a
particular consequence. An example of a contingent reward is being told by the teacher that they can play games if they finish them and their playing them when they are finished. An example of a non-contingent cost is unexpectedly being interrupted in one's work by another pupil. Categories representing various combinations of material, symbolic, and substantive and non-substantive task consequences that were either public or private and/or contingent or non-contingent were generated. Because the combinations are so numerous, examples will not be given.

Sampling Non-Equivalency

Each day was divided into time periods during which substantive tasks in different subject areas took place. While this study is concerned only with Teacher D, Table 2 shows the variation in time spent by the participant observer in these subject areas in each of the four teacher's classes for each day. The minutes were computed on the basis of the start and stop times for each of the periods given in the participant observation records.

Inspection of Table 2 shows great variation in the allocation of time to different subject areas, e.g., only two teachers had News Explorer and mathematics classes while every teacher had Random House and Science classes. Even when all teachers held classes in particular subjects, there were variations in the days they were held, e.g., Random
House, Social Studies, and Science occurred mostly on Tuesday, Wednesday, and Thursday, but Open Time occurred every day. Finally, there is great variation in the time spent in a subject across days within and between teachers. For example, on Monday, the range of time spent in Open Time Total across teachers was 125 minutes to 205 minutes; on Wednesday it was 90 minutes to 205 minutes. If one selected a particular teacher, D for example, the range of time spent in Open Time Total across days is 105 minutes on Friday to 205 minutes on Monday.

While Table 2 is interesting for showing how different teachers within one school differentially allocate time, it is also clear that there is a great deal of non-equivalency in time spent in subjects across days and across teachers. Because the lack of equivalency would make meaningful comparisons between teachers difficult, this was another reason for restricting the theoretically guided analysis of the data in this study to Teacher D and Open Time. Open Time for Teacher D was selected because, as Table 2 shows, the data is complete.

**Encoding Procedures Problems.** Despite careful definition of categories judgments were made for those occurrences which did not fit neatly into one of the categories or for which insufficient information was available about an occurrence that otherwise could have been easily categorized. As
to the latter, the determination of which substantive function a particular task was often difficult because of insufficient information. For example, is listening to a pupil report on Ben Franklin’s life serving an initial learning or follow-up function when there is no prior information indicating any prior experience with the subject of Ben Franklin? In the face of insufficient information regarding these categories, the rule was to always code the function as initial learning. The rule is justified on the basis that the subject curricula tended to be individualized rather than common. Even if a topic was common across all pupils, like Early American Patriots, different pupils would study different aspects. A report to the class, therefore, was likely to be the first time the rest of the pupils encountered the subject for the common purpose previously defined. Thus, in dealing with category decisions for which insufficient specific information was available, prior or future information for that teacher and class was examined for clues indicating what was typically the case. Given all available information, a specific category decision was made on the basis of what was typical. That it was a high inference decision was indicated by the capital letter I on the code sheet; otherwise tally marks were used.

Sometimes aspects of a task did not easily fit into a category. This was most often true for decisions about the
### Table 2

**Distribution of Subject Area Minutes by Teacher and Days of the Week**

<table>
<thead>
<tr>
<th>Day</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A  B  C  D</td>
<td>A  B  C  D</td>
<td>A  B  C  D</td>
<td>A  B  C  D</td>
<td>A  B  C  D</td>
</tr>
<tr>
<td>Teacher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Time Total</td>
<td>125 140 130 205</td>
<td>140 140 140 155</td>
<td>125 90 90 185</td>
<td>55 115 190 75</td>
<td>105</td>
</tr>
<tr>
<td>AM</td>
<td>80 80 80 70</td>
<td>65 40 15 70</td>
<td>80 20 40 120</td>
<td>35 40 110 45</td>
<td>105</td>
</tr>
<tr>
<td>PM</td>
<td>45 60 50 135</td>
<td>75 100 110 85</td>
<td>45 70 50 65</td>
<td>20 75 80 30</td>
<td></td>
</tr>
<tr>
<td>News Explorer</td>
<td>60</td>
<td>45</td>
<td>15</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Language</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random House</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Science</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Social Studies</td>
<td>130</td>
<td>45</td>
<td>70</td>
<td>65</td>
<td>45</td>
</tr>
<tr>
<td>Mathematics</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Spelling</td>
<td>15</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>280</td>
<td>260</td>
<td>265</td>
<td>280</td>
</tr>
</tbody>
</table>

*Classes were not held because of a professional day*

**Classes were not held because of a snow emergency**
degree of a material's availability. Like the previous problems, insufficient information made the decision more difficult, but the difficulty is also one of conceptual vagueness. For example, at what point are library books judged to be of low availability, middle and high availability?

Since availability was conceptualized as being a function of amount relative to demand and of allocation restrictions, a somewhat interactive mental juggling of these two dimensions was done based on all information before, during, and after the task. Since the scale is ordinal, a judgment of availability was made relative to the availability of the material at other times, post and future. Difficult judgments affect coding reliability.

Encoding. The basic coding unit was the substantive, managerial, or non-functional task. A task was defined as any sequence of purposeful behavior that had reward/cost consequence potential. The participant observation record typically contained description of what the observer was doing, with whom, and with what resources. This descriptive information served as the basis for judgments about a task. For each task, tally marks were made for the appropriate category for each of the areas previously defined. If the observer's behavior changed and a different purpose was inferred, a new set of tally marks for each of the categories was made. A new task could occur if the behavior
shifted from substantive to managerial or any of the other possible combinations. A new task could also occur within one of the three examples. For example, during Open Time period, the observer may have engaged in reading a library book and then completed a math ditto. Since it was inferred that the substantive purposes of these tasks changed, they were coded as different tasks. This process continued until all records were coded. The notes found at the end of some records were not coded. However, the information they contained was often useful in making judgments about ambiguous situations.

Coding Reliability. Intra-coder reliability was assessed through a simple formula giving the percent agreement between coding the same task on two different occasions. The formula is given below.

\[
\text{Percent Agreement} = \frac{100 \times \text{Number of Categories Coded Identically}}{\text{Total Number of Categories Coded}}
\]

Since tasks could vary because of the subject matter focus or because of the teacher's arrangement of the task, three tasks were selected, one each from a different day for each subject for each teacher and an agreement percentage was computed for each task based on two separate codings a week apart. The average of these three percentages is reported in Table 3 by teacher and subject matter.
<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Teacher C</th>
<th>Teacher D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>85</td>
<td>88</td>
<td>97</td>
<td>93</td>
</tr>
<tr>
<td>PM</td>
<td>88</td>
<td>90</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>News Explorer</td>
<td>95</td>
<td>100</td>
<td>95</td>
<td>*</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random House</td>
<td>92</td>
<td>95</td>
<td>95</td>
<td>98</td>
</tr>
<tr>
<td>Science</td>
<td>90</td>
<td>93</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Social Studies</td>
<td>92</td>
<td>90</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Mathematics</td>
<td>98</td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Spelling</td>
<td></td>
<td>100</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

*All empty cells mean that separate subject matter periods were not held.
Areas of greatest disagreement were Materials Complexity, Novelty, and Availability and Self, External, and Vicarious Rewards and Costs. However, since all agreement percentages approached 90 or better, the data were judged to be consistently coded.

Content Analysis Validity. It is argued that the content analysis system has at least face validity and logical construct validity. As to face validity, the categories bear an obvious, intuitive relationship to the analysis of task sequences and limiting conditions outlined in Chapter III. As to construct validity, the categories and their definitions represent logical applications of theoretical constructs to participant observation records.

Data Analysis and the Logic of Reconstruction

Any attempt to develop an explanation of some phenomena after non-experimental data have been collected runs the risk of committing a post hoc fallacy. The possibility for committing such a fallacy is less a reason for eschewing attempts at explanation but more a warning to the investigator that developing valid ex post facto explanations are problematic. That ex post facto explanations are satisfactorily done is evidenced by their use by historians, art critics, detectives, and anthropologists. Each perhaps have their own standards for what constitutes a satisfactory explanation, but there can be no doubt that practitioners
within each of those fields have developed satisfactory explanations.

This study represents an attempt at developing a valid \textit{expost facto} explanation for the high level of pupil substantive tasks time observed in one teacher's class during one week of observation. Data representing multiple perspectives the teacher, selected pupils, and a participant observer-were collected by the original investigator. This investigator created some of the data by defining the coding categories for both the teacher and participant observation data sets, but these categories emerged after the data had been collected and without having had first-hand experience with the classroom in which the data were obtained. In one sense this is like the historian working with records of events collected or made by others. A crucial difference is in the systematic ways in which the data for this study were collected and created. Another critical difference between this analysis and historical analysis is the historian's use of genetic explanations in which the origins and development of some phenomena are detailed. While the origins and development of the high level of substantive tasks time is a potentially interesting question, it is not the question of this investigation. Nor is the explanation of the occurrence of substantive task time the question since a satisfactory functional explanation for that could be developed with much
less effort. Understanding the conditions that regulate pupil substantive task time is the question of interest, a question requiring a different type of explanation.

Scriven (1974) has articulated a strategy for maximizing the explanatory power of a non-experimental study. By assuming a week, local determinism, the strategy is analogous to the mechanic searching for the causes of a malfunctioning engine. The assumption that is made by a mechanic is that there is a determinate number of causes of the malfunctioning engine. When these causes are listed as a result of prior experience or theory, then indicators of each can be defined and their presence checked.

If the "presence check" results in only one cause being found while the others were absent, then the conclusion is that the existing cause probably determined the outcome. The conclusion is probabilistic because of the possibility that not all possible causes were checked or because insufficient data existed for checking the presence of a cause.

When a presence check reveals more than one cause, Scriven suggests that the investigator utilize a "modus operandi" check. Making a modus operandi check involves examining the data for the endogenous properties, processes, or events that link the cause to the effect of interest. It is these characteristic properties, processes or events that enable the investigator to link a cause with the effect of
interest. It is always possible that a cause may be present, e.g., a gun, but its mere presence in the presence of other possible cause does not enable one to conclude that the gun was the cause or a co-cause of the event. One would first have to establish the link between the gun's presence and the effect (death) by showing that it had been fired, that a bullet hole in the person existed and that the bullet from the gun in question entered the victim's body. When two or more causes are present, it is the existence of a complete modus operandi that determines whether a cause determined an effect. If more than one complete modus operandi exist, than the effect has been multiply determined.

Even when it is not possible to list all possible causes, checking a partial causal list can be helpful. If one of the listed causes results in a successful check of a complex modus operandi, then the conclusion that the scrutinized cause determined the effect is made more probable, given that the probability of another cause with an identical modus operandi is very low.

So far, two methods, presence check and modus operandi analysis, for determining whether or not one or more causes resulted in a particular effect have been discussed. Data analyses for these two methods involve those ascribed to qualitative analysis, that is, classification, enumeration, and descriptive statistics. When interest evidence does not
exist, then logical analysis may permit circumstantial inferences.

A third situation occurs when multiple weak causes are present, no one of which is a sufficient condition for the effect, but when taken together, they are sufficient in totality to determine the effect. For example, some students are not inclined to change their misbehavior by the presence of either the threat of punishment or a visible paddle, but their joint presence is a sufficient condition for changed behavior. Correlational analysis, like path analysis, permits a quantifiable assessment of the separate and joint effects of a set of causes.

In this study, it is not claimed that all possible causes of high pupil substantive task time have been listed. Only a partial list is claimed, leaving other investigators to define and examine the data for the presence and modus operandi of other causes. It is also not claimed that the links between the causes and effects can be specified a priori as they could be with mechanical or bio-chemical systems. This is a shortcoming of Scriven's approach since it is likely that the actual linkages differ from context to context, making it difficult to determine when a complete modus operandi analysis has been done. If one is not able to define tracers or indicators a priori, then one is left to constructing them after the data has been collected. To do
this, theory is drawn upon to the same type of data analysis, suggest possible linkages and that is, classification, enumeration, and descriptive statistics, combined with logical argument is used. To identify the course or causes and explicit their modus operandi.

Thus, in light of the modus operandi approach to developing a causal explanation for the observed high levels of pupil substantive task time, the data will be examined by day for the presence of the cost and reward consequences that regulate behavior. Their presence will satisfy the first condition for making a probabilistic inference. The remainder of the analysis of the consequences occurring each day will attempt to detail the events, processes and properties that causally link the presence of the consequences to pupil’s substantive task behavior. The analyses of the proposed limiting conditions represents a detailed elaboration of conditions that may affect the linkages between substantive task behavior and regulatory consequences.

Operational Definitions

Figure displays the operational definitions for each construct in each hypothesis. Since there are three data sets, operational definitions exist for any data set for which data were available. Empty cells indicate that no operational definition for that data set was possible.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Focus on Teacher</th>
<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>Sum of categories T8, T9, T8A, T9A, T7$N</td>
<td>Sum of categories T8, T9, T8A, T9A</td>
<td>Sum of External and Vicarious Rewards</td>
</tr>
<tr>
<td>Substantive Task Time</td>
<td>Percentage of time in Substantive categories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question 2</td>
<td>Sum of categories T8, T9, T8A, T9A, T7$N in Class/Group Contexts</td>
<td>Sum of categories T8, T9, T8A, T9A in Class/Group/Pupil Dyadic Contexts</td>
<td>Sum of External of Vicarious Rewards in Class/Group/Pupil Dyadic Contexts</td>
</tr>
</tbody>
</table>

Figure 9, Operational Definitions
<table>
<thead>
<tr>
<th>Variable</th>
<th>Focus on Teacher</th>
<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Rewards</td>
<td>Sum of categories T8, T9, T8A, T9A, T7$N in Dyadic or Independent Contexts</td>
<td>Sum of categories T8, T9, T8A, T9A, T7 in Teacher Dyadic or Independent Contexts</td>
<td>Tally of Self, Vicarious, External Rewards in Teacher Dyadic or Independent Contexts</td>
</tr>
<tr>
<td>Private Costs</td>
<td>Sum of categories T11, T12, T11A, T12A, T04A, T05A, T07A, T7$0 in Dyadic or Independent</td>
<td>Sum of categories T11, T12, T11A, T12A, T04A, T05A, T07A in Teacher Dyadic or Independent</td>
<td>Tally of Self, Vicarious, External Costs in Teacher Dyadic or Independent Contexts</td>
</tr>
<tr>
<td>Question 3</td>
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<td></td>
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<tr>
<td>Contingent Reward Substantive Tasks</td>
<td></td>
<td></td>
<td>Tally of Pupil Control or Joint Control Substantive Tasks that are consequences of Prior Substantive Tasks</td>
</tr>
<tr>
<td>Contingent Reward Non-Functional Tasks</td>
<td></td>
<td></td>
<td>Tally of Pupil Control or Joint Control Managerial and Non-functional Tasks that are consequences of Prior Substantive Tasks</td>
</tr>
</tbody>
</table>

Figure 9. Operational Definitions (cont.)
### Data Source

<table>
<thead>
<tr>
<th>Variable</th>
<th>Focus on Teacher</th>
<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
</tr>
</thead>
</table>
| Question 4  
Task Difficulty | | | Tally of Follow-up Tasks and Tasks with Insufficient Time, Human, and Material Resources |
| Question 5  
Class Structuring | Sum of subscript categories T$A$, T$B$, T$C$, T$D$, T$E$, T$G$, T$H$ | | Tally or Task Structuring Occurrences |
| Question 6  
Task Feedback | Sum of subscript categories T$F$, T$I$, T$J$, T$K$ | | Tally of Feedback Occurrences |
| Question 7 and 8  
Substantive Task Time | | Percentage of Behavior in Pupil Substantive categories | Tally of Substantive Task Occurrences |
| Managerial Tasks | | Percentage of Behavior in Pupil Managerial categories | Tally of Managerial Task Occurrences |

Figure 9. Operational Definitions (cont.)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Focus on Teacher</th>
<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-functional Tasks</td>
<td></td>
<td>Percentage of Behavior in Pupil Non-functional categories</td>
<td>Tally of Non-functional Task Occurrences</td>
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<td>Question 9 Substantive Teacher Contexts</td>
<td></td>
<td>Ratio of Substantive Task time in Class, Group and Teacher Dyadic Contexts to all contexts</td>
<td>Tally of Substantive Task Occurrences in Class, Group with Teacher, Dyad with teacher, to all contexts</td>
</tr>
<tr>
<td>Question 10 Number of Persons in Contexts</td>
<td></td>
<td>Percentage of Substantive Task time in each Context</td>
<td>Tally of Substantive Task Occurrences in each Context</td>
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<tr>
<td>Question 11 Amount of Task Completion Time</td>
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<td></td>
<td>Tally of Task Occurrences with Same Period Same Day, or Different Day due dates</td>
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</table>

Figure 9, Operational Definitions (cont.)
<table>
<thead>
<tr>
<th>Variable</th>
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<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
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</thead>
<tbody>
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<td>Question 12</td>
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<td>Percentage of Pupil Time in Independent Contexts</td>
<td>Tally of Differentiated Tasks</td>
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<tr>
<td>Differential Resource Allocations</td>
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<td></td>
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<tr>
<td>Question 13</td>
<td></td>
<td></td>
<td>Tally of novel materials used</td>
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<td>Novel Materials</td>
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<tr>
<td>Question 14</td>
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<td>Tally of complex materials used</td>
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<td>Tally of material availability</td>
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<td>Material Availability</td>
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<tr>
<td>Question 16</td>
<td></td>
<td></td>
<td>Tally of Substantive Tasks that have two or more Reward Consequences</td>
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<tr>
<td>Multiple Reward Consequences</td>
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Figure 9. Operational Definitions (cont.)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Focus on Teacher</th>
<th>Focus on Pupil</th>
<th>Participant Observation Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 17 Pupil Movement</td>
<td></td>
<td>Percentage of Pupil time in Moving Around category</td>
<td></td>
</tr>
<tr>
<td>Question 18 Reward Allocation Norum</td>
<td></td>
<td></td>
<td>Tally of rewards reflecting different norums</td>
</tr>
<tr>
<td>Question 19 Pupil Cognitive Capability</td>
<td></td>
<td></td>
<td>Pupil combined score on CAT test</td>
</tr>
<tr>
<td>Question 20 Pupil Choice Tasks and Resources</td>
<td>No operational measures exist</td>
<td></td>
<td>Number of tasks coded for which pupil choice was allowed for tasks and resources</td>
</tr>
</tbody>
</table>

Figure 9. Operational Definitions (cont.)
CHAPTER V

RESULTS

Chapters II and III established a theoretical perspective for interpreting the data. Derived from that theoretical perspective were specific questions to help focus the interpretative analysis further. As part of the modius operandi strategy, it will first be necessary to display the frequency counts and/or examples of the variables indicated by each question, to document the variables' presence. Theoretically guided logical and descriptive analysis will follow to try to link the variable with pupil substantive task time.

Three data sources exist for responding to each question. The first, the Focus on Teacher data set, consists of teacher verbal behavior that was analyzed for each of the five days - Monday through Friday - that Open Time was observed. The second data set, Focus on Pupil, consists of observation data analyzed on six pupils for five consecutive days of Open Time. The third data set, the Participant Observation notes, consists of the substantive, managerial,
and non-functional tasks in which the observer engaged for five days and described.

It will be recalled from Chapter III that these data sets were collected over two different, five day periods, each Monday to Friday. This fact was not judged to pose a serious analysis problem since the original investigator had a high degree of regularity in pupil and teacher tasks during the week and across weeks. Thus, the types of tasks pupils and teachers did on two Mondays were similar in both type and function for getting the week's work accomplished. Monday's were for getting pupils started on the new weeks work and Fridays were for finishing and checking the week's work. The days between were for completing daily and weekly assignments. This work schedule was repeated weekly giving a regularity to events that permits use of data sets derived from different weeks possible.

