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ORGANIZED BY GOAL STRUCTURE IN A FIFTH GRADE OPEN
CLASSROOM

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STUDENT DYAD EVALUATION OF LEARNING CENTER ACTIVITIES
ORGANIZED BY GOAL STRUCTURE IN A FIFTH GRADE OPEN CLASSROOM

DISSERTATION

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

by

David Roy Heigle, B.S., M.A.

The Ohio State University

1981

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Approved by

Adviser
Department of Early and Middle