In order to provide some contextual background to help the reader interpret the results, a summary of the daily events follows. The summary is derived from the Participant Observation data set. Following the context summary, data on pupils' time on substantive, managerial and functional tasks will be presented. This section will be followed by data presentation and discussion of the research questions.
Context Summary

Monday (January 12)

"The school day just started. No fanfair, confusion or apprehension. Ms. B. and her students knew what to do and went about it in a relaxed and yet serious manner....The role was taken without childrens names being called..." (p.1).

Discussion of the days' and weeks' activities followed. Students read a children's newspaper silently and separately, and then came together to discuss what they read. Recess followed at 10:15 and lasted until 10:30. Upon their return, students took a math pretest and then worked on individual math assignments determined by the student's pretest performance. Independent work on math and reading assignments lasted until lunch at 11:50. After lunch, students read silently for 20 minutes until 12:50. From 12:50 to 1:35 students worked independently on a dittoed language assignment that was related to the morning News Explorer. After gym from 2:30 until the end of school, students worked independently on tasks previously assigned. During this time, the teacher met with individual students to check their work or to provide instruction. The participant observer finished all assignments with 10 minutes to spare and "felt a relaxed sense of accomplishment" (p.5).
Tuesday (January 13)

"School started in much the same way as yesterday. Students don't have to be told what to do. They seem to know the multiple routines and get started by themselves" (p.1). Students started at 9:15 working either with the teacher in a group or independently on a language assignment. Following this lesson, students went to their self-selected science lesson stations led by one of the six teachers in the area. In the observed teachers' section, students worked in small groups on experiments, while the teacher circulated among them, serving as a resource. Recess followed, and after recess most students worked independently on their weekly assignments while the teacher worked with a small group on math. Before lunch, a quiz was taken on Monday's newspaper. After lunch, students read silently for 20 minutes on their self-selected books. The participant observer completed his book, recorded that he had completed it, and obtained another from the library. After reading, the observed teacher's students and students of the other teachers watched a social studies film which would be completed on Wednesday. Independent activity during Open Time followed. The observer noted a fall-off in substantive task activity, possibly because of the excitement about seeing gymnasts later. The students then went to see the gymnasts. Upon their return at 2:50, those who had not completed their work
worked independently. Those who had completed their daily work played a mathematics multiplication game with the teacher.

Wednesday (January 14)

"School just started as usual. It just started" (p. 1). After the teacher and pupils discussed the day's special events, Random House began at 9:15. Students worked independently on a language worksheet in preparation for a game, while the teacher circulated, helping those who needed it. At 9:45 students moved to their science group with a different teacher, while the participant observer stayed with the observed teacher's class. In her class, small pupil-led groups worked until 10:20 at completing worksheet tasks started Tuesday. After recess at 10:30, students worked independently during Open Time on their daily mathematics, spelling, and reading assignments, while the teacher worked with a small mathematics group needing special help.

During Open Time, the teacher explained to the participant observer about how to do his spelling assignment. A little later, the observer realized that if he wanted to go to the special programs, he would need to complete his work before or stay after school to complete the work. Following lunch, the students engaged in silent, independent reading. The participant observer had a conference with the teacher about the book completed yesterday. At 12:50 all of the teacher's
students went to another area of the cluster to finish watching a social studies film started Tuesday. Following the film with no discussion, the pupils went to music. At 2:30 a special, optional art program started. Twelve of 26 pupils remained to complete their daily assignments, while the teacher checked completed papers and provided assistance when needed. This lasted until the end of the school day. Students who had not completed their daily work remained after school.

**Thursday** (January 15)

"School opened today as usual" (p.1). The day's assignments were explained. At 9:15 Random House began, and the time was spent in a teacher led group checking and correcting their previously completed work. In the last five minutes, a five item language test was taken by all pupils. At 9:45, the science class began. As a teacher led group, each student checked his own science worksheets. From 10:20 to 11:15, pupils first went to recess and then art class. At 11:15, independent pupil work on math assignments occurred during morning Open Time. Following lunch, a birthday party for the teacher, arranged by the students, took place instead of silent reading. After the party at 2:00, students resumed their independent work during Open Time. This time was used by pupils to complete their math assignment which was necessary if a pupil wanted to play in the math game at
2:20. At that time, all but four students had completed their work and played in the game until school ended. Some students stayed after school to complete their work.

**Friday (January 16)**

"The day once again just started" (p.1). The teacher explained that the special afternoon arts program would be attended only by those with their daily work completed. At 9:15, pupils read silently on their self-selected books while the teacher had a reading conference with one student. At 9:45, the teacher's science pupils watched a filmstrip as a review of the science concepts studied during the week. Following a review discussion, pupils worked independently on their daily tasks during Open Time. The participant observer took a spelling test with one of the pupils dictating the words. He then observed a small group of pupils playing a self-selected mathematics game and joined them at their invitation. The teacher moved from pupil to pupil, checking daily work and checking off pupils who had completed all tasks for the week. She announced that the regular end-of-week reward, the Happy Gram, given for completed work would be given out on Monday instead of Friday because many pupils had to watch weekend television in order to complete one of the assigned tasks. After lunch, the teacher read part of a book to pupils during the usual silent reading period. At 12:50, Open Time took place with pupils working to complete
their weeks work. From 1:20 to 2:30, the pupils attended an all-school assembly to listen to a tuba ensemble. From 2:30 to the end of school, all students in the teacher's area watched two social studies films without discussion following their completion.

Pupil Time In Substantive, Managerial and Non-Functional Tasks

Table 4 displays the proportion of substantive task time by day and by each pupil for Open Time. Data came from the Focus on Pupil data set.

Table 4
Proportion of Substantive Task Time by Pupils and Days

<table>
<thead>
<tr>
<th>Pupils</th>
<th>Jan</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>Total</th>
<th>TD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.99</td>
<td>.62</td>
<td>.99</td>
<td>.73</td>
<td>.58</td>
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<td>.58</td>
<td>-.41</td>
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<td>2</td>
<td>.88</td>
<td>.92</td>
<td>No. Obs.</td>
<td>.58</td>
<td>.87</td>
<td>.81</td>
<td>.58</td>
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<td>3</td>
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<td>.73</td>
<td>.69</td>
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<td>4</td>
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<td>.87</td>
<td>.47</td>
<td>.95</td>
<td>.97</td>
<td>.76</td>
<td>.45</td>
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<td>5</td>
<td>.73</td>
<td>.97</td>
<td>.72</td>
<td>.77</td>
<td>.77</td>
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<td>.72</td>
<td>.77</td>
<td>.77</td>
<td>.02</td>
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</tbody>
</table>

a "C" is a gross indication of the curve over the days of the week.
b "TD" is the sum of the change in proportion for each consecutive day.
Descriptive findings of note include the following:

1) The total time spent by each pupil in substantive tasks ranged from 69% to 81%.

2) Variability in substantive task time existed for each pupil. This is suggested by the figures in the C (curve) column which show the general shape of each pupil's curve across the weeks. Only the "total" row shows a nearly flat curve.

3) The shapes of the curves show that pupils 1, 3, and 6 decreased both early in the week and by the end of the week after a midweek increase. Pupils 2, 4, and 5 increased early in the week and by the end of the week following a midweek decrease.

4) For pupils 1 and 4, the transition from day to day tended to be more extreme as indicated by the TD column which is the sum of the change in proportion from one day to the next. For pupils 2, 5, and 6 the differences in proportions in consecutive days that were increases were nearly cancelled out by the differences in proportions on consecutive days that were decreases.

Since pupil behavior was also coded in terms of time spent in managerial and non-functional tasks, it is possible to show what each pupil did when not engaged in substantive tasks. Since these data will be referred to frequently throughout, they are displayed in Table 5.
Descriptive findings of note include the following:

1) Examination of the total column reveals that pupils 1 and 4 spent more time in non-functional behavior than managerial behavior by better than 2:1. Pupils 2, 3, 5, and 6 spent more time in managerial tasks by more than 2:1.

2) But variability across days existed for each pupil for both non-functional and managerial task time as shown by column C's distribution shape.

3) The shape of the curves show that for non-functional tasks three of six pupils finished the week with an increased proportion of time, one decreased, and two stayed the same. For managerial tasks, four of six pupils ended the week with increased proportions, while two pupils decreased.

4) As to the magnitude of the daily transitions for non-functional tasks, pupils' 4 and 5 downward transition was much larger than the sums of their upward transitions. The reverse was true for pupil 1, while the other three had transition scores of nearly zero. As to managerial tasks, the transitions for pupils 1 and 5 were more upward than downward, while for pupil 3 it was the opposite. The others were balanced.
Table 5
Proportion of Non-Functional and Managerial Time
By Days and By Pupils

<table>
<thead>
<tr>
<th>Days of the Week</th>
<th>C&lt;sup&gt;a&lt;/sup&gt;</th>
<th>M</th>
<th>NF</th>
<th>M</th>
<th>NF</th>
<th>M</th>
<th>NF</th>
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<th>NF</th>
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<tbody>
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<td>Pupils</td>
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</tbody>
</table>

"C" is a gross indication of the curve over the days of the week.

"TD" is the sum of the change in proportion for each consecutive day.
One final descriptive analysis of this data is to determine how the total proportions of time in substantive, managerial, and non-functional tasks are ordered. Correlations in Table 6 answer this question.

Table 6
Correlations of Substantive, Managerial, and Non-Functional Tasks

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Managerial</th>
<th>Non-functional</th>
<th>Managerial</th>
<th>Non-functional</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>- .94</td>
<td>- .99</td>
<td>.99</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>- .99</td>
<td>.46</td>
<td>- .50</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>- .96</td>
<td>.62</td>
<td>- .81</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>- .59</td>
<td>- .97</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>- .36</td>
<td>- .56</td>
<td>- .53</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>- .88</td>
<td>- .07</td>
<td>- .53</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>- .17</td>
<td>- .37</td>
<td>- .85</td>
<td></td>
</tr>
</tbody>
</table>

Inspection of Table 6 reveals the following:

1) For pupils 1, 2, 3 and 6 the relationship between substantive task time and managerial task time across days of the week is negative and very
strong, while for pupils 4 and 5, the relationship is negative and moderately strong.

2) For pupils 1, 4 and 5, the relationship between substantive task time and non-functional task time is negative and moderate to very strong; while for pupils 2 and 3, the relationship is positive and moderate. For pupil 6 it is approximately zero.

3) For pupils 2, 3, 5, and 6, the relationship between non-functional and managerial task time is negative and moderate to strong; while for pupils 1 and 4, the relationship is positive and low or very strong.

In general, Table 6 shows that there is a consistently strong, negative relationship between substantive task time and managerial task time, suggesting that substantive tasks during days with few managerial tasks were related to high substantive task time. The inconsistency between the sign and magnitude of the correlations between pupils' substantive task time and non-functional task time suggests that other factors were operating and acting differently upon the individual pupils. This also seems to be true for the relationship between managerial and non-functional task time. An analysis of some of these factors follows from the questions developed in Chapter III.
Question 1

How are external teacher rewards and costs related to pupil substantive task behavior during Open Time?

From the Focus on Teacher data set, "external rewards" were all teacher verbal behaviors coded as T8 (judgment of correctness), T9 (positive personal judgment), and T4, T7$N (Initiation or command about a reward). "External costs" were all teacher verbal behaviors coded as T11 (judgment of correctness), T12 (negative personal judgment), T4, 7$0 (Initiation or commands about a punishment), and T4, 7$M (Initiation or commands about a class management rule). Table 7 displays the frequencies for each of these categories for Open Time each day of the week. Table 8 displays the proportions of teacher external rewards and costs to all teacher behavior.

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Frequencies of Reward and Cost Teacher Behavior By Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>M</td>
</tr>
<tr>
<td>Rewards</td>
<td></td>
</tr>
<tr>
<td>T8</td>
<td>16</td>
</tr>
<tr>
<td>T9</td>
<td>0</td>
</tr>
<tr>
<td>$N</td>
<td>0</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
</tr>
<tr>
<td>T11</td>
<td>12</td>
</tr>
<tr>
<td>T12</td>
<td>0</td>
</tr>
<tr>
<td>$M</td>
<td>1</td>
</tr>
<tr>
<td>$0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 8
Frequencies and Proportions of Teacher External Rewards and Costs

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>T</td>
</tr>
<tr>
<td>Frequency</td>
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<tr>
<td></td>
<td>16</td>
<td>13</td>
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<tr>
<td>Proportion Total</td>
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<td>Teacher Behavior</td>
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<td>.046</td>
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<tr>
<td>ER</td>
<td>.551</td>
<td>.571</td>
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<tr>
<td>ER + EC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 8 represents the frequencies and proportions of teacher external rewards and costs across the days of the week.*
Examination of Tables 7 and 8 reveal the following:

1) Objective, emotionally neutral judgments of correctness and incorrectness typified the teacher's external reward and cost consequence behavior.

2) The frequencies of external rewards and costs were low and approximately equal except for Wednesday.

3) Except for the fewer number of rewards on Wednesday, the percentage of rewards and costs to all teacher behavior was approximately 5% each day.

4) Consistent with finding (2), the proportion of teacher external rewards to teacher external rewards and costs was consistently around .5 each day of the week.

Generally, Table 7 shows a remarkable consistency in the frequency of teacher rewards and costs across days of the week; and except for the discrepancy between Wednesday's rewards and costs, there is a remarkable balance between the number of teacher rewards and costs.

Correlations shown in Table 9 suggest the relationship between the ratio of teacher external rewards and pupil substantive task times across days of the week.
Table 3
Correlations of the Proportion of Teacher External Rewards With Pupil Substantive Task Time

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Total</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>.22</td>
<td>-.47</td>
<td>.58</td>
<td>-.87</td>
<td>.54</td>
<td>.49</td>
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</tbody>
</table>

That the correlations for pupils 2, 4, 5, 6 and Total are all moderately positive are suggestive of a relationship between the teacher's use of external rewards relative to all rewards and costs and increased time spent in substantive tasks during Open Time. Contrary to that suggestive trend are the correlations for pupils 1 and 3.

Interpretation of the findings has to be made with extreme caution since the measures of teacher behavior and pupil behavior were not taken simultaneously, although they did occur during the same day. Thus, if the correlations are to be interpreted one must assume that the proportion of teacher rewards to rewards and costs was representative for each pupil to whom they were directed. This is a somewhat dubious assumption since other coded data reveals that the teacher made individual, private contacts with other pupils on the order of 27, 14, 17, 16, and 35 times for each respective day of the week. Given the number of private contacts with the same pupil at different times during Open Time or with different pupils at different times, it is
unlikely that each pupil was the recipient of the teacher's reward or cost consequence behavior.

Data reported from the Focus on Pupil data set in Table 10 substantiate the fact that contacts with the teacher were infrequent and without coded teacher reward or cost.

Table 10
Frequency of External Rewards and Costs Received By the Observed Pupils For Each Day of the Week

<table>
<thead>
<tr>
<th>Pupil</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
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<td>C</td>
<td>R</td>
<td>C</td>
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</tr>
<tr>
<td>6</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

"X" No observed teacher-pupil communication
"0" Observed teacher-pupil communication but no rewards or costs

Table 10 reveals that only pupil 3 obtained a verbal reward from the teacher on two occasions. While pupil 3 and 2 interacted with the teacher more than once, the rest interacted with the teacher only once throughout the week during the times they were observed.

Thus, given the teacher's infrequent reward and cost consequence behavior, a more conservative interpretation is
the correlation between pupils' daily, aggregated time in substantive tasks with the teacher's daily proportion of rewards to costs. As seen in Table 9, the correlation is .22, suggesting that pupil substantive task time is moderately related to the teacher's use of rewards. This low to moderate correlation appears theoretically puzzling since external, teacher reward and cost consequence behaviors were seen as significant regulatory determinants of pupil substantive task behavior (see Chapter III, Task Consequences-Classroom Application). It is assumed that the teacher's control of resources gave her more opportunity to regulate pupil behavior with reward and cost consequences. Yet, the data presented suggest that this teacher made infrequent use of direct external rewards and cost consequences. How, then, can the high level of observed pupil substantive tasks behavior be explained? Further insights into the relationship between teacher external reward and cost consequence behavior and pupil substantive task behavior are derived from an analysis of the Participant Observation data set.

The teacher not only was a direct source of external rewards and costs through verbal and nonverbal behavior, but she was also an indirect delayed source through the behavior, tasks, and artifacts that were structured into the complex pattern of daily tasks and work expectations that guided students' behavior. The participant observation notes
do provide evidence that the rewards for completing daily tasks and the costs for not completing tasks were likely determinants of pupil substantive task behavior. The teacher's strategy seemed to be one of structuring the day's tasks at the beginning with reference to special programs, if any, later in the day. With few exceptions, non-completion of the daily substantive tasks meant that the pupil had to stay after school to finish the work and/or miss the special program later in the day. Students seemed to understand these costs for non-completion, and they seemed to know that if they completed their work before time, they could go to the special programs and/or engage in presumably rewarding, self-selected activities (games, reading, etc.). This seems to be a clear example of Premack's principle that low probability (substantive tasks) can be motivated by high probability tasks (games, reading, avoiding staying after school) that are contingent upon completion of the low probability tasks (see Chapter III, Premack Principle section).

At the end of the week, if all daily and weekly assignments were completed satisfactorily, students took a certificate of completion or "Happy Gram" home to their parents. It is likely that these structured rewards and costs functioned as motivational incentives for pupils to complete their work.

Variations of this strategy occurred daily during the week of observation and are worth exploring for the insights
they provide on how the teacher structured tasks and resources in order to maximize pupils' time on substantive tasks.

Monday

The first thing Monday, the teacher spent time discussing the day's schedule and four assignments to be completed during Open Time. Two of the four assignments were ones that had to be completed that day, while the other two were due on Friday. The teacher also talked about the special art events that were characterized by the participant observer as being something "a bit different," suggesting that the content and/or the occurrence of the special events were different. In addition to an art program that all pupils would attend, several artists would visit, and pupils could choose the one that they wished to see, thereby increasing the likelihood that the event would be maximally rewarding for the pupils. It can only be speculated that these special events had reward value and thus, incentive value, for one or more of the following reasons: the novelty of their substantive content made pupils curious; the infrequency of special events meant that they may have reduced task fatigue and satiation with the other regular rewards; the content was consistent with an existing rewarding interest or set of activities familiar to the child; the tendency to conform to social pressure such that, if sufficient high status members
of the class viewed the events positively, those of lesser status would tend to conform to their judgment; the event provided an opportunity to engage in some other highly valued task, e.g., talking with friends. That these events were termed "special" both suggests their infrequency and the possibility that their reward value may have been enhanced by their scarcity.

Following the discussion of task assignments and special events, the participant observer went through the day engaged in the tasks described in the context summary. While the participant observer made no reference to how much substantive task activity there was among other pupils during Open Time, the observer worked steadily on his assignments and completed them "with 10 minutes to spare" before the day ended. It is known from Table 4 that the average substantive task time of the six observed pupils during Monday Open Time was 77%, a high percentage and third highest for the week. It is reasonable to assume, therefore, that approximately this percentage of pupil substantive task time occurred on this day. Since no contingent special events occurred, it is reasonable to believe that avoiding staying after school to complete work and that pupils' having time at the end of the day to engage in self-selected activities were incentives increasing the percentage of time pupils spent on substantive tasks. While the observer did not say what he did with
his free time, descriptions of other days suggest that end-of-day free time presented an opportunity to pupils to engage in potentially rewarding, self-selected tasks like games, social conversation, reading, etc.

**Tuesday**

Events on Tuesday showed some interesting contrasts. The day began with no clarification of tasks or other special explanations. The day just began with pupils working at what they were supposed to. The participant observer described it as follows:

Students don't have to be told what to do. They seem to know the multiple routines and get started by themselves (p.5).

The quote suggests that pupils' knowledge of what task to do and when to do it, and what to do when it was completed is a necessary condition for substantive task behavior, especially when pupils spent approximately two hours each day in independent work. This theme will be touched on later. During morning Open Time, the participant observer noted a high level of substantive task-related activity. The observation is consistent with the total percentage of substantive task time for Tuesday (79%) which was high.

Tuesday was the first day of an optional afternoon special event - optional in the sense that a pupil could choose to go to it. Prior to that special event, a gymnastics demonstration, the observer noted a "fall off" in
substantive task-related activity. There is no indication whether this reduction was the result of pupils having completed their daily assignments and/or their excited anticipation of a potentially highly rewarding alternative task. A threat from the teacher of forbidding all talk increased substantive task activity in some students and reduced the talking. It is reasonable speculation to assume that pupils knew the threat was not a hollow one, thereby raising the potential costs of their non-functional talking behavior to the point that, rather than incur those actual costs, they were avoided by reducing the behavior.

When time for the special event came, the observer reported that all but four students initially went, suggesting the high incentive value of the event since they could have remained and engaged in self-selected activities. As for the four who did not go initially, the teacher consulted with each one "...and apparently determined that either they would finish their assignments for the day or had good reason for not being able to do so" (p.4). All four, then, went with the teacher to the event which lasted until 2:50. The brief interaction between the four pupils and the teacher suggests the importance of the available time to complete a task, the qualities of the task to be completed (like length and difficulty), the pupils' capabilities to complete the task, and the cost consequences of non-completion of tasks.
While these may not be all the factors that entered into the teachers' or pupils' decision to continue engaging in a substantive task or to engage in a non-functional task, they are ones suggested by other events during the week and will be explored in other questions. The point is that a cognitive decision-making process seems to be an important mediating condition.

Upon their return to class, pupils who had not completed their tasks were sent to a private area to start their work again. The other pupils, who had completed their substantive tasks, engaged in a mathematics game with teams. The fact that some pupils went to the gymnastics event and played in the mathematics game suggests that the fall-off in substantive task activity may have been the result of pupils having completed their daily work. Thus, both the optional special program and the mathematics game probably functioned as reward incentives for completing substantive tasks. That four pupils initially did not go to the special program suggests that the costs for them of not finishing the daily work (staying after school) were greater than the rewards of going to the optional event.

At the end of the day, three students still had not completed their work. It is likely that they were three of the four who initially did not go to the special program.
The teacher did not require them to stay after school for the following reasons:

1) One child's mother was ill and could not wait, so he took his work home.

2) One child had helped the kindergarten in the morning and because she went to the special program, did not have enough Open Time to complete the work.

3) One child finished the two problems that were left, but because her mother was waiting, they were checked the next day.

The functions of these reasons is important to understand since a reward or cost consequence will only have incentive value if the person receiving them perceives a regularity between his behavior and the later outcome. Apparently these pupils did not suffer the cost of staying after school because they did not satisfy the implicit conditions for staying after school. Whether one stays after school seems to be related to not only not having completed work but also not having completed it for particular reasons which are not clear from these examples. It is clear that there are reasons for not having to stay when a pupil does not have his work done. Analysis of the reasons suggests that a pupil will not have to stay after school if s(he) has been engaged in other acceptable tasks, e.g., working with kindergardeners, or if it represents an inconvenience to
parents. Thus, Tuesday demonstrates the relationship between substantive task behavior and optional end-of-day special events, games, avoiding staying after school that would function as reward incentives to maintain substantive task behavior. Tuesday also provided the insight that, while incomplete work was usually punished by having to stay after school, other conditions entered into the teacher's determination of whether or not a child stays.

Wednesday

As with Tuesday, Wednesday "just started" with the teacher briefly reviewing the day's assignments. Two optional art specials were scheduled for the afternoon. The observer reported that the teacher reminded the pupils that they should think about the fact that the specials would cut into their Open Time. Such a statement suggests that it would be acceptable to go to the special events but that if pupils did not get their work done, they would incur the cost of staying after school. The burden, then, was upon each pupil to accurately judge if sufficient time existed to complete the assignments. This time press was reflected in the participant observer's comments during morning Open Time.

Looking at the schedule of the day I realized the consequences for me. If I wanted to go to the special art program in the afternoon, I would have to stay after school to finish my work. There would be no Open Time in the afternoon (p.4).
While the effect of having to weigh the relative rewards and costs of completing the daily assignments or going to the special events on the level of substantive task behavior was not commented upon by the observer, it is clear that the observer was busy with work during Open Time and that the psychological pressure created by the conflict between time available, tasks needing completion, and reward and cost possibilities was referred to by the observer during morning Open Time. Table 4 also indicated that the average substantive task time of the six observed pupils on Wednesday was high (76%). As with Monday and Tuesday, it is likely that attending the special events and avoiding staying after school functioned as incentives to keep pupils working to complete their substantive tasks. Later events that day were consistent with this interpretation.

When time came for pupils to leave for the special art programs, "12 of 26 students stayed in the cluster to work on Open Time activities. Several students who had signed up to go...erased their names...and stayed" (p.6). During this period, the observer judged that substantive task activity was high. That so many pupils stayed to finish their work suggests that for them the work had higher reward value than the special events, or that the costs of staying after school were significantly greater than the rewards of going to the special events, or both.
At the end of the day, seven pupils had to stay after school to complete their work. Thirty minutes after the end of school, two were still working, and one parent was observed to be "patiently waiting," suggesting parental acceptance of the teacher's rule about staying after school until work was completed. Unlike Tuesday when three pupils were absolved from staying after school for good reasons, Wednesday was different. There were no explicit indications in the participant observation notes as to how Wednesday was different. It may be speculated that students had to stay after school since:

1) they had been reminded of the fact that there would be less Open Time because of the special events, and therefore, they should use all their time for completing the assignments;

2) the teacher must have believed all pupils could have completed the tasks in the available time.

Therefore, pupils who did not complete their assigned tasks were probably engaging in too much non-functional activity, necessitating the end-of-day conference with those pupils.

The fact that seven pupils stayed after school is also important from the standpoint of maintaining the pupils' belief that the cost of not completing work is staying after school. If the conference that the teacher had with those pupils dwelled on the reasons why each pupil had to stay,
then the pupils would either learn or relearn the conditions under which a pupil had to stay and the conditions under which he would not have to stay after school when work was not finished.

Thursday's events reflected a slight variation in that no special events were scheduled for the afternoon. However, at 2:00 the teacher informed the pupils that a math game would be played 20 minutes later. Playing in the game was, apparently, understood by pupils to be contingent upon completion of daily assignments although the participant observation notes indicated that the teacher made no explicit statement of this contingency.

Thursday began somewhat differently in that the teacher reminded the pupils about completing their weekly language and reading assignments and an explanation of one of the day's assignments. While the participant observation notes gave no explicit indication of why the teacher reminded pupils only today, it is reasonable to speculate that it was motivated by the fact that only one day remained after this one and that the reminder might minimize the number of pupils that would have to stay after school.

While the observer made no judgment of the level of substantive task activity during morning Open Time, the observer judged that there was a high level of activity during
the afternoon Open Time. This is consistent with the high percentage of substantive task time (72%) observed with the six pupils during a different week.

Despite the observer's judgment of a high level of substantive task behavior during the afternoon, the teacher announced that a special math game would be played in 15 minutes. The teacher's attempt to create a reward incentive by making participation contingent on task completion was referred to by the observer when he paraphrased the teacher as saying that everyone should "...put forth a special effort to get our assignments finished (those of us who needed to do so)" (p.4). The observer's paraphrase and parenthetical comment suggests that many pupils were finished and time needed to be filled with an activity that might be rewarding. For those not finished, it suggests that the teacher was trying to increase the potential rewards for finishing on time. Thus, for those who were not done, the game functioned as an incentive, while for those that were done it functioned as a non-contingent reward. Since pupils apparently only knew about the game just 15 minutes before it started, it would not have functioned as an incentive prior to that time. Thus, the high substantive task behavior of pupils during that time was likely a function, in part, of the incentive to avoid staying after school. It is important to note that pupils who had not completed their
work when the game began did not play, and several students—presumably those that did not play—remained after school to finish. Thus, once again the experience of these pupils vicariously reinforced all pupils' belief that if they did not complete their work they stayed after school in order to finish it.

Friday

Again, this day "just started." The teacher did emphasize the need to get their work done in the morning if they wanted to attend the special afternoon arts program. Thus, unlike the other special programs during the week, attending this one was made contingent upon completing all substantive tasks. As on Wednesday, the teacher reminded the pupils to think about what they had left to do and the amount of time remaining, thereby leaving the pupil to judge the pace at which he would need to work to complete his tasks.

By the end of morning Open Time, the observer indicated that he and about half of the other students had finished all their work for the week. Thus, they were free to participate in self-selected, independent or group activities with other finished students. The observer played a math game on the floor with several others, gave another student a spelling test, had a conference with the teacher over his completed work, watched another pupil draw a design, and observed others reading. What is important is that the
variety of self-selected activities probably increased the likelihood that a student would engage in rewarding substantive or non-functional tasks. Their existence and pupils' experience with them would establish a belief that completion of tasks before school was over results in engaging in a rewarding self-selected task. Thus, new reward incentives would be established.

Another important point is the co-operation shown by students to help those who were not finished by giving them the necessary end-of-week tests. It is not clear why this willingness to help others finish existed but it would function to keep pupils engaged in substantive tasks since those needing tests would not have to wait for the teacher to administer them.

During morning Open Time, the participant observer referred to another potentially important external reward, the "Happy Gram," which was awarded to students at the end of the week for acceptable completion of all the week's substantive tasks and which was taken home to parents. This week the teacher announced that Happy Grams would be given out next Monday since some students needed to watch weekend television to complete one of their assignments. The announcement of a delayed reward seemed to have no reported effect on the level of task engagement. Just after the announcement, the observer described it this way:
Everyone seemed to be busy at that time finishing assignments, doing managerial tasks, playing games.
(January 16, p.4)

The fact that the Happy Gram was sent home raises the possibility of pupils receiving additional external rewards awarded by their parents. That parents expected them on Friday is suggested by the observer's statement of the teacher's direction to pupils that they should tell their parents that the Happy Grams would come out on Monday. This direction suggests that Happy Grams were both a regular enough reward that parents probably had developed an expectation of their receipt and that non-receipt of a Happy Gram might have resulted in parents administering external costs to their children. The teacher's direction would prevent the latter situation.

It is also important to note how the teacher structured the weekly tasks and the rules for their completion in such a way that the probability of everyone receiving a Happy Gram was very high. Frequent daily monitoring through a variety of devices, e.g. conferences, test papers, observation, enabled the teacher to know what work pupils had completed as well as the quality of the work. Thus if pupils were not completing their work or if it was not up to standard, she could provide corrective action before the week was over. To help insure that pupils got their tasks completed, most were assigned in the morning to be completed
that day. Longer assignments, like the reading and language ones, were given the full week to be completed. By keeping the time available (daily Open Time) equal to the time needed (estimated initially by the teacher), the amount of time to engage in rewarding non-functional activities would be minimized. Even if the teacher or pupil was wrong in estimating the time needed to complete the tasks, the rule requiring pupils to stay after school ensured that the daily work would be completed. Thus, daily tasks, staying after school, and frequent monitoring probably functioned to minimize the possibility that students would reach Friday with insufficient time to complete the tasks, resulting in non-receipt of the Happy Gram.

There was one incident reported by the participant observer of a pupil who had badly miscalculated the time needed to complete his work and the teacher's monitoring had not picked this up until Friday afternoon Open Time. Presumably, if Happy Grams were given out on Friday, this pupil would not have received one that day. However, the teacher's solution was to require the pupil to finish his assignment during next Monday's recess. There was no indication given by the observer as to whether the pupil would receive the Happy Gram then since the other pupils would receive theirs at that time.
This incident also is important for suggesting the role of homework in maintaining high levels of substantive task behavior. One of the solutions to the pupil's problem would have been to take his work home and complete it during the weekend. This seems consistent with the fact that others would be watching television shows during the weekend to complete the language assignment. Indeed, a solution to the problem of pupils not completing their daily work would be to allow them to take their work home. However, with few exceptions (see Tuesday, p.5), the teacher did not allow students to take work home during the week. The teacher's negative opinion toward homework is reflected in the following paraphrased quote of the teacher to the observer about homework:

... if (a pupil) had a real problem with a concept and after several times that failed to help the child understand that, she then will let the child take work home if the parents would be capable of helping the child. 'No reason though for parents to have to spend their weekends working with their children on homework.' (Friday, p.6).

In addition to using parents as additional instructional sources as the quote indicates, the incident on Tuesday suggests that homework was allowed as a means for completing assigned tasks if staying after school imposed a hardship on the parents. In this case, the teacher apparently knew the mother was ill, and, rather than have the ill mother make a
special trip to get the child, the teacher allowed the pupil to take home his incomplete work.

The teacher must have understood - at an intuitive level at least - that giving pupils the opportunity to complete work at home would probably have been disastrous to the high level of pupil substantive task engagement since the time available relative to the time needed to complete tasks would become grossly out of balance, leaving more time during school to engage in non-substantive task activity. Homework would eliminate the aversive consequences of having to stay after school and the incentive to avoid those consequences. Homework would also devalue the Happy Gram reward since time as a resource would never be scarce. All three effects taken together would probably result in an increase in non-functional tasks, (e.g. talking, paper football, etc.) since both the rewards and costs of task completion would be greatly diminished while, at the same time, the profit potential of non-functional tasks would be greatly increased. A counter-strategy that the teacher could and did use was to provide contingent, rewarding activities at the end of the day for completion of all tasks. However, the fact that during the week, many students chose not to go to special programs in order to complete their work suggests the possibility that the reward value of avoiding staying after school was greater than the reward value of the
optional programs. It is possible that this occurred because those pupils were not certain of the reward value of the programs, while they were more certain of the cost value of staying after school. Their behavior implies they may have chosen certainty over uncertainty.

The discussion so far has focused upon the teacher's use of optional and contingent special events, end-of-day self-selected tasks, after school work to complete tasks, and homework as external rewards and costs that were structured into the program by the teacher. In addition, the participant observation notes referred to the teacher's use of appraisal behavior which was systematically coded for the Focus on Teacher data set and analyzed prior to this discussion. It will be recalled that Table 7 showed that the proportion of verbal reward (T8, T9 categories) and costs (T11, T12) to all behavior was low (approximately 5% each) and relatively constant across days. The participant observer, who was familiar with these reward and cost categories, more than once analyzed the teacher's use of these behaviors in the following way:

Ms. B seems to have a low judgmental appraisal pattern. She repeats, often with minor embellishments, in order to give judgment of correctness (T8) and acknowledgement (T10). In so far as I can tell, only the context of the situation, such as the nature of the response or question, would enable one to tell whether the appraisal was a judgment of correctness or acknowledgement. She seldom says that a student's comment is right or wrong
but will rather say, 'Well, think about that,' or will defer by saying, 'Does anyone else have an idea about that?' (Monday, p.8; see also Wednesday, p.7; Thursday, p.1.)

A different context in which verbal rewards or costs were used occurred when the teacher spoke to a pupil engaging in inappropriate behavior. Again, the participant observer commented upon the teacher's low-key approach.

In a class session on News Explorer, one student was quietly 'fooling around.' The teacher simply inserted the following into the lesson without major disruption of the substantive content, 'Bill, are you ready to listen and pay attention, or do you want to go back to your desk now and have me work with you individually later?' That was enough. The 'fooling around' stopped. (Monday, p. 28; see also Thursday, p. 2).

On Tuesday, the observer recorded another incident during Open Time when the teacher, after having become annoyed with the talking, publicly acknowledged that many of them were excited about seeing the gymnasts, stated that many were still working and that there was too much talking, and indirectly threatened them with the possibility of an order for silence. The observer reported that "the talking subsided and some students started more task related work again."

The recorded behavior of the teacher's use of rewards and costs reported in Table 7 and the participant observer's
description and comments of the teacher's behavior when responding to student's answers on inappropriate behavior, both suggest the infrequent use of external, verbal rewards and costs. The participant observer's notes also imply that the tone of voice, wording, and content of these messages minimized strong emotional responses from the pupils. Thus, when the teacher admonished pupils, there was no indication of any strong emotional pupil reaction which is often manifested by resistance or angry behavior of some sort. In short, the teacher's style of administering verbal admonishments seemed to minimize the costs experienced by the pupils.

On the other hand, the frequency and style of the teacher's verbal rewards seems just as low-key, even-handed, and emotionally neutral in tone. The participant observer reported no incidents of extended or emotionally strong praise of a pupil or himself. If the teacher was using these behaviors both infrequently and equally, then why did pupils desist so quickly from the inappropriate behavior in the Monday incident?

Some speculative possibilities include: they either were showing off how "good" they could be or did not want to be embarrassed by further reprimands in front of the participant observer; the quality of the relationship between the teacher and pupils was positive and rewarding which, when
combined with the teacher's infrequent use of scarce reward and cost behavior, made her reward and cost behavior more valuable and powerful, and obedience to the teacher's authority.

The second explanation assumes a strongly positive relationship between the pupils and teacher. The best evidence for that assumption occurred during the Thursday surprise birthday party planned by the pupils on their own for the teacher. As tokens of their positive regard, they gave her a bouquet of flowers and some gifts made by them. The observer described the pupils as "clearly excited as they waited for her..." (p.3). The observer described the teacher's response as "clearly pleased" but showing little overt excitement. She smiled, acknowledged them, and thanked the children. "A joyous celebration" followed. How the teacher developed such a positive, caring relationship is not clear, but the description of the party suggests that the pupils liked and cared about their teacher. Thus, it is possible that both the quality of the relationship and the scarcity of the teacher's verbal rewards functioned to maximize their regulatory efficacy.

Summary

Frequency and participant observation descriptive data have been presented. They present a picture of a classroom group in which the teacher exhibited verbal reward and cost
consequence behavior at a low, constant, approximately equal frequency in an emotionally neutral way. The correlation between teacher verbal reward behavior and pupil substantive task time was .36. In addition to the teacher's verbal reward and cost consequence behavior, the role of "special events" as contingent or self-awarded high reward probability activities in regulating pupil substantive task behavior was discussed. Another significant reward consequence, avoiding staying after school to finish assigned tasks, was also examined. At the end of the week, pupils received "Happy Grams," a symbolic, external reward from the teacher indicating that all work had been acceptably completed. Finally, preliminary analyses were made of presumably relevant limiting conditions, e.g. available time, work pacing, daily assignments and reminders of tasks to be completed, and mechanisms of maximizing the likelihood that pupils would receive Happy Grams.

Question 2

How are public and private rewards and costs related to pupil substantive task behavior during Open Time?
Table 11 displays the public and private teacher rewards and costs by days of the week from the Focus on Teacher data set.

Table 11
Teacher Public and Private Rewards and Costs
By Days of the Week

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
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</tbody>
</table>

It is clear from Table 11 that during Open Time the teacher administered all external symbolic rewards and costs in a private context. Data displayed for question 10 will show that the teacher spent over 84% of her time in private teacher-pupil communication. The descriptive findings based on the frequency counts given for question 1 then, are the same for this question, only they now are applicable for external, private rewards and costs.

From the Focus on Pupil data set, it is possible to determine on which days the teacher interacted with the observed pupils, the frequency of the teacher's behavior, and the frequency of the external, private teacher rewards and costs. Table 12 displays the frequency and proportions of teacher behavior during Open Time with each of the observed pupils.
Table 12

Frequency and Proportions of Teacher Behavior in Dyadic Communication With Observed Pupils By Days of the Week

<table>
<thead>
<tr>
<th>Pupil</th>
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<th>Th</th>
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<td>N.O</td>
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<td>Pupil 2</td>
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</tr>
<tr>
<td>Pupil 3</td>
<td>22(.077)^b</td>
<td>16(.066)</td>
<td>12(.069)</td>
<td>N.O</td>
<td>12(.027)</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>21(.167)</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>1(.003)</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>N.O</td>
<td>1(.044)</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
</tbody>
</table>

^a "N.O" refers to no teacher/pupil communication coded on that day.

^b Proportions represent the count of teacher behavior from the Focus on Pupil data set divided by the total of all teacher behavior by day from the Focus on Teacher data set.

The frequencies show that only pupil's 2 and 3 interacted with the teacher at least once during more than two days, while pupil's 4, 5, and 6 received scant verbal attention from the teacher. The proportions in parentheses represent approximate proportions of teacher behavior directed at that pupil during Open Time that day to all Open Time teacher behavior. The proportions are approximate because of sampling error that undoubtedly existed. Nevertheless, Table 11 shows the range of very brief interactive episodes (.3% to 16.7%) with the observed pupils. It also shows that for the week that teacher's and pupils' behavior
was recorded, the teacher spent more time per episode on Thursday.

Table 13 shows the frequencies of external private teacher reward and cost consequence behavior.

Table 13
Private Teacher Reward and Cost Behaviors
By Pupil and Days of the Week

<table>
<thead>
<tr>
<th>Pupil</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>R</th>
<th>C</th>
<th>R</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil 1</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 3</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 4</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 6</td>
<td>N.O</td>
<td>N.O</td>
<td>0</td>
<td>0</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
</tbody>
</table>

"N.O." refers to no teacher/pupil communication coded on that day.

Table 13 is further evidence that the teacher was very sparing in her verbal, reward and cost consequence behavior, since only pupil 3 was the recipient of any. More specifically, pupil 3 received two judgments of incorrectness (T11), and judgment of correctness (T8), and two positive personal judgments (T9).

The absence of public, verbal teacher reward and cost consequence behavior and the infrequency of private, verbal external rewards and costs raise important questions about how pupil substantive task behavior was maintained. In the
section, Task Consequences - Classroom Application of Chapter 3, it was argued that public rewards and costs in contrast to private ones would most likely be the most efficacious ones since they would tend to maximize vicarious reinforcement and the informational and the incentive functions of consequences. Private rewards and costs would likely be less efficacious in regulating behavior since they would make it more difficult for pupils to establish correct hypotheses about behavior and consequences and since rewards from others observing a public reward would less likely be given if the reward was privately given instead. The data do not provide much support for the assertions. The infrequency of teacher public and private reward and cost consequence behavior would suggest that pupils would have few opportunities to develop accurate hypotheses between behavior and consequences to obtain vicarious rewards or costs, and to obtain rewards or costs from other pupils as a result of the teacher's public allocation. Thus, neither teacher verbal, public and private rewards and costs consequences seem very useful for explaining the high levels of substantive task time displayed by the observed pupils.

The data, however, may be misleading since they were collected in a classroom mid-way through the school year in a school where there was much experience and normative pressure among the teachers to do things in a similar way.
Thus, it is quite possible that students had developed accurate provisional hypotheses and appropriate incentives as a result of their prior experiences both in that class and in the school. If this is true, then these incentives may very well have regulated pupils behavior with a minimum of teacher verbal consequence behavior. It is also possible that the infrequency of the teacher's public and private symbolic rewards contributed to their saliency, assuming the valadity of Homan's scarcity proposition and assuming that pupils judged a symbolic reward from the teacher to be desirable.

The Participant Observation data set provides evidence of a classroom in which patterns of pupil and teacher behavior were well known and anticipated. Evidence of this include the following:

1) Descriptions of the beginnings of each day as ones in which "Ms. B and her students knew what to do (January 12, p. 1); "They seem to know the multiple routines and get started by themselves" (January 12, p. 1); "School started as usual. It just started." (January 14, p. 1);

2) A new pupil, including the participant observer, quickly learned the classroom routines and expectations (January 12, p. 6),
3) Students volunteered to help the observer learn what to do, when to do it, and how to get work accomplished (January 12, p. 6; January 12, p. 3; January 16, p. 2);

4) Students seemed to understand that 80% correct was the level of acceptable performance for math and spelling papers (January 12, p. 6);

5) "Students are aware of keeping on schedule (assignments)" (January 12, p. 6);

6) The observer, after viewing a teacher-student exchange in which the teacher was reviewing the pupils meager work output for the day, noted that there was "no fuss, no argument" after the student declared how much work he would finish during the rest of the day, leading the observer to infer that the pupil "apparently understood the expectations and consequences and accepted then," (January 12, p. 7);

7) When time came for a quiz, pupils were observed to separate their desks without being told (January 13, p. 2);

8) The teacher suggested that the observer either ask her or any of the pupils about the procedures for taking the weekly spelling test (January 16, p. 1).
The evidence suggests a "mature" classroom in which pupils and teacher were quite familiar with the routines and consequences of getting work done. In such a classroom, it is quite plausible that incentives were well established which effectively regulated pupil substantive task behavior. The analysis related to the first question argued that the important incentives were related to avoiding staying after school, participating in pupil-selected, free-time activities, and obtaining the Happy Gram at the end of the week.

Another type of private consequence was that which the pupil administered to himself privately. Private self-rewards would consist of any symbolic or material consequence awarded to oneself without others knowing it. No data was collected on the frequency of this type of consequence although the Participant Observation data set does give evidence of one occurrence.

On Monday, January 12th, the participant observer felt "a relaxed sense of accomplishment," representing a symbolic interpretation of a private emotional state. Since this symbolic interpretation was presumably not shared, it represents a private consequence. To be a self-reward requires that a person have a conception of what constitutes an acceptable performance and the capability to determine when the level of acceptability has been reached. These components are implicit on the observer's quote, for it implies
that the observer knew that so many tasks had to be done before the school day ended. Indeed, the observer would know this since the teacher spent the first part of each day explaining the day’s tasks. Thus, the level of acceptable performance represented completed tasks within the time frame of a school day. Capability to assess that level of performance requires a relatively simple binary judgment of done or not done. The observer completed all his tasks in the allocated time and felt satisfied as a consequence.

While the observer felt satisfied with his accomplishment, is it likely that other pupils had similar positive consequences? As indicated before, no frequency data exist to answer this question, but it is possible to argue that time and tasks structured by the teacher would tend to maximize the opportunities for rewarding self-consequences.

The Participant Observation data provide evidence of the fact that the teacher structured substantive tasks within both daily and weekly time frames. Each day there were different daily substantive tasks, while the weekly tasks were started Monday and due for completion by Friday, except for those students needing to watch a weekend television show for their language task. Open Time was used by the observer and other pupils to complete both the daily and weekly tasks. The observer commented that this time arrangement of substantive tasks was a conscious choice made by the
teacher because "she is able to keep a better record of what the students are accomplishing each day. . . ." (January 13, p. 5). Thus, the daily tasks open the possibility of daily self-rewards by pupils completing their work. The weekly tasks would function to keep pressure on pupils to continue working even if they did finish their daily tasks. If the completion time frame had been the week, rather than the day, the pupil would likely have rewarded himself once at the end of the week unless he established his own daily task completion goals. Since the daily task structure resulted in the opportunity for daily private self-rewards, since the fact that it would be relatively easy for pupils experienced with the classroom routines to judge whether or not each and all daily tasks had been completed, and since very few pupils did not complete their daily tasks, the probability of private self-rewards would be increased. Therefore, private self-rewards represented a minimally documented but probable source of regulatory consequences of pupil substantive task time.

There is more evidence of the existence of public, self-consequences, i.e., a material or activity reward or cost administered to oneself in such a way that others are aware of it. The Participant Observation data provide evidence of several instances. These instances take the form of a pupil, finished with their daily work, selecting an activity of
interest to fill the remaining time in the day. The activity consequence was contingent upon completion of daily tasks. While the teacher structured the day, permitting pupils the opportunity for self-reward activities, the pupil was the one who acted upon the opportunity by choosing from among many (very often) activity reward consequences, making it a self-awarded consequence. Instances of self-reward activity consequences include the special art program on January 14 (p. 6), and Friday morning Open Time where many pupils read, played, and engaged in other self-selected activities (January 16, p. 3). Thus it is likely that the opportunity to engage in self-reward activity consequence functioned as motivational incentives to complete substantive tasks, as reinforcement for completion of tasks, and as a reminder to pupils of the relationship between task behavior and consequence. In addition, task fatigue would likely be reduced.

In summary, frequency data was presented showing no teacher public consequence behavior and a very low frequency of private consequence behavior. While pupil behavior may be regulated, in part, by these few but highly desirable reward consequences, other private rewards were discussed, like the self-awarded special events and games that pupils engaged in if tasks were completed or near completion. An instance of a private, symbolic self-reward was also discussed and the conditions that increased the likelihood that those
self-rewards occurred were discussed. Briefly, they involved assignment of daily tasks to be completed the same day and operational procedures and expectations well known to all participants.

Question 3

How are contingent substantive task reward and cost consequences related to pupil substantive behavior during Open Time?

The only data set that provides information for responding to this question comes from the Participant Observation notes. The question is motivated both by logical and theoretical analysis. In Chapter III, the Premack principle section, the argument was made that highly desirable activities can be used as rewards for less desirable activities. Such an activity can function as an incentive to complete substantive tasks; it can function as reinforcement for substantive task completion, and if regular, it can provide information to the pupil about the relationship between substantive task behavior and outcome. Such information results in probabilistic hypotheses that function as motivational incentives. When a consequence is one such that it is known to participants that the occurrence of a prior behavior or task is a sufficient condition for the occurrence of a consequence, then it is a contingent consequence. While activity consequences are one type of contingent consequence, symbolic and material consequences are also included.
A non-contingent consequence was defined as unexpected reward or cost consequence. The relationship between prior behavior and consequence is not known to the pupil. The argument was made that contingent consequences would increase the probability that accurate provisional hypotheses and stable incentives would develop and be maintained by regular reinforcement. In contrast, non-contingent consequences would be an inefficient way of developing accurate provisional hypotheses and stable incentives.

The Participant Observation data set reveals that contingent consequences were referred to on Tuesday (the optional gymnastics program, p. 4), Wednesday (the optional special arts program, p. 4), Thursday (the math game, p. 4) and, Friday (pupil selected activities upon completion of substantive tasks, p. 3; special music program, p. 5). No non-contingent consequences were referred to by the observer. Conceptually, there is an interesting distinction between Tuesday's, Wednesday's, and Thursday's contingent consequence and Friday's contingent consequence. The most theoretically important is that Tuesday's, Wednesday's and Thursday's consequences were presumably non-regular consequences in the week-to-week flow of activities. That is, the art programs on those days were the "special events" referred to at the beginning of the week as "something a bit different" (January 12, p. 2). That they were special
suggests that they were infrequently repeated, thereby, minimizing their future value as motivational incentives. Only Friday's free time tasks presumably occurred with sufficient weekly frequency to have continuing incentive value. Thus, pupils knew that for this week and the weeks after, completed work meant the opportunity to engage in rewarding tasks.

The other aspect of the distinction is that the consequences of Tuesday, Wednesday, and Friday were optional in that pupils chose those activities or, presumably, others as a consequence of task completion. Because they were optional, a pupil's selection of the consequence makes it a self-awarded contingent consequence. This is in contrast to Thursday's math game for which no options were available. If a pupil met the condition for playing the game (substantive task completion), then he had to play the game. The theoretical importance of optional, self-awarded consequences is that when alternative rewards are available, the probability that more pupils would have a highly rewarding consequence available would be increased.

As to the relationship of these contingent consequences to pupil engagement in substantive tasks, it appears that, in conjunction with the incentive to avoid having to spend time after school finishing work, the contingent consequences were powerful forces for keeping pupils engaged in
substantive tasks. This is suggested by the facts that on Tuesday all but four pupils went to the special program, on Wednesday 14 of 26 pupils went to the special event, on Thursday the observer noted a high level of substantive task engagement prior to the math game and on Friday the observer noted that pupils were engaged in a variety of tasks prior to the special event. That avoidance of staying after school was a powerful incentive is suggested by the fact that four pupils initially chose not to go to the optional Tuesday event in order to finish their work and that 12 of 26 pupils did not go to Wednesday's event to do the same. It can only be speculated that staying after school was a cost consequence to be avoided because of embarrassment felt by the child, and/or because of missed rewarding play opportunities, and/or because of negative consequences for not completing the work on time.

In addition to the contingent special events and mathematics game, the Happy Gram reward was another contingent reward since its receipt was the result of completion of all tasks assigned during the week. It is probable that both the contingent reward consequences throughout the week and the contingent cost consequence (staying after school) functioned together to effectively maintain pupils' substantive task engagement.
Question 4

What is the relationship between substantive task difficulty and pupil substantive task time during Open Time?

In the section of Chapter III on consequence limiting conditions, the argument was made that difficult tasks with which a pupil was working might reduce the pupil's expectancy of obtaining a reward as well as the probability of actually receiving one. Task difficulty was conceptualized as insufficient resources to successfully complete a substantive task. Cognitive capability, resource allocation norms, and resource availability were presumed to affect the degree of task difficulty. Data from the Focus on Pupil and Focus on Teacher data sets were not collected to answer this question. The Participant Observation data provide insights into the level of task difficulty and the mechanisms for affecting task difficulty.

Data presented later and information presented in Chapter I establish that the pupils in this class were heterogeneous in their cognitive capability. Thus, the perennial dilemma of matching task and pupil is confronted by the teacher such that if the same task is assigned to all pupils some will find it too difficult and some will find it too easy. The problem for a teacher choosing to match capability with task difficulty is to find ways of doing it accurately. Textbook publishers have made available to
schools a diagnostic-prescriptive instructional system in which a pupil is pretested and assigned tasks on the basis of what he does not know or cannot do. Often a variety of materials are available for use to either match learning preferences or to provide additional instruction if the initial attempt at learning is unsuccessful.

The Participant Observation notes clearly indicated that the teacher used a diagnostic-prescriptive system and a variety of materials to match capability with tasks to be completed during Open Time. Of the tasks worked on during Open Time (arithmetic, spelling, reading and language), arithmetic and spelling utilized a diagnostic-prescriptive method; reading involved reading self-selected, classroom library books; and language involved two groups working at different tasks. Assuming that a variety of books existed that varied in the cognitive capability required to successfully complete them, the strategy of using self-selected books would permit a pupil to choose a rewarding book because the topic was of interest and at the same, to choose one that would not be too hard for the pupil to read. The strategy used by the teacher for determining the language tasks of pupils was not clear from the observer's notes. It was clear that two groups were formed, and each group engaged in tasks differentiated by their learning objective (possessive nouns or part participles; January 12, p. 1).
Thus, three of the four Open Time tasks were ones in which there was an attempt to match pupils' cognitive capability with the cognitive demands of the tasks.

There was no evidence of a shortage of temporal or material resources needed to complete any of the tasks although there was evidence of pupils' poor use of allocated time which sometimes resulted in a pupil having to stay after school to finish work. A previous discussion of the way the teacher used time suggested that the blocks of Open Time were used to complete the aforementioned daily and weekly tasks. Daily tasks that were not completed were completed after school in most cases. The teacher's experience with the capabilities of the pupils and the arithmetic and spelling curriculum probably resulted in an appropriate match between tasks and time available to do them. Evidence for this assertion is suggested by the fact that few students had to stay after school and that the teacher made frequent checks of her pupil's task progress.

An example of this teacher checking behavior is the previously mentioned incident with a pupil who had completed little work by 2:50 P.M. and was confronted by the teacher that he had taken two hours to complete 35 to 40 minutes of work (January 12, p. 2). In the other reported incident in which a pupil had misjudged the time it would take to complete his math tasks, the time available to complete the
task was extended into the next week with the penalty of loss of morning recess (January 16, p. 6). Thus, while time limits were specified by the teacher, those limits were elastic, but costs were incurred (staying after school, loss of recess) when the limits were violated as a result of pupil negligence. That time limits were elastic would function to minimize task difficulty due to insufficient time.

There was no evidence that material resources were insufficient in amount or inadequate in quality for any of the tasks during the week. While arithmetic, spelling, and language tasks were assigned differentially, material resources seemed to be assigned in equal amounts to all pupils relative to their tasks. In conclusion, differential task assignment, sufficient and appropriate time and material resources appeared to keep task difficulty low. Thus, costs resulting from these factors would be minimized and the pupil's expectancy of receiving a reward consequence would not be diminished. In short the teacher's mechanisms for minimizing task difficulty helped create some of the conditions for establishing and maintaining a high level of substantive task time.

Question 5

What is the relationship between teacher task structuring and pupil substantive task time during Open Time?
It will be recalled that teacher task structuring was conceptualized in Chapter III as a phase of the teacher's pupil monitoring process. More specifically, task structuring refers to the communication to the pupil of the nature of the substantive task and the conditions that need to be met for successful task completion. The argument was made in Chapter III that task structuring was a potentially important consequence limiting condition. It was argued that if task structuring was inadequate, the pupil's expectancy for obtaining a reward would be diminished and the probability of receiving one would be diminished if the incomplete task structuring information resulted in a greater likelihood that the task would not be completed. 

The Focus on Teacher data set provides frequency data displayed in Table 14 on the amount and kinds of task structuring information given by the teacher during Open Time.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification of:</td>
<td></td>
</tr>
<tr>
<td>Learning Goal</td>
<td>M</td>
</tr>
<tr>
<td>Work Quantity</td>
<td>0</td>
</tr>
<tr>
<td>Work Quality</td>
<td>1</td>
</tr>
<tr>
<td>Substantive Tasks</td>
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</tr>
<tr>
<td>Task Materials</td>
<td>12</td>
</tr>
<tr>
<td>Task Procedures</td>
<td>0</td>
</tr>
<tr>
<td>Time Frame</td>
<td>2</td>
</tr>
<tr>
<td>Task Procedures</td>
<td>23</td>
</tr>
<tr>
<td>Proportion to all Teacher</td>
<td>.134</td>
</tr>
</tbody>
</table>

Table 14
Frequencies of Teacher Open Time Task Structuring Behavior By Days of the Week
Inspection of Table 14 reveals that the most frequent category of task structuring was the "task procedures" category representing the teacher's attempt to explain to a pupil(s) how to successfully complete a substantive task, e.g., how to divide numbers. Except for Wednesday's decrease, the frequencies were fairly constant across the week. The next two most common categories of structuring were "work quality," representing statements about the quality of work expected from the student and "substantive tasks," representing specification of the task the pupil was to do. "Work quality" and "specification of substantive tasks" statements were variable across the week, ranging from 0 to 19 and 2 to 16, respectively. "Task materials," "time frame," "work quantity" occurred very infrequently during the week, and "learning goal" did not occur during Open Time.

Analysis of the Participant Observation data suggests that the teacher opened Monday, Wednesday, Thursday, and Friday with some task structuring. Thus, it is possible that task structuring involving the less used categories occurred then. Because of the sampling plan, only Monday and Wednesday openings were recorded. The task structuring frequencies are displayed in Table 15.
Table 15
Frequencies of Teacher Opening of the Day
Task Structuring Behavior

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
</tr>
</thead>
<tbody>
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<td>Specification of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Goal</td>
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<td>0</td>
<td>N.O.</td>
<td>N.O.</td>
</tr>
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<td>5</td>
<td></td>
<td></td>
</tr>
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<td>Work Quality</td>
<td>0</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substantive Tasks</td>
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<td></td>
<td></td>
</tr>
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<td>Task Materials</td>
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<tr>
<td>Task Procedures</td>
<td>0</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*No observations made that day*

In contrast to Open Time task structuring, beginning-of-day task structuring was focused more upon specifying the tasks for pupils and the time frame in which these tasks were to be completed. Much less teacher behavior was spent on specifying correct task procedures. Like Open Time, "learning goal," "work quantity" and "task materials" were relatively infrequent behaviors. In understanding these differences, it is important to remember that teacher communication during the opening of the day was with the whole class typically, while Open Time teacher communication was typically with an individual or small group of pupils. Thus, the effect of a low frequency behavior at the beginning of the day would likely be different than a low frequency in Open Time since, for example, the one instance of work quantity for Monday opening of the day was...
communicated to the entire class while the one instance of work quantity was directed toward only one pupil in Open Time.

The data suggest that this teacher used a strategy in which the opening-of-the-day task structuring focused upon the substantive task to be completed, the time frame for its completion, the quality or level of acceptability of a pupil's work, and the amount of work to be done. During Open Time, the teacher focused her task structuring on clarifying or teaching individual pupils correct task procedures, emphasizing work quality, and reminding pupils of the tasks to be completed.

To assess the relationship between the teacher's Open Time task structuring and pupil's substantive task behavior, the proportion of task structuring to all Open Time teacher behavior was correlated with the average proportion of all six pupils' substantive task time during Open Time. The result was a correlation of -.32, a moderate inverse relationship, suggesting that as the pupils reduced substantive task behavior, there was a slight increase in task structuring probably reminders about work quality and substantive tasks.

The Participant Observation data set provides further insights into the teacher's use of task structuring. On
Monday the teacher began the day by displaying and discussing with the class the day's schedule and assignments for both the day and week. Presumably, then, the pupils had an idea of the tasks and time frames for getting the assigned tasks completed. In addition, the teacher explained the special events that would be occurring later in the week which, from a task structuring standpoint, would function to alert pupils that their time to complete their tasks might be reduced if they went to the programs.

The interrelationship between a diagnostic-prescriptive instructional system and task structuring was illustrated later in the day when the observer was assigned a task on the basis of his diagnostic or pretest score which functioned to match pupil cognitive capability with task cognitive demand.

That pupils did not need much teacher task structuring is suggested by the observer's comments on various days that pupils "...have a clear sense of the daily and weekly routine" (January 12, p. 5) and further that five pupils volunteered to help him "...understand what to do, or were very willing to assist me when asked about such matters as taking pre-tests (when to do them), where to get and return materials, papers and folders and were concerned that I get my work done for the day..." (January 12, p. 5-6). The observer also noted that while the teacher made no comments
to the class on Monday about the expected level of task quality, "...students seemed to understand that they must get at least 80% on math and spelling papers" (January 12, p. 6). Finally, from Monday's notes the observer commented that pupils were aware of keeping on schedule with the prevailing norm that it was acceptable to engage in non-substantive tasks as long as the work was completed and others were not bothered (January 12, p. 9).

What emerges from the observer's description and comments is a depiction of a group of pupils that were so familiar with the materials, work quality, and time frame that all the teacher needed to do was to explain on Monday what tasks needed to be done for the day and week and any special variations so that pupils could complete the work during Open Time.

The observer's description and comments of Tuesday's activities is supportive of this interpretation. No opening-of-the-day or morning Open Time task structuring with the class apparently occurred. As with Monday, the observer commented that the day's schedule and assignments were on the board, presumably as reminders. The teacher did meet with the observer to explain a substantive task procedure related to a spelling assignment. Apparently, she came to the observer and not to all the other pupils because the others
understood how to do it because of prior experience which the observer did not have.

Wednesday began with a brief explanation of the schedule. Since there were art specials that day, the teacher pointed out that they would reduce the amount of time that pupils had for completing their work and that they should keep that in mind as they did their work. Wednesday's description also reflected the teacher's use of task procedure structuring with pupils in a dyadic context during Open Time. If the teacher was not working with a remedial group or checking papers, she was described as moving around the room from pupil to pupil, helping pupils with problems with their work. The observer described an episode with a pupil, showing how she used a clarification strategy to correct a pupil's incorrect task procedures. The observer's description is consistent with the high (relative to the other categories) use of task procedure structuring. The observer noted this same teacher behavior during afternoon Open Time.

Like Monday and Wednesday, Thursday began with a review of the day's schedule and assignments. She specifically mentioned the language and reading assignments that were due Friday. These statements would function as reminders of task completion expectations and implicitly, of the consequences.

Friday began with the teacher establishing both a time frame for task completion and a contingent relationship
between task completion and attendance at a special event in the afternoon. During morning Open Time the observer described the teacher as "constantly moving around the room checking on the status and progress of student work" (January 16, p. 3). At the beginning of afternoon Open Time, the teacher again reminded pupils that the special program was contingent upon task completion.

The evidence cited from the Participant Observation data suggests that low frequencies in many of the task structuring categories are explained by a well established and repeated work routine, resulting in pupils knowing how to get work done in the appropriate time frame with appropriate materials and at the appropriate level of acceptability. The teacher's structuring behavior, then, focused more on daily reminders and explanations of substantive procedures which would function to help insure that a pupil completed his work on time and at the appropriate level of acceptability. Thus, the teacher's task structuring behavior mechanisms appeared to function smoothly enough such that pupil substantive task time would not be depressed by it. The negative correlation is probably a function of the teacher's increased use of task reminding and substantive task procedure behavior as the week progressed and pupils decreased substantive task behavior on Thursday and Friday as pupils finished their daily and weekly tasks.
Question 6

What is the relationship between teacher task feedback and pupil substantive task time during Open Time?

"Task feedback" was conceptualized in Chapter III as the second phase of the teacher's monitoring process by which the teacher obtains information about the pupil's task behavior. Theoretically, task feedback is a necessary condition for teacher allocation of reward and cost consequences based on task performance. Without regular task feedback, it would be more difficult for pupils to establish incentive expectancies.

The Focus Teacher data provide frequencies of certain dimensions of the teacher's task feedback behavior. They are displayed in Table 16.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Task Progress</td>
<td>14</td>
</tr>
<tr>
<td>Cue or Prompt</td>
<td>10</td>
</tr>
<tr>
<td>Diagnostic Probing</td>
<td>6</td>
</tr>
<tr>
<td>Testing</td>
<td>8</td>
</tr>
<tr>
<td>Proportion to all</td>
<td>.134</td>
</tr>
<tr>
<td>teacher behavior</td>
<td></td>
</tr>
</tbody>
</table>

Inspection of Table 16 reveals that the most frequent Open Time task feedback behavior was the teacher's attempts to determine the amount of progress that pupils were making.
It is interesting to note that this behavior occurred most frequently on Thursday and Friday, probably because of the week time frame that existed for task completion. Thus, if pupils were expected to complete their substantive tasks by Friday, the data show that the teacher engaged in substantially more task progress monitoring as the weekly deadline approached. The potential significance of this finding is that the teacher's checks upon pupil's task completion progress would not only act as a reminder to pupils of the deadline and the reward and cost consequences, but they would also help insure that pupils would complete their work and receive the positive consequences as a result. Thus, while pupils had the opportunity to pick and even schedule the time when they worked on their daily and weekly tasks (January 12, p. 9), the teacher's heavy use of task progress monitoring behavior implies that the freedom existed within the boundaries established by the teacher and her watchful eye.

The other task feedback categories, "cue or prompt," "diagnostic probing," "testing," represent mechanisms for obtaining information from the pupil about what he knows and has done. Surprisingly, the frequencies are low, suggesting that the teacher either did not obtain much feedback on pupil's task behavior, or that it was done in other ways, or that it was done at different times of the day, like the
beginning or end of the day when there was unscheduled time. Table 17 displays the task feedback frequencies for opening- and-closing-of-the-day periods.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>W</td>
<td>Th</td>
</tr>
<tr>
<td><strong>Opening</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task Progress</td>
<td>5</td>
<td>N.O.</td>
<td>10</td>
<td>N.O.</td>
</tr>
<tr>
<td>Cue or Prompt</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Probing</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>0</td>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td><strong>Closing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task Progress</td>
<td>2</td>
<td>N.O.</td>
<td>N.O.</td>
<td>1</td>
</tr>
<tr>
<td>Cue or Prompt</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Probing</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

a No observations were made.

For the days observed, Table 16 shows that the beginning of the day was used to monitor task progress and give tests (Wednesday), while generally very little task feedback behavior occurred at the end-of-the-day, except for a few task progress behaviors.

The correlation between the proportion of teacher task feedback behavior to all her behavior during Open Time and the average substantive task behavior of the six observed pupils during Open Time is -.23. As with teacher task structuring behavior, this low negative correlation suggests the
tendency of the teacher to increase task feedback behavior as pupil substantive task behavior decreases. It is likely that this inverse relationship was especially true during the latter part of the week. As pupils completed their daily and weekly tasks and engaged in non-substantive tasks the teacher probably increased her behavior to determine pupil's task progress.

The Participant Observation data provide further insight into the mechanisms by which the teacher obtained information about pupil substantive task behavior. Recalling that tasks were assigned to be completed for that day or by the end of the week, and that many of the tasks during Open Time involved pupils working independently the teacher needed mechanisms to accurately determine what and how well pupils were doing.

Analysis of the observer's notes reveal that feedback mechanisms served two purposes: to obtain information on the pupil's task progress and to determine the quality of the pupil's work. For determining pupil's task progress, the teacher used a combination of methods. First, the teacher employed visual scanning of pupils from her desk or as she moved around the room (January 12, p. 7; January 14, p. 2; January 16, p. 3). The frequency of her scanning behavior prompted the observer to comment that she "...gives the impression to the students that she knows what is going on
at all times..." (January 12, p. 7). Certainly, if the teacher was successful in maintaining pupils' belief in her omniscience, that belief would function to maintain pupils' expectancies for obtaining teacher-allocated rewards and costs. The observer provides evidence that the teacher worked to maintain pupil's beliefs in her omniscience when he quotes her as saying to a pupil:

I knew that you couldn't have finished by watching you during the day. You spent too much time in talking to your neighbors to have done your work. (January 12, p. 7)

Another example of the teacher trying to maintain pupils' belief in her omniscience occurred at the end of the week when she met with the observer to go over his work. In response to his statement that all his work was done, she responded by saying, "Yes, I know you have been checked off on everything" (January 11, p. 4).

The last quote suggests that the teacher's knowledge of pupils' task progress was based not only on her scanning but also on a mechanism related to the flow of pupil work papers. The observer's notes make clear that many tasks involved the use of ditto materials which were handed out for completion by the student and returned to the teacher in the appropriate subject folder. Upon the ditto's return to the teacher, she made a check on a record sheet, apparently indicating that a pupil had completed that task. A similar mechanism using library cards was used by the teacher to
keep track of books pupils read. Thus, by looking at the record sheet, the teacher could quickly determine which pupils had not completed which daily and weekly tasks. This mechanism was necessary if the teacher was to correctly determine who needed to stay after school each day.

Sometimes ditto work placed in folders would be checked for correctness later; sometimes it would be checked at the time of its return. The latter represents a simultaneous check of pupil task progress and quality while the former represents an immediate check of progress and a delayed check of quality. This suggests the relative greater importance attached by the teacher to getting tasks done by the end of the day or end of the week over getting work done well. The criterion for staying after school was related to task completion, not task quality. A careful reading of the observer's notes reveals no explicit reference to the criteria for receiving Happy Grams at the end of the week, but the fact that both remedial work and groups existed and that the teacher some times allowed homework if a pupil was unsuccessful in learning a concept during school suggests that the more important criterion for receipt of a Happy Gram was completion of all assigned tasks. Certainly, the primary of task completion as a criterion is understandable since a judgement of quality presumes task completion. Thus, teacher allocated reward and cost
consequences were apparently contingent upon task completion rather than task quality.

Further evidence for this is suggested by the observer's comments about pupils' awareness of keeping on schedule (January 12, p. 6) and that pupils kept an eye on the waiting line to see the teacher so as not to spend too much time waiting (January 12, p. 9). These observations suggest that students were conscious of the necessity and consequences of getting tasks completed and that this awareness was transformed into strategies for getting those tasks completed and checked-off by the teacher, e.g. giving each other spelling tests, observing the length of the line to see the teacher.

Even though reward and cost consequences were probably focused more upon task completion than task quality, several feedback mechanisms existed for determining the quality of a pupil's work. Since much of the work was done on ditto work-sheets, the teacher spent time checking them when pupils were engaged in independent work. Sometimes they were checked at the time the pupil brought them to her. Besides checking the written work, the teacher sometimes probed the pupil to obtain more information. (January 12, p. 5). This permitted immediate corrective action if the pupil needed it. The teacher apparently was able to scan pupils' work not only for progress but also for quality. The observer described such an episode with a pupil who was incorrectly
completing a ditto sheet task in language. What is interesting is that the teacher intervened without being able to see the page upon which the mistakes had been made, leaving the observer to speculate that the teacher knew the pupil was having difficulty from prior scanning. After providing the pupil some corrective feedback, she left him to check the rest of his work for errors and to complete the ditto (January 14, p. 3).

In addition to scanning and checking ditto sheets, tests were used for spelling, arithmetic, newspaper reading and Random House tasks. Based on the pupils' test performance, the teacher either had the pupil move on to the next task or provided the pupil with corrective instruction (January 16, p. 4). Feedback on a pupil's reading performance was obtained by a dyadic conference with the teacher during which the teacher checked for comprehension, fluency, vocabulary (January 14, p. 5). No indication was given by the observer of what the teacher did with the information she obtained.

The feedback mechanism for both progress and quality assessment seem thorough, reliable, accurate and efficient. There is no evidence that pupils did not receive a reward or cost consequence that they should have or that they did receive one that they should not have. As suggested earlier, the teacher seemed to know the daily progress of each pupil and worked at maintaining pupils' belief that she knew what
they were doing. As a result, consequences were awarded as expected, thereby maintaining pupils' reward expectancies. In short, the task feedback mechanism seemed to function in a way that would maintain a high level of substantive task time, especially where the teacher-allocated consequences were focused upon task completion rather than task performance quality.

Question 7

What is the relationship between pupil substantive task time and non-functional task time during Open Time?

In Chapter III, the argument was presented that in a class with an adequately functioning monitoring system, some non-functional behavior will occur and that it plays a role in maintaining substantive task behavior by reducing substantive task reward situation and fatigue. Recalling Tables 5 and 6 presented earlier, it was found that substantive task time was high, while non-functional task time was low. There was great variation in these proportions across both days of the week and pupils. Table 7 revealed a generally negative trend of correlations between the two. It is impossible to determine from these data why this negative relationship and the low level of non-functional behavior existed. The Participant Observation data set provides some insight.
The observer noted instances of several regular, presumably rewarding, non-functional tasks that probably accounted for much of the non-functional time shown in Table 7. These included socializing with a neighbor pupil (January 12, p. 7; January 13, p. 3; January 14, p. 5), playing "paper football" (January 14, p. 5), playing tricks on other pupils (January 14, p. 6), and "playing" (not described by the observer) (January 16, p. 3). The surprise birthday party for the teacher given on Thursday by the pupils represents a planned, non-functional event. Because of its infrequency, it will not be considered other than to say that the observer noted the pupils excitement before and during the party, suggesting that it not only was a display of pupils' positive regard for the teacher but that it may have reduced substantive task fatigue. This latter point is suggested by the observers comment that the substantive task level was very high after the party (January 15, p. 3).

The observer also noted a greater number of pupils engaged in a variety of self-selected substantive, managerial, and non-functional tasks during Friday morning and afternoon Open Time. This was a result of pupils' completion of their daily and weekly substantive tasks, resulting in the opportunity to engage in a variety of self-selected tasks some of which were non-functional. These self-selected tasks, therefore, functioned as rewards for pupils who had
completed their tasks. Their reward value would likely be increased because pupils were allowed to select from alternative rewarding tasks. In short, the increased number of pupils engaged in non-functional tasks on Friday was probably the result of a substantive task completion time frame that began on Monday and ended Friday and the presumed acceptance by the teacher that pupils may engage in self-selected substantive, managerial, and non-functional tasks when their assigned tasks for the day and week were completed. The argument has also been made that these self-selected tasks probably functioned both as rewards for task completion and as incentives for motivating future task completion.

While pupil's non-functional behavior on Friday can be accounted for by these socio-organizational factors, they do not account for the non-functional behavior that occurred during the week and the variations in it that occurred from day-to-day and pupil-to-pupil as is evident from Table 6. The variable and sometimes high frequency of non-functional time noted in Table 6 is especially interesting in light of the analysis of the teacher's monitoring system (Questions 5 and 6) which revealed an effective mixture of visual and procedural mechanisms used by the teacher to keep track of each pupil's daily substantive task progress. It is also
interesting in light of the cost pupils paid for non-completion of daily assignments (staying after school).

One partial explanation for the variable and sometimes high daily non-functional task behavior is provided by the observer when he commented that "not all time is used in task related activity, but the norm seems to be that that's OK, as long as one gets their work done and doesn't bother others" (January 12, p. 9). That comment is supported by the observation that two pupils, who had been engaged in much non-functional conversation during the day discussed the possibility of separating themselves so that they could complete their work. One of the pupils was motivated to do this because he had to stay after school to finish his work.

In addition to the acceptability of non-functional behavior, the observer also noted that pupils were allowed to choose the sequence for working on daily and weekly assigned tasks during Open Time (January 12, p. 9). These socio-organizational factors suggest that two of the reasons for the variable and frequently high levels of non-functional pupil behavior was that costs were not incurred for engaging in it unless one bothered others and that the opportunity to engage in it was provided by pupil self-scheduling of work (within the limits of the day and week time frames) and by tasks that required less time to complete than time available for their completion. Thus, one pupil might have
decided to spend most morning Open Time playing paper football, while spending all afternoon on his assigned tasks. Another pupil might have arranged his work schedule very differently.

That so few people had to stay after school during the week suggests that through experience pupils were adept at balancing non-functional time with substantive task time such that the assigned tasks were completed. The cases of pupil mis-estimation of time needed versus time available were few. That the proportion of non-functional time was low relative to substantive task time seems to be the result of the teacher's capability to assign tasks that matched time available with time needed and the seemingly strong incentive to avoid staying after school.

While no evidence exists of the value of non-functional tasks for reducing substantive task fatigue and reward satiation, it remains a possibility. It is also possible that as a result of pupil self-scheduling of task work, pupils created their own incentives and rewards by using non-functional tasks as both during the day, e.g., a pupil does his math assignment and rewards himself with 10 minutes of paper football. However, none of the data sets enable this possibility to be assessed.
Question 8

What is the relative proportion of time spent by pupils in substantive, managerial, and non-functional tasks during Open Time?

Chapter III developed the argument that the different tasks engaged in by pupils had self- or external reward potential. However, it was argued that substantive tasks had the greatest reward potential since the teacher had control of more resources that could be directed toward increasing pupils' substantive task behavior and minimizing pupils' non-functional task behavior with the amount of managerial task behavior in between the two.

Proportions of pupil time spent in each of these three types of tasks were given in Tables 4 and 5 earlier. The daily totals for each type, aggregating across the six pupils, is presented in Table 18.

Table 18
Proportion of Time Spent in Substantive, Managerial, and Non-Functional Tasks By Days of the Week

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Substantive Tasks</td>
<td>.77</td>
</tr>
<tr>
<td>Managerial Tasks</td>
<td>.13</td>
</tr>
<tr>
<td>Non- Functional Tasks</td>
<td>.10</td>
</tr>
</tbody>
</table>
Examination of Table 18 reveals that time spent in substantive tasks was always at least four times greater than time spent in either of the other two types of tasks. It also reveals that time spent in managerial tasks was slightly greater than time spent in non-functional tasks except for Friday (Wednesday’s proportions are judged to be the same). In short, the consistent ordering of time in types of tasks that favors substantive tasks suggests that the teacher was able to utilize the resources and consequences she controlled to maximize pupil substantive task time and minimize pupil non-functional task time. As has been previously discussed, rewarding non-functional tasks occurred but their incentives presumably were not as powerful as those controlling substantive tasks. Some of the reasons for this have been explored in discussions of previous questions and in discussion of future questions.

Question 9

What is the relationship between pupils working with and without the teacher and pupil substantive task time?

The argument was made in Chapter III that when a pupil works in a context that includes the teacher, pupil substantive task behavior is likely to be higher than contexts in which the teacher is not included since teacher monitoring of pupils would likely be more frequent and since more
Table 19
Proportion of Substantive and Non-Functional Task Time
With and Without The Teacher By Pupil and Days of the Week

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S</td>
<td>NF</td>
<td>S</td>
<td>NF</td>
<td>S</td>
</tr>
<tr>
<td>Pupil 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>N.Oa</td>
<td>N.O</td>
<td>N.Ob</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.999</td>
<td>.0</td>
<td>.62</td>
<td>.29</td>
<td>.999</td>
</tr>
<tr>
<td>Pupil 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.88</td>
<td>0</td>
<td>.92</td>
<td>.02</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>.20</td>
<td>0</td>
<td>.13</td>
<td>0</td>
<td>.25</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.40</td>
<td>0</td>
<td>.35</td>
<td>0</td>
<td>.65</td>
</tr>
<tr>
<td>Pupil 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.52</td>
<td>.44</td>
<td>.87</td>
<td>.07</td>
<td>.47</td>
</tr>
<tr>
<td>Pupil 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>.05</td>
<td>0</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.68</td>
<td>.12</td>
<td>N.O</td>
<td>N.O</td>
<td>N.O</td>
</tr>
<tr>
<td>Pupil 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>N.O</td>
<td>N.O</td>
<td>.02</td>
<td>0</td>
<td>N.O</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>N.O</td>
<td>N.O</td>
<td>.85</td>
<td>0</td>
<td>.70</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Teacher</td>
<td>.04</td>
<td>0</td>
<td>.02</td>
<td>0</td>
<td>.05</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>.73</td>
<td>.10</td>
<td>.77</td>
<td>.06</td>
<td>.70</td>
</tr>
</tbody>
</table>

a "N.O" No communication with the teacher was observed.

b Percentages may add up to less than 100%, - the difference being due to time in managerial tasks.
teacher allocated consequences would be immediately applied. The proportions of substantive and non-functional task time with and without the teacher for the six observed pupils are shown in Table 19 and were derived from the Focus on Pupil data set.

Examination of Table 19 reveals the following:

1) Substantive task behavior in a context with the teacher was very infrequent relative to time spent in contexts without the teacher;

2) Substantive task time in contexts without the teacher exceeded substantive task time in contexts with the teacher by a minimum of 5.5 to 1 and a maximum of 38 to 1;

3) In 10 out of 10 instances in which one of the pupils worked in a context with a teacher, no non-functional behavior was recorded;

4) In contexts without teachers, 11 of 29 observation days occurred without observed non-functional behavior.

There is evidence that even though the observed pupils worked infrequently in contexts with teachers, when they did it was without any non-functional behavior. When pupils worked in contexts without teachers, the incidents of non-functional behavior was higher. Further support for this finding is found in the transformation of the proportions shown in the "Total" rows of Table 19. The "Total" row
provides a more stable, representative estimate of the actual proportions. Table 20 shows the proportions of substantive behavior to both substantive and non-functional behavior in both task contexts.

Table 20  
Proportion of Substantive Task Behavior in Teacher and Non-Teacher Contexts By Days of the Week

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Teacher</td>
<td>.999</td>
<td>.999</td>
<td>.999</td>
<td>.999</td>
<td>.999</td>
</tr>
<tr>
<td>Without Teacher</td>
<td>.88</td>
<td>.93</td>
<td>.83</td>
<td>.87</td>
<td>.87</td>
</tr>
</tbody>
</table>

Table 20 clearly shows that the proportion of pupil substantive task behavior to both substantive and non-functional task behavior was high in both contexts but that it was higher in the context with the teacher. What is interesting about this finding is not so much that the presence of the teacher was related to higher levels of substantive task behavior but that the proportions of substantive task time was so high in contexts without the teacher. The teacher’s absence did not seem to encourage pupil non-functional behavior much.

A possible explanation for this is derived from the Participant Observation data set. Discussion of question 6 made reference to the fact that the teacher engaged in behavior to create the impression”. . . that she knows what
is going on at all times. . ." (January 12, p. 7). This belief by pupils was reinforced by the teacher's complex feedback mechanisms described in question 6. Thus, in addition to the reward and cost consequences that existed and that were known to pupils which seemed to increase the likelihood of substantive task behavior, the effective monitoring system in conjunction with the pupils' belief that the teacher "knew all" may have created an environment in which it did not matter too much to the amount of substantive task time whether or not the pupil worked with or without the teacher. If the pupil worked without the teacher and "goofed off," the teacher may not have known that immediately, but she would know eventually and certainly by the end of the day if the pupil had not completed his assigned tasks. Thus, even though pupils spent much of their time working without the teacher, consequence expectancies were maintained because of the monitoring system and the pupils' probable belief in the teacher's omniscience.

Question 10

What is the relationship between the number of persons in a substantive task context and pupil substantive task time?
An argument was developed in Chapter III that the number of persons in a task context is related to pupil substantive task time, since the number of potential external reward and cost consequences increases as the number of persons increases. In some classes, these rewards and costs are manipulated by pupils in opposition to the teacher to maximize non-functional behavior, while in other classes reward and cost consequences from all sources are used in concert to maximize substantive task behavior. Evidence previously presented from the Participant Observation data set suggested that pupils felt positively toward their teacher and that they expended much time trying to satisfy her work expectations. Thus, it is likely that in addition to the teacher, pupils utilized their resources for reward and cost consequences to make substantive task behavior high relative to non-functional behavior. Table 21, derived from the Focus on Pupil data set, shows the proportion of substantive task time to substantive and non-functional task time for each task context in which pupils were observed. The task contexts are differentiated by the number of persons involved.
Table 21
Proportion of Substantive Task Time in Task Contexts
By Pupils and Days of the Week

<table>
<thead>
<tr>
<th>Task Context</th>
<th>MTW T H F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil 1</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>N.O. a</td>
</tr>
<tr>
<td>Private</td>
<td>.999</td>
</tr>
<tr>
<td>Pupil 2</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>N.O.</td>
</tr>
<tr>
<td>Private</td>
<td>.999</td>
</tr>
<tr>
<td>Pupil 3</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>.999</td>
</tr>
<tr>
<td>Private</td>
<td>.999</td>
</tr>
<tr>
<td>Pupil 4</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>.15</td>
</tr>
<tr>
<td>Private</td>
<td>.95</td>
</tr>
<tr>
<td>Pupil 5</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>.94</td>
</tr>
<tr>
<td>Private</td>
<td>.78</td>
</tr>
<tr>
<td>Pupil 6</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>N.O.</td>
</tr>
<tr>
<td>Private</td>
<td>.999</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Dyad</td>
<td>.59</td>
</tr>
<tr>
<td>Private</td>
<td>.95</td>
</tr>
</tbody>
</table>

a "N.O." - The pupil was not observed in this context.

The first significant point is that none of the pupils were observed working in a group or class context. While teacher-led groups did occur for pupils needing special attention in mathematics (January 13, p. 2; January 14, p. 4; January 15, p. 4) during the period of participant observation, none of the observed pupils worked in any context with more than two persons during their periods of observation. This data, then, does not permit full examination of the relationship between substantive task time and the
number of persons in a task context.

Given this limitation of the data, an examination of Table 21 reveals generally that the proportion of substantive task time to both substantive and non-functional task time was high for each pupil in each of the contexts. One indication of the relationship between substantive task time and context is a count of the number of proportions for which the dyadic context had the higher proportions in each context. Of 24 days of observations for which a pupil was observed in both contexts, the dyadic context was higher in eight, the private context was higher in six, and both contexts were equal in ten. The "total" rows reveal that the dyadic context was higher in three, and the private context was higher in two. Thus, given this limited data there is evidence suggesting that the dyadic context was more often associated with higher proportions of substantive task time than the private context. Since the dyadic context has to involve a pupil with another pupil or the teacher (or her assistant), since Table 20 showed that pupils working with the teacher had .999 substantive task proportions 7 out of 9 times, and since Table 21 showed that the teacher only worked with the observed pupils in a dyadic context, then the higher proportions of substantive task time in dyadic contexts were probably due to the presence of the teacher. Table 22 gives the proportion of substantive task time to
both substantive and non-functional task time for pupils in dyadic contexts working with and without the teacher.

### Table 22

<table>
<thead>
<tr>
<th>Variable</th>
<th>Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Pupil 1</td>
<td></td>
</tr>
<tr>
<td>W Teacher</td>
<td>N.O. (^a)</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>N.O.</td>
</tr>
<tr>
<td>Pupil 2</td>
<td></td>
</tr>
<tr>
<td>W Teacher</td>
<td>N.O.</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>N.O.</td>
</tr>
<tr>
<td>Pupil 3</td>
<td></td>
</tr>
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<td>W Teacher</td>
<td>.999</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>N.O.</td>
</tr>
<tr>
<td>Pupil 4</td>
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</tr>
<tr>
<td>Pupil 5</td>
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<td>W Teacher</td>
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</tr>
<tr>
<td>W/O Teacher</td>
<td>.93</td>
</tr>
<tr>
<td>Pupil 6</td>
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<tr>
<td>W Teacher</td>
<td>N.O.</td>
</tr>
<tr>
<td>W/O Teacher</td>
<td>N.O.</td>
</tr>
</tbody>
</table>

\(^a\) "N.O." - The pupil was not observed in this context.

It is clear from Table 22 that when the teacher was part of the dyad, all time was spent in substantive tasks. When only pupils worked together, 13 of 20 observations showed pupils spending all their time in substantive tasks, and 5 of 20 observations showed pupils spending at least 50% of their time in substantive tasks. Thus, if non-functional tasks were to occur in Open Time, they occurred when only pupils worked together or when they worked alone. Even so,
the level of substantive task time in private and pupil-only dyads was quite high, possibly for reasons suggested earlier - the effective monitoring system and the external cost applied for not finishing daily assignments. That pupils working together in dyads spent most of their time in substantive tasks suggests also that they shared the goal of completing work on time and valued that goal more than goals related to non-functional tasks like paper football. This possibility is reflected on the participant observer's comment that it was acceptable to engage in non-functional tasks as long as the daily tasks were completed and pupils trying to complete them were not bothered. Thus, while the private context was more conducive to non-functional task time, the amount of it was still low and, therefore, not a particularly powerful factor affecting pupil substantive task time. However, the presence of the teacher in a dyadic context appears to be a very powerful determinant of pupil substantive task time. These data do not permit an assessment of the relationship of the size of the task context and the presence or absence of the teacher upon substantive task behavior in contexts larger than a dyad.

**Question 11**

What is the relationship between task feedback proximity and pupil task behavior during Open Time?
"Task feedback proximity" was defined in Chapter III as the amount of time remaining before feedback information about the task is required by the teacher. This unit of time can be defined by the difference between the time left to complete the task and the clock time at which the task is to be completed. The theoretical importance of task feedback proximity to the amount of time pupils spent on substantive tasks is based on assumptions about a pupil's cognitive processing of task feedback proximity, the time needed to complete the task, the reward and cost consequences for completion or non-completion of the substantive task, and other available rewarding tasks. The possible theoretical relationship between these factors is shown in Figure 10.

![Graph showing the relationship between Time on Substantive Tasks and Ratio of Time Needed to Task Feedback Proximity](image)

**Figure 10** Relationship of Time Needed for Task Completion and Task Feedback Proximity With Time on Substantive Tasks
Figure 10 suggests that for any unit of time as the ratio of time needed to task feedback proximity approaches one, time in substantive tasks increases steeply to a level approaching 100%. As the ratio increases beyond one, the curve flattens since little vertical area remains. This graph assumes a fixed amount of time between task assignment and task completion point. If reward and cost consequences are contingent upon an ever expanding time frame, then the costs for engaging in non-functional tasks would be diminished. While no data was collected enabling precise quantification of the times, some information about these conditions is contained in the Participant Observation data set that permit informed speculation about the shape of the curve depicted in Figure 10.

From previous discussions, it is known that tasks were assigned in a fixed time frame of either a day’s or week’s duration. As a result of the teacher’s opening-of-the-day and Open Time task structuring behavior, pupils knew what tasks they needed to complete and when they were to be completed. Evidence presented earlier on reward and cost consequences indicated that pupils knew the consequences for both completion and non-completion of their work in the allocated time. The monitoring process was effective in providing correct information to the teacher about the task progress or completion for each pupil. As a result expected
consequences were allocated and pupils knew that if they did not complete their tasks on time, they would have to stay after school. Reference has also been made to several non-functional tasks that presumably were rewarding to the participants. Most substantive tasks were assigned to be completed during two daily periods of Open Time where pupils either worked by themselves, with another pupil, or with the teacher in a group. Thus, Open Time represented the time available for completion of the assigned tasks. Homework was not allowed. It would have functioned to expand the time available beyond what was needed and into work contexts not controlled by the teacher.

The difference between a specific point in time and the due date for completion of a task is the task feedback proximity time or the time remaining for the pupil to finish. While a pupil could calculate that easily and precisely, a pupil's determination of the time needed to complete a task would have to be much less precisely determined and based on his/her experience with similar tasks. Thus, this estimate may be in error which would have profound effects upon the substantive task time curve. If the estimate was low, resulting in a low ratio, then time in substantive tasks would be low. If it was high and the ratio was greater than one, then time spent in substantive tasks would be high. The presumed relationship between the ratio of time needed and
task feedback proximity and time on substantive tasks, then, might be affected by the accuracy of the judgments about needed time.

Judgments about the time needed to complete a task were probably made both by the teacher and pupils. The teacher in her planning probably made some judgment about the likelihood that pupils would finish their assigned tasks before the end of the day or week. It would be in her interest to overestimate somewhat the time a task would take so that the number of pupils receiving expected end-of-day, or end-of-week rewards would be maximized. This would also maintain the reward consequence expectancies and minimize costs resulting from non-completion.

As indicated in a previous discussion, pupils were given the responsibility to determine the order in which they did their tasks and the time they spent on them. Thus, assuming that the teacher made fairly accurate judgments about time needed for task completion based on her experience with the tasks and her pupils, the judgment problem faced by each pupil was how much of the available time must be spent completing the task and how much could be spent in non-functional tasks but still complete the assigned tasks. That this was an individual problem is suggested by the great variability each pupil showed in the amount of time spent on substantive tasks each day of the week.
As a clue to pupils individual judgments, this pattern of substantive task time bears closer scrutiny. One reasonable assumption about this pattern would be that tasks due for completion by Friday would show an increasing proportion of time spent on them as the possibility for receiving a cost consequence for non-completion increased with the nearing week's end. The "C" or curve column of Table 4 does not support the assumption. Instead, the curve column reveals great variability across days of the week in the time each student spent in substantive tasks. While the data do not support the assumption, they possibly do reflect the individuality with which students chose to apportion their time to different tasks during the week.

Other clues came from the Participant Observation data set. One indication of inaccurate pupil judgments about time needed would be the number of pupils that stayed after school each day to complete their daily work and that did not receive Happy Grams at the end of the week. The number of pupils needing to stay after school that were noted by the observer were two on Monday, three on Tuesday, seven on Wednesday, "several" (count not stated) on Thursday, and none on Friday. The observer noted one boy who made a bad miscalculation of time needed for his weekly mathematics task with the result that his work was carried over to the next week. Whether the pupil received the Happy Gram was not
indicated, but there is reason to believe that the Happy Gram was contingent upon task completion. If this is true, it is likely that that pupil was the only one not receiving the end-of-week reward. This suggests that the pupils judged their needed time better for the weekly tasks than the daily tasks. Even so, the number of pupils needing to stay after school for task non-completion was fairly small, indicating that most students were skilled in accurately apportioning their time to substantive and non-substantive tasks so that assigned tasks were completed on time. This accuracy was probably aided by the teacher reminders related to task time frames reported in Tables 14 and 15.

If students were accurate in their estimates of time needed to complete tasks, it was probably based on knowledge derived from experience with routinized daily and weekly schedules. This was reflected in the observer’s comment that "students appear to have a clear sense of the daily and weekly routine" (January 12, p. 5) and that "students are aware of keeping on schedule" (January 12, p. 6). That some students are so experienced and accurate in their judgments that they chose to postpone starting their weekly tasks is suggested by the following observer’s comment:

"Students apparently pace themselves in some cases to save work to fill time. One student said that he wasn’t going
to do much reading today (Monday) so as to save that for later in the week if he got all of his other work done early. Students seem to pace themselves so as to fill time, but not all students do the minimum.
(January 12, p. 9)

This quote hints at several potentially important points. First, that some students saved work to fill time later suggests that the teacher's judgment of needed time was not accurate for all pupils, resulting in some having more time for non-functional tasks than others. That not all pupils did the minimum required and some saved work for later in the week rather than doing it all early in the week suggests that the substantive tasks were self-rewarding and/or the number of non-functional tasks was limited with fatigue quickly setting in and/or strong social pressure exerted to keep busy with substantive work throughout the week.

While no direct evidence exists of the effect of time needed and task feedback proximity upon substantive task time, the prior discussion suggests that all conditions existed for maximizing substantive task time, e.g., tasks were assigned in a fixed time frame, the teacher allowed sufficient time for task completion, and pupils were skilled in making accurate judgments about time needed for task completion.
Question 12

What is the relationship between differential allocations of task resources and pupil substantive task time during Open Time?

A "resource allocation norm" was defined in Chapter III as the shared expectations as to how time, material and human resources are allocated. Three different kinds of norms were identified: equality, simple adjustment, and complex adjustment. These norms reflect beliefs about the importance of individual differences to learning and about the degree of task and resources differentiation needed to accommodate those differences. The three norms are distinguished by the degree to which resources are differentiated. The argument was made that these shared beliefs were manifested by the allocation of resources, affecting the match between the resources demanded or needed by the task for successful completion and the available resources. A theoretical relationship was assumed that as demanded or needed resources and available resources more directly match, pupils are more likely to stay on task to completion; rewards would be received; reward incentives would be maintained; and task costs would be minimized. The theoretical relationship between demanded or needed resources and available resources and the probability of successful task completion is depicted by a ratio function in Figure 11.
The "Task Resources Ratio" is the amount of available resources divided by the amount of needed resources. The curve depicted in Figure 11 suggests that the probability of successfully completing a task increases as the task resources ratio approaches one and flattens as the ratio increases above one, that is, available resources are greater than needed resources. While no data exist for the quantification of available and needed resources to assess this relationship, the Participant Observation data provide clues as to the type of resource allocation norm that existed in this teacher's class and the relationship between needed and available resources.

One indicator of the type of resource allocation norm that existed is the degree of task differentiation across pupils. In other words were pupils expected to do the same task in the same way, or did they do different ones? While
it is possible to do the same tasks and differentiate some resources, like time, it is not possible to have different tasks using the same resources. Discussions of previous questions have pointed out that Open Time was used by pupils to complete daily and weekly mathematics, spelling, reading, and language assignments. The tasks described by the observer for each of these subjects suggest some variation in the degree of task differentiation. Tasks in mathematics and spelling were assigned on the basis of the observer's diagnostic test performance (January 12, p. 3) which suggests a complex adjustment resource allocation norm. Assuming that the math and spelling curricula were like other diagnostic-prescriptive curricula, the individual differences emphasized by them are the skills that the pupil can and cannot successfully demonstrate. It is possible, therefore, that an entire class may be assigned different tasks.

While the observer did not specify the number of different spelling and mathematics assignments, it is more likely that more than three different assignments were made for each subject. The result would be different material and human resources needed for successful completion of those tasks.

Reading tasks were assigned somewhat differently in that pupils selected their own reading books, probably on the basis of their interest and capability. Thus, while all
pupils were assigned the same task - to read a self-selected book - the material resources probably varied a great deal in terms of content, topic, and difficulty. Thus, a complex adjustment resource allocation norm was likely.

The language tasks worked on by pupils during Tuesday's Open Time (p. 2) seemed to represent a simple adjustment resource norm since only two groups were formed with each group having different tasks. There was no indication by the observer as to how these two groups were formed. The two sets of different tasks would require different resources, but their differentiation would not nearly be as great as the mathematics, spelling, and reading tasks.

If the substantive tasks pupils engaged in during Open Time involved simple to complex adjustment resource allocations, then the teacher must have a variety of resources to use with those differentiated tasks so that resources required by the tasks were matched by available resources. Time, as a resource, has been discussed extensively in the prior question. All that will be said about it is that sufficient time seemed to exist during daily Open Time periods for most pupils to complete daily and weekly assigned substantive tasks.

Human resources refer to both those the pupil had, e.g., capability, interest, attitudes, and those of either other pupils or the teacher that were utilized by the pupil to
help complete his task. The diagnostic-prescriptive mathematics and spelling curricula and the self-selected reading books would probably function to reduce the discrepancy between needed cognitive capability and available capability. There was no information that permits a judgment about the match between needed and available capability for the language tasks.

One way to diminish the discrepancy between needed and available human resources would be to have other persons provide assistance. Answering questions, providing task procedure information, and obtaining task performance feedback from the teacher are three common examples. It will be recalled that pupils worked by themselves for the most part, while the teacher sat at the desk checking papers or working with a pupil, moved around the room doing both, or worked with a specially formed math group. Analysis of the monitoring system used by the teacher revealed an effective mixture of procedures involving visual scanning and other procedures that permitted the teacher to know how far along pupils were in their work and how well they were doing. Thus, the teacher was active in making herself available for assistance to pupils needing it. She was also available when she worked at her desk to check papers. Pupils learned to observe the length of the line waiting to see the teacher so as not to waste much time waiting.
If the teacher was not available, pupils utilized the resources of other pupils for assistance (January 12, p. 3, 7; January 14, pp. 4, 5; January 16, p. 2). Legitimate assistance took the form of practice spelling tests and task procedure information. There was one instance reported by the observer of illegitimate assistance, that is, soliciting an answer on a quiz. Thus, there is reason to believe that pupils were allowed to and, in fact, used their peers for needed assistance in order to complete tasks.

While peer and teacher resources were needed and used to help with knowing what and how to do a task, the tasks pupils engaged in during Open Time required material resources. For the assigned tasks, they included reading books from a classroom library, ditto sheets with exercises to be completed, and other books like spelling, dictionaries, and perhaps a mathematics text. There was no indication from the observer's description or comments that needed material resources did not match the available material resources. Given the curricula requiring simple to complex adjustment resource allocation norms, and given the apparently good match between needed and available temporal, human, and material resources, it is likely that the allocation of resources helped maintain a high level of pupil substantive task time.
Question 13

What is the relationship between material resources of varying novelty and pupil substantive task time during Open Time?

In Chapter III, "resource material novelty" referred to new or unfamiliar objects used to complete a substantive task, where new or unfamiliar referred to a continuum existing in an arbitrarily defined time frame. Not only are material resources used as a medium for completing tasks in order to obtain rewards, but if the material resources are novel, their use may be rewarding in themselves.

No evidence was collected that permits a direct examination of the question, but speculative inferences can be drawn from information contained in the Participant Observation data set. Examination of that data reveals that during Open Time the observer reported himself and others using pencils, textbooks, reading books, and dittos with exercises on them. One mathematics game played Thursday afternoon required the use of cards. These do not seem to be novel materials. The fact that pupils were able to help the observer find the materials he needed suggests that pupils were very familiar with them, not only as a result of their use during the weeks of observations but also from prior weeks' use in all likelihood. Thus, novel materials do not seem to be a factor in accounting for the high level of pupil substantive task time. On the other hand, pupil's familiarity with the
materials would tend to minimize time needed to learn to use them correctly which would reduce substantive task time.

While Question 13 does not address task novelty, the Participant Observation data suggests that certain tasks involving novel sensory or intellectual stimuli have both incentive and reinforcing functions. The best example of this was the special events in art, music, and gymnastics mentioned by the teacher first thing Monday morning. The designation of these events by the teacher as "a bit different" would function to establish an expectation in pupils that the events were novel to some degree (January 12, p. 2). That students were able to sign up for the ones they wanted which would probably maximize the likelihood that pupils would select on the basis of perceived novelty. The incentive function of these special events is suggested by the fall-off in substantive task engagement to the point that the teacher had to intervene with a mild admonishment (January 13, p. 3). The behavior of the pupils and the admonishment of the teacher suggest a high level of anticipatory excitement about the event. While this special event and the others - Wednesday's special art program, Thursday's birthday party, and Friday's tuba ensemble - would function to reduce the physical and psychological fatigue produced by their efforts in substantive tasks, the excitement those activities generated before and during their occurrences
(described for Thursday's birthday party and Friday's tuba ensemble) suggests the reward value each had for pupils, some of which was probably due to their novelty in both an absolute and relative sense. Absolute in the sense that most pupils may not have encountered a tuba ensemble or a gymnastics demonstration. However, that pupils were clearly excited about and enjoying the birthday party suggests that part of its reward value as well as the other events with which pupils had prior experience in other social contexts was the result of their novelty in a school context. Thus, even though several of these events may not have been new to pupils, they were different kinds of events than those that typically occurred in school, suggesting that as reward satiation and fatigue with typical events increased, "different" events increased in their reward potential.

The reinforcement function of these events, except for the birthday party and tuba ensemble, was the result of the way the teacher structured their use. The teacher made them optional. Thus, they were self-allocated rewards that would function as reinforcement for pupils' prior substantive task behavior. While material novelty does not appear to maintain high levels of substantive task behavior, the possibility was raised that the novelty of the special events increased their incentive and reinforcement functions, helping to maintain high levels of substantive task time among pupils.
Question 14

What is the relationship between the complexity of material resources and pupil substantive task time during Open Time?

"Material resource complexity" was defined in Chapter III as the number and configuration of the physical manipulation required to correctly use, either directly or vicariously, the material. The theoretical importance of material resource complexity derives from Berlynes' work (1960) on the reinforcing function of complex and novel stimuli. Thus, complex material resources would be presumed to have a higher reward potential than operationally simple materials. The only data set providing information to assess this question is the Participant Observation data.

Reference was made in Question 13 to the observer's use of pencils, textbooks, reading books, dittoes with exercises printed on them, and a pupil-selected mathematics game involving the use of dice, a board, and pieces that were moved around on the board (January 16, p. 3). Assuming that all but the last material were the standard materials found in most classrooms from grade one, they represent operationally simple materials. Only the mathematics game represents a more complex material but by an undetermined degree. Even this material may have lost much of its complexity by frequent use. Thus, because of the presumed operational simplicity of the materials used during Open Time, it is
likely that materials complexity did not increase pupil substantive task time. On the other hand, there is no reason to believe that it functioned to decrease it as would happen if the materials were extremely complex and pupils were inexperienced in their use.

Question 15

What is the relationship between task material availability and substantive task time during Open Time?

"Resource material availability" was defined in Chapter III as the degree of accessibility of adequate materials for pupil use in completion of substantive tasks. Degree of accessibility is presumed to be both a function of quantity relative to demand and of the restrictions placed on their use. The adequacy of materials is presumed to be a function of their amount, technical fitness, and appropriateness. Theoretically, the argument was made that resource availability could affect both pupils' expectancies for completing a task and receiving a reward and the actual likelihood completing the task and receiving the reward. Thus, as resources become less available, the expectancies for task completion and rewards would decrease and the probability for engaging in non-functional tasks would increase. No direct observation data was collected that permits a frequency assessment of the question. However, information contained on the Participant Observation data provides
insight for drawing speculative inferences about the relationship between task material availability and substantive task time.

As was indicated in the previous question, the materials used by the observer and by others as reported by him were textbooks, ditto sheets, reading books, pencils, and mathematics game materials. There was no indication in any of the data that materials used during Open Time were not fully accessible and adequate.

There was one instance in another subject period momentary material inavailability. During science period on Wednesday (p. 4), all the dictionaries needed to do a task were being used by others, resulting in "a minute of frustration" until a pupil returned with dictionaries from another class area. The incident is suggestive of one advantage of the cluster arrangement of classes, that is, needed materials were more easily and non-obtrusively accessible. It also suggests a willingness among the teachers in the cluster to share materials which would diminish any problems with material availability.

Thus, the fact that there was no evidence of material unavailability suggests their availability may have contributed to the high rate of substantive task time, but probably did not contribute to the proportion of time pupils' spent in non-functional tasks.
Question 16

What is the relationship between tasks with multiple contingencies and pupil substantive task time during Open Time?

The "consequence contingency networks" construct refers to the number of consequences known to the recipient for which the receipt of one is a necessary or sufficient condition for others. Its theoretical importance is related to the presumed increase in the motivational value of incentives since more is gained or lost when multiple contingent consequences exist than when only one consequence follows. No assessment of frequencies is permitted by the two direct observation data sets. However, the Participant Observation data provides some insights, permitting speculation into the relationship between multiple contingencies and substantive task behavior.

To understand the interdependencies of the regular consequences in this teacher's class, one has to recall how substantive tasks were structured. There were both daily assignments and weekly assignments. If daily assignments were not completed by the end of the day, pupils stayed after school until they finished. If weekly assignments were not finished by Friday's end, then they may have been carried over to the next week, perhaps with some penalty to the pupil like missing recess (see Brad's miscalculation, January 16, p. 5). Thus, there were both daily and weekly...
quotas of work, the completion of which resulted in several presumably rewarding consequences.

The logical interconnection of these tasks seems to be as follows: completion of daily individual tasks was a necessary condition for all daily tasks, and completion of all daily assignments was a necessary condition for completion of the week's work quota. At each completion point - individual tasks, daily tasks, and weekly work - different consequences occurred. Thus, the contingency network was tied directly to the task completion structure such that if the pupil worked to obtain the end-of-week reward, the Happy Gram, he must have completed all assignments for the week and all daily assignments which, in turn, required the completion of individual assignments. Thus, receipt of a reward for completion of an individual task was a necessary condition for receipt of a reward for completion of all daily tasks at the end of the day. They are a necessary condition because of their contingent connection to the task structure.

The possible reward consequences at each level of task completion - individual, daily and weekly - were several. When a pupil finished an individual task assigned for that day, it may have been checked by the teacher at that time (January 12, p. 4) or later in the day, (January 12, p. 6). These checks by the teacher functioned to determine if work
had been completed but not necessarily the quality of the work.

For example, on Monday the observer had his mathematics task graded and received some probing from the teacher to determine if he understood the process used to solve the problems. Later, during afternoon Open Time the observer completed two other daily tasks which were checked off by the teacher as completed but not graded by her. The possible reward consequences for the observer for completing his mathematics task and having it checked and graded was praise by the teacher for having completed the task at an acceptable level, self-praise by the observer for doing the task well and the teacher's attention. While the observer mentioned none of these they remain possibilities. The low frequency of teacher verbal praise reported in Table 7 suggests that that type of reward was not probable. Thus, it may be that teacher attention and recognition that a pupil had completed a task was a more common external reward, but again there is no direct evidence for this.

When pupils completed all their daily tasks for any one day, there was not only the possible rewards for the individual tasks, but also the self-symbolic reward awarded for completing everything. Evidence for this the observer's own feelings "of a relaxed sense of accomplishment" (January 12, p. 5). Another reward possibility existed if the pupil
completed his work before the end of school, leaving time for a teacher-determined or self-selected rewarding activity like a game or talking with others. Teacher-determined, rewarding, end-of-day activities occurred on Tuesday (p. 4) and Thursday (p. 4) when the teacher played a mathematics game with the pupils that were finished. Pupil-selected rewarding activities occurred on Friday when pupils read books, played games, or socialized (p. 4) and on the days when pupils decided to go to the afternoon special events. There was also the possibility of teacher attention and praise as the teacher determined who had completed all the assignments and graded some of them. This is suggested by the observer in Monday's (p. 6) and Friday's (p. 6) end-of-day teacher activity in which she checked pupil's work. Finally, the completion of all daily tasks meant that the cost of having to spend time after school was avoided.

When pupils completed all the week's work, the possibility existed for pupils to receive the same types of rewards just described, and a "Happy Gram" to take home to their parents to indicate that all work had been completed and, possibly, that it had been completed at an acceptable level of quality. The Participant Observation data do not make it clear if the letter is one of the conditions for receipt of the Happy Gram. That the Happy Gram was an expected reward consequence of pupils' work by parents and,
by implication, an important one is suggested by the teachers announcement to pupils that they should tell their parents that receipt of the Happy Gram would be delayed until Monday of the next week (January 16, p. 4).

Receipt of the Happy Gram represented another type of consequence contingency network, one that more closely approximates the definition and example described in Chapter III. Receipt of the Happy Gram would be a necessary condition for receipt of rewards from parents. No data indicates that parents did reward their children as a result of the Happy Gram, but it was a possibility. It did seem to be an attempt by the teacher to give feedback information to parents with possibly the hope that they would encourage their children to continue receiving them.

In summary, the teacher structured the completion of substantive tasks in such a way that, at different times, multiple reward outcomes were possible and known (as a result of prior experience) to pupils. These outcomes were interconnected into a consequence contingency network by the logic of the task assignment and completion dates. The "Happy Gram" reward represented a consequence contingency network of another type, that is, one in which receipt of it was a necessary condition for receipt of parental rewards.

While one can only speculate on the importance of the consequence contingency network to the maintenance of the
high levels of pupil substantive task time, it is likely that the existence of known, multiple outcomes contributed to it. Conversely, there is no evidence that the way tasks and consequences were structured diminished pupils' substantive task time.

Question 17

What is the relationship between pupil movement and pupil substantive task time during Open Time?

"Pupil movement" was defined in Chapter III as the amount of time a pupil spends away from his substantive work context for teacher-authorized or non-authorized reasons. The theoretical importance of pupil movement is derived from the argument that as pupils are provided more opportunity to move around the class area, there will be a greater opportunity to seek out resources and tasks that may be either substantive or non-functional in nature.

The Focus on Pupil data in Table 23 show the amount of time pupils spent moving around the work area during Open Time.
Table 23
Proportion of Time Spent By Pupils in Moving Around
By Days of the Week

<table>
<thead>
<tr>
<th>Task Context</th>
<th>Days of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Pupil 1</td>
<td>0</td>
</tr>
<tr>
<td>Pupil 2</td>
<td>.10</td>
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<td>Pupil 6</td>
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</tbody>
</table>

Table 23 shows variability across both pupils and days on the amount of time pupils spent moving around. For example, pupil 3 moved around each day while pupil 5 moved around only three days. When pupils did move around, the time spent was low, ranging from 2.5% to 10% of the time they were observed.

When the proportions are aggregated across pupils, the peak periods of moving around were Tuesday, Thursday and Friday. To assess the relationship between substantive task time and pupil moving around, the correlation between the "Total" rows of substantive task time and moving around was -.57, a moderate relationship, suggesting that as moving around behavior increased, substantive task time decreased.

The Participant Observation data set provides further insights into this relationship. Discussions of previous questions established that pupils worked by themselves at tables or assigned tasks while the teacher worked at her
desk checking papers with or without the pupil present, circulated among the pupils in their work areas, or worked with a small group of pupils on mathematics. Given this independent working context, what was pupils' purpose(s) for moving around during Open Time?

The purpose that was mentioned several times was one of going to and from the teacher or her desk to obtain information, to have work checked off or graded, or to turn in work (January 12, p. 3, 4). Another incident described by the observer occurred on Thursday (p. 3) when pupils crowded around the observer and teacher while the teacher went through a brief instructional episode with the observer. The observer did not mention any admonishment by the teacher of the pupils to return to their seats, suggesting that there were few restrictions on movement around the class area and that pupils were willing to go to spots in that area where something was happening that aroused their curiosity. The low restriction on movement is suggested by both the observer's comments that pupils could engage in non-functional tasks as long as they didn't bother others (January 12, p. 9) and pupils' willingness to help the observer find materials needed to complete his tasks. This latter point also suggests that pupils moved around to obtain needed materials. While no example of this was reported during Open Time, it did occur during a Wednesday science period (p. 3).
The final purpose for moving around described by the observer was to join other pupils in some self-selected task, like a game, after their daily work had been completed (January 16, p. 3). On Friday, the number of finished pupils must have been so high and their movement increased to a level that the observer described them as "all over the area" (January 16, p. 4). While other purposes may have existed, these were the only ones mentioned by the observed and no admonishments for unappropriate moving around were mentioned.

What is remarkable is that, given the probable low restrictions on movement, the amount of it was low and that some of it — if not much of it — is as related to conducting substantive tasks, e.g. getting work checked and getting materials. That the proportions were low suggests the powerful influence of having daily tasks to complete, the consequences for their completion or non-completion, and an effective monitoring system that maintains the expectancies of those consequences in pupils’ thinking. The low proportions of moving around are substantively more important than the negative correlation. Since it was likely that a pupil did not move around while engaging in a substantive task, one would expect a negative correlation. The importance of moving around for these pupils seemed to be that it permitted the flow of substantive work to continue, unobstructed
by rules suppressing it. Pupils moving around were necessary for the monitoring system to work effectively since they came to the teacher to deliver their work or have it checked. Since the opportunity to move around also permitted pupils to act upon things that raised their curiosity for either substantive or non-functional reasons, pupils were more likely to engage in self-rewarding tasks that would, in addition, reduce task fatigue and reward satiation related to other tasks. While the potential for engaging in much non-functional tasks would be increased by such unrestricted movement, it was not apparent because of the pressure to complete assigned tasks. The contrast between the observer's comments about pupils' high substantive task behavior on Monday, Tuesday, and Wednesday, and pupils' low substantive task behavior on Friday as they finished all their assigned substantive work (described as "all over the area") suggests the importance of this pressure in minimizing moving around behavior, especially for non-functional purposes.

Question 18

What is the relationship between the reward allocation norm(s) and pupil substantive task time during Open Time?

The "reward allocation norm" was defined as the shared expectations by pupils and the teacher of how rewards and costs are allocated. The argument was developed that these
norms were related to substantive task differentiation, pupil capability differentiation, and the type of scale against which a judgment about work quality is made. The theoretical importance of the reward allocation norms is related to their effect upon the actual rewards a pupil receives, the incentive expectancies a pupil develops, the evaluative standards he develops for his own self-rewards, and the amount of frustration and aggression displayed. While the Focus on Teacher data provided information on frequencies of teacher verbal rewards, much of the information needed to assess this question is derived from the Participant Observation data which helped establish the degree of task differentiation and the nature of quality standards used by the teacher.

Data presented for question 20 will establish that the observed pupils were heterogeneous in their capabilities. Given the sampling procedure which purposely selected pupils of varying capabilities for observation, it is reasonable to infer that there is heterogeneity in cognitive capability. Prior discussions have established that Open Time mathematics, spelling, and reading tasks utilized a diagnostic-prescriptive approach that functioned to more closely match the cognitive demand of the task with the pupil's cognitive capability. Reading involved pupil-selected books, presumably of varying levels of difficulty. Thus, pupils would
likely select books that were both of interest to them and matched their reading capability. The scale upon which judgments of quality were made appeared to be nominal. For mathematics, a pupil went on to the next task if he got 80% or more of the assigned problems correct. If he did not, he was asked to redo them, or engage in independent remedial instruction, or obtain special help from the teacher until he did 80% or more of the problems correctly (January 12, p. 6). The observer gave no clear indication of the scale for spelling, but it was probably similar to the one for arithmetic. At the end of the week, pupils took a spelling test, but it is not clear what happened when pupils missed words (January 16, p. 3). A pupil's reading performance was assessed by a conference with the teacher in which she checked the pupil's comprehension of the story, reading fluency, and vocabulary (January 14, p. 5). Since this type of evaluation is difficult to quantify, it was likely that the teacher judged a performance acceptable or unacceptable based on her knowledge of the pupil's capability and prior reading performances. No indication was given by the observer of whether any pupils had unacceptable performances or what they had to do if they did.

These conditions suggest that the equity adjusted for capability norm was the one operating in the class. This seems clearly the case for mathematics and probably the case
for spelling and reading.

Assuming this to be true, then the argument was made in Chapter III that the probability of success would be more evenly distributed across pupils, resulting in a more even distribution of external rewards.

There is some evidence that external rewards were evenly distributed. Data in Table 4 revealed a very low frequency of teacher symbolic rewards, suggesting that their infrequency, while probably increasing their reward value due to their scarcity, prevented any gross inequities in her distribution of them. This possibility is further suggested by the data in Table 10 showing an almost complete absence of external, symbolic rewards that the observed pupils received from the teacher. As prior discussions argued, the primary rewards for substantive task completion were the self-selected activities pupils engaged in at the end of the day if their work was completed, the avoidance of staying after school by completing all assigned tasks, and the Happy Gram given at the end of the week for completing all assigned work for the week and presumably, completing it at an appropriate level of quality. Mechanisms were used by the teacher to insure that pupils completed all their work by the end of the day and week and at an appropriate level of quality.
The teacher's daily monitoring of pupils' work progress and pupils staying after school to finish seemed to insure that by the end of the week almost all pupils would be eligible for the Happy Gram. To the degree to which the quality of the work was important for receipt of the Happy Gram, the teacher's use of corrective instruction and retesting increased the likelihood that all pupils would reach the designated level of quality. This seemed especially true for mathematics; it is less clear that this was true for the other Open Time subject tasks. This no-fail approach would function to maintain pupils' self-reward expectancies and allocations.

Another important point is that since the teacher had placed the burden on the pupils to pace themselves, then they cannot justifiably direct any aggressive behavior towards the teacher for having to stay after school. Since the teacher carefully explained what the pupils were to do each day and the possible special situations that might affect pupils' scheduling of their work, and since the teacher provided adequate resources to get assigned tasks completed in the allotted time, then a pupil who did not finish did so either because of poor planning (January 16, p. 6) or overindulgence in non-functional tasks (January 12, p. 6). That pupils accepted their responsibility and the consequences is suggested by the reaction of the pupil who
had to stay after school on Monday. The observer commented that there was no argument from the pupil and that "he apparently understood the expectations and consequences and accepted them" (January 12, p. 7).

Besides minimizing the negative emotional reaction that might have occurred if a pupil could legitimately assign blame to someone else for having to stay after school, staying after school insured that the week's work would be completed and that the Happy Gram would be received. Thus, the cost was a no-fail mechanism, insuring that most or all pupils would receive their Happy Grams. There is reason to infer, therefore, that the end-of-week external rewards were equally distributed and that self- and external reward expectations were maintained. The high, observed levels of substantive task behavior may have been related to the equity adjusted for capability reward allocation norm and the no-fail mechanisms for insuring that the week's work was completed and at the designated level of quality.

**Question 19**

What is the relationship between pupil's cognitive capability and pupil substantive task time during Open Time?

"Cognitive capability" refers to Cattell's constructs (1971) of fluid and crystallized mental abilities that are highly associated with achievement test performance. The
Theoretical importance of "cognitive capability" is derived from the cognitive demand of tasks a pupil is asked to complete and the pupil's capability to complete them. Pupils with high levels of cognitive capability would likely obtain external and self-rewards which would both reinforce and also maintain reward incentives and expectancies. The opposite would be more likely for pupils with low levels of cognitive capability.

Both objective and subjective cognitive capability data were collected by the original investigator. The objective data were derived from the Cognitive Abilities Test, a standardized measure of verbal, non-verbal, and quantitative cognitive capability. The subjective data consisted of the teacher's responses to questions about the academic capability of each pupil. The intercorrelation between these two measures was .80, a respectable validity coefficient. The two measures permit separate assessments of the relationship between pupils' substantive task time and their cognitive capability. The inclusion of the teacher's assessment was motivated by the hunch that the beliefs a teacher has about the cognitive capability of a pupil may be related to the task consequence behavior directed at pupils and, therefore, to pupils' substantive task time.

The correlation between substantive task time and the objective measure was .80, while the correlation between the
teacher's assessment of cognitive capability and substantive task time was .70. The consistent, high, positive correlations suggest that as pupils spent more time engaged in substantive tasks the more cognitively capable they were whether or not the latter was assessed by the teacher or a standardized test. That the teacher may have differentially allocated rewards on the basis of capability was suggested by the frequency of rewards (3) allocated to pupil 3 and the number of contacts with the teacher during the week (at least one, four of the five days). Pupil three, the one judged lowest of the six by the teacher in cognitive capability, obtained the only recorded symbolic reward from the teacher of the six pupils, had the most teacher contacts, and had the lowest total substantive task time. One pupil is not a trend, but it does suggest that the teacher was aware of the pupils having difficulty and needing more encouragement or corrective feedback.

The high correlations between cognitive capability and substantive task time suggest that even with a diagnostic-perscriptive curriculum, either the match between task cognitive demand and cognitive capability was not good and/or the rewards for substantive tasks were not quite as powerful as they were for more capable pupils. Even so, the reward allocation norm, the no-fail mechanisms, and the monitoring system apparently functioned to maximize all pupils'
substantive task time in spite of their cognitive capability.

**Question 20**

What is the relationship between tasks and resources chosen by pupils and substantive task time during Open Time?

"Pupil control" was defined in Chapter III as the opportunity provided by the teacher for pupil to determine the task, the resources for doing it, and the consequences for doing it. The theoretical importance of pupil choice derives from the assumption that if given the opportunity, pupils will choose tasks, materials, and consequences that are maximally self-rewarding.

Throughout discussions of several questions the role of pupil choice has been mentioned. The Focus on Teacher data was coded so as to record the number of teacher statements in which she provided the pupils an opportunity to exercise some choice. During Open Time, no such utterances were coded. The teacher did make statements providing students choices when they worked as a class or a group. There were four on Monday, one on Tuesday, and three on Thursday. Only observations of the opening and closing of each day resulted in any similar behavior with one occurrence each. Thus, it would appear that pupils were provided few opportunities to exercise any choice, unless the areas in which a student was
allowed to do so were so well understood by everyone that the teacher did not have to say anything about them.

The Participant Observation data provide insight into the areas where pupils were permitted to exercise choice. Previous discussions have indicated that in regard to substantive tasks, pupils chose the reading books to read (January 12, p. 4); they were given the option of drawing a picture in social studies (January 13, p. 3); and they were given the choice over the source they wished to use for a review that was assigned in language class (January 14, p. 7). Related to the conditions for completing substantive tasks, pupils were given the opportunity to determine the sequence and pace of their work during Open Time, just as long as it was completed (January 12, p. 9). They were also given the opportunity to work together (January 12, p. 2), the freedom to help each other out by finding needed materials or produce tests (January 12, p. 9; January 16, p. 3). In science class, the work groups were allowed to choose their leaders (January 15, p. 2). Consequence-related choices were focused on self-selected activities after their work was done, e.g., the special arts event (January 13, p. 4; January 14, p. 6), mathematics games (January 16, p. 3), and show-and-tell (January 13, p. 5).

Probably the most important areas in which pupils exercised some choice was the sequencing and pacing of tasks
during Open Time and the selection of rewarding activities after all substantive tasks were completed for the day or week. The theoretical importance of the former was discussed in the previous question and will not be repeated in detail. Briefly, it was argued that it functioned to minimize frustration and angry behavior directed at others for non-completion. As to the latter, self-selected reward activities would function to maximize the reward value of the activity. While the frequency data suggest that pupil choice was almost non-existent, the Participant Observation data informed these frequency data and suggest that pupil choice may have played an important role in maintaining pupils on task as well as contributing to their sense of being trusted, respected and independent learners. When these feelings are followed-up with repeated success in completing substantive tasks successfully, a positive sense of their effectiveness would probably result. As a consequence of their experiences in this class, this positive sense of personal effectiveness or confidence would be a significant self-reward. Thus, the choices pupils could make in the teachers' class increased the probability that time spent on substantive tasks would be high.
CHAPTER VI
SUMMARY AND DISCUSSION

The results and conclusions reported in the previous chapter represented an attempt to develop a theoretically-based causal explanation for the high levels of time that pupils' spent on substantive tasks during part of a day, Open Time, in one teacher's class for a one week period. Data for this case study were collected by utilizing a combination of descriptive methods providing multiple perspectives, including participant observation, live coding of six selected pupils, and coding of audio tape recorded teacher verbal behavior. Given this presumably rich source of descriptive data, this study has two goals for its use. The first was to use the data as the source for a theoretically guided explanation of pupil substantive task time. The second was to make an assessment of the adequacy of the collected data for developing an explanation of pupils time spent on substantive tasks utilizing a modus operandi approach. This chapter will summarize the results of the analyses of the previous chapter, giving a succinct,
theoretically-based, context specific explanation of the high levels of pupil time spent on substantive tasks. The second major section will address some issues related to the use of multi-perspective data collected prior to this investigation for developing a valid, ex post facto causal explanation.

Analytic Summary

Investigative Strategy

This investigation attempted to explain the observed high levels of time that pupils spent working on substantive tasks. The investigative strategy was to develop an elaborated theory based on both social-learning and exchange theory constructs and propositions. Constructs from both theories were integrated and additional ones were developed to provide an elaborated theory especially applicable to the classroom. Based on these constructs and propositions, a set of hypothesized relationships between the constructs and substantive task time were deduced to help guide the development of a causal explanation. Since this was not a hypothesis-testing study these relationships were stated in the form of questions, representing a presumed cause, task consequences and their symbolic representation by pupils, and a complex web of organizational elements, the limiting conditions that intervened between the task consequences and
pupil substantive task time. Once the questions were posed, relevant data from any of the three sets were used to answer the questions, specifically to determine the presence of a presumed cause or limiting condition and to analyze the causal linkages. The frequency data derived from the Focus on Teacher and Pupil data sets lent themselves to an analysis based on classification, enumeration, and descriptive statistics that were used to determine the presence and frequency of the cause, the limiting conditions and effects. The Participant Observation data lent themselves to classification for logical analysis of causal linkages in which incidents and examples of constructs were identified and in which their possible relationships to other theoretically relevant incidents and examples were examined. Applying this method to each question resulted in statements about the presence of the theoretical construct and an analysis of the ways the causes were probably linked to substantive task time.

**Analytic Conclusions**

The high levels of substantive task time exhibited by the observed pupils during Open Time appear to be the result of a complex interplay between reward and cost consequences, incentives, and several limiting conditions.
The salient reward consequences that seemed to have both reinforcement and incentive functions were the self-selected and teacher-determined tasks that pupils would engage in if they were finished with their daily work assignments. These included going to the special art programs throughout the week, or engaging in reading, games, talking, or paper football at the end of the day. Of special note was the end-of-week reward, the Happy Gram, the receipt of which was contingent upon, at least, the completion and perhaps, the successful completion of all daily and weekly tasks. This reward was taken home to parents where it was quite possible that additional external rewards were received by the pupil.

Interestingly, the frequency data of the teacher's verbal behavior did not show her to be a frequent source of either symbolic reward or cost consequences. When she did use verbal rewards and costs, they were typically objective, emotionally neutral, and private judgments of correctness of student responses to the teacher's questions. There was evidence that the pupils had high esteem for the teacher. It is possible, therefore, that the low frequency of teacher reward and cost consequence behavior in conjunction with pupils' esteem for the teacher increased the regulatory efficacy of both her verbal rewards and costs. Homan's scarcity proposition suggests this conclusion. The data did not permit analyses of salient self-rewards, except to the
extent of the contingent, self-selected tasks pupils engaged in at the end of the day when their work was completed.

The salient cost consequence was probably having to stay after school to finish the day's assigned work. Presumably this was a cost because it prevented the pupil from engaging in other more enjoyable activities and because parents, waiting for the child to finish, might have applied other undesirable consequences. Having pupils stay after school probably was a vicarious cost and certainly a reminder of the consequence of not finishing all the assigned tasks. In short, pupils' time in substantive tasks seemed regulated by the possibility of engaging in rewarding tasks and of receiving a Happy Gram, and by avoiding the costs of staying after school - if their assigned tasks were not completed by the end of the day.

These regulatory consequences, however, operated in a social context in which the pupil and teacher did school work. The accomplishment of school work was guided by well-established goals, expectations, and procedures, resulting in regularized behavior patterns directed toward accomplishing work. Understanding the inter-relationships of these conditions, the modus operandi, is important because of their potential for affecting the likelihood that a pupil received a reward or cost consequence. Thus, the following conditions appeared to link the task consequences with the
high levels of substantive task time exhibited by the observed pupils:

1) Tasks that were assigned for completion that day with the consequence that pupils with unfinished work stayed after school until finished.

2) Assigned tasks whose completion date was the end of the week. If these tasks were not completed, the pupil would either have to lose time from some other rewarding task, e.g. recess, and/or not receive the Happy Gram. Since homework was not allowed, the tasks had to be done during Open Time.

3) A monitoring system that enabled the teacher to make efficient and accurate determinations of which pupils had completed which assigned tasks so that cost consequences, if needed, could be applied. The monitoring system probably maintained pupils' belief that the teacher knew what they were doing all the time (Milgram (1974) found this to be an important variable in subject's obedience), thereby, maintaining pupils' expectancies of specific cost consequences for non-completion.

4) The diagnostic-prescriptive curriculum, daily Open Time periods, multiple sources of materials, pupil choice of reading books, daily teacher task structuring behavior, and pupils helping each other
which helped assure that sufficient and adequate
time, material, and human resources were available
so that task activity could proceed with minimal
discrepancies between needed and available
resources, thereby minimizing task difficulty and
costs.

5) Pupil proficiency at judging needed time for
completing their task and at alternating
substantive and non-functional tasks which helped
minimize task fatigue and reward satiation.
Students' proficient was probably the result fo the
responsibility given than to determine the rate and
sequence of their work and the teacher's tolerance
of some pupil non-functional behavior. Pupils also
exercised choice over reading books and end-of-day
tasks, thereby maximizing the reward values of
each.

6) The high probability of pupils receiving the Happy
Gram because of the teacher's effective monitoring
and because of having to complete daily work after
school. The availability of materials and proce-
dures for dealing with pupils having difficulty in
in the context of an individualized diagnostic-
prescriptive program would tend to minimize pupils'
frustration at not receiving expected rewards.

7) The experiences and skill exhibited by both the teacher and pupils in moving through the week and getting their work done. Such experiences would minimize the costs associated with doing a task incorrectly or procedurally inappropriately.

Perhaps it should be emphasized that these conclusions are probabilistic since other causal interpretations were not proposed (and are left to others to propose and support) and since it is impossible to know whether all the causal linkages -represented to a great extent by the limiting conditions in the analyses -have all been identified. The implication is that the validity of the causal explanation is, in part, a function of the kinds and quality of the collected information. Some of the problems of conducting an ex post facto causal analysis with existing data are discussed in the next section.

Meta-Analysis

One of the goals of the original investigator was to develop and implement a methodology for obtaining rich, descriptive information about four elementary classrooms. The utility of this information for developing a valid analysis for answering a question about why something
occurred hinges, in part, on the vagueness and ambiguity of the concepts "rich" and "description". The concept "rich" connotes an abundance of elements or qualities. The vagueness of the term is suggested to any investigator when s/he realizes that any observation of a social setting is selective, unless a permanent record is made by some mechanical means, but this would still lose the immediate phenomenal aspects of the setting. Thus, both temporal and perceptual limitations force an observational selectivity on the investigator, making it impossible to describe all the elements of any social setting at any one time.

There is no doubt that by obtaining data from multiple perspectives, a greater number of classroom elements were observed by the original investigator than if only one perspective - the teacher, for example - had been observed. There can also be no doubt that the number of elements observed in each of these perspectives was limited. For example, the Focus on Teacher and Pupil data sets focused exclusively on overt behavior. Covert behavior - thoughts and feeling states - were contained in the Participant Observation data set, but this was limited to the observer's thoughts. That a data set's richness is limited should be apparent, and it should be apparent that, since it is limited, any attempt to answer a question about why something happened is likely to be constrained by the kinds of
elements that the original investigator included. Thus, the utility of information used for *ex post facto* causal analysis may be limited by the observer's selectivity. For Scriven's modus operandi strategy to be fully used, data would have to be available to test for the presence of all possible causes and their linkages with the outcome of interest. Obviously, as the number of possible causes increases and the richness of the data decreases, the utility of the information for conducting a complete modus operandi analysis is diminished.

It is quite possible, however, that an analysis of a valid cause could be conducted for only one of several possible causes without information available to check for the other causes. The result according to Scriven, is a probabilistic conclusion that the analyzed cause determined the outcome since it would be unlikely that any of the other unanalyzed causes would have a similar modus operandi. In this study, even though other possible causes were neither stated nor analyzed because of data limitations, both the cause, consequences and pupils' knowledge of them, and the complex set of processes and procedures, the limiting conditions, were analyzed in relation to pupil substantive task. The analysis of this link between cause and outcome would have been strengthened with information on pupils' conceptions of reward and cost consequences during Open
The utility of information for an *ex post facto* causal analysis is also related to the observer's conceptions of what constitutes description. The concept of "description" is ambiguous, since it can be used to mean a graphic, detailed account or to mean a report of an event, or to mean an explanation. For instance, if asked to describe two automobiles colliding, an observer might respond with a detailed portrait of the scene of the two crashed automobiles. This would represent pure description since it would enable another person to recognize it as a car crash. A description that is a report is a much more abbreviated account of the sequence of events such as would be given by a police officer or newsman. A description containing explanatory elements would consist of statements packed with causal implications in addition to reportive or descriptive statements. These statements both describe and explain. By explaining, they link one element to another. For example, an account that includes the statement that one of the drivers was drunk and driving on the wrong side of the road, not only helps answer the question of what happened but also why it happened. It is likely that any extended description of some social event - as is found in qualitative research - will contain both pure description and description that contains or presuppresses an explanation. If this latter
statement is correct, then it has important implications for the use of *ex post facto*, modus operandi analysis. It would seem to suggest that the potential for doing a complete modus operandi analysis is directly related to the completeness or richness of the description. If the observer provided pure description, then the potential for a complete modus operandi analysis is limited only by the perceptual and temporal constraints placed on the observer. If the observer provided explanatory description, then the potential for a complete modus operandi analysis is limited to the observer's repertoire of explanatory constructs and theories. If an observer enters a social setting and allows the explanation to emerge through his intimate contact with the participants, resulting in an understanding of them, it seems likely that this situation has the potential, at best, for providing a partial causal list and analysis which, according to Scriven, can be very useful for developing a probabilistic explanation. A basic difficulty with this analysis is that the explanatory scheme of the original investigator was not elaborated enough to permit a presence check of pupil self-rewards, a very important explanatory construct when pupils work independently much of the time. Thus, even a simple cause modus operandi analysis is incomplete.
Recommendations

It would be inappropriate to make prescriptive statements about how teachers ought to arrange their classes to maximize pupils' substantive task time. While the theoretical constructs and relationships are likely to be applicable to most social contexts, the operative reward and cost consequences and limiting conditions are likely to be different and the interrelationships between the operative consequences and limiting conditions are likely to vary from one context to another, making generalized prescriptive statements presumptuous. However, it may be appropriate to suggest that teachers pay close attention to the availability and delivery of reward and cost consequences and how such organizational characteristics, like the seating arrangements, resource availability, monitoring system, task and consequence diversity, etc., enhance or diminish the regulatory efficacy of the task consequences.

One methodological recommendation derives from the previous discussion of the difficulty of doing an ex post facto analysis of data collected by someone else. If the first investigator has completed a causal analysis of his data, then having a second one do it would either expand the analysis to other possible causes or validate the original investigator's analysis. If the second investigator does a modus
operandi analysis of a cause different from the first investigator, then judging between the two will, as Scriven suggests, be a matter of determining which analysis more completely links the cause with the effect. If both do, then the effect is co-determined. However, to do these different analyses requires that the data be as extensive or descriptive of as many elements as possible with the observer being informed about which elements to observe by his understanding of the social setting and knowledge of a broad spectrum of social science theory.

The data collected for this study contained sufficient pure description to check for the presence of a variety of task consequences and their symbolic representation and to analyze some of the linkages between them and substantive task time. It will be left to other investigators to define and test other competing causes and their linkages for determining the high levels of pupil substantive task time. Whether that can be done is one test of the explanatory validity of the analysis.
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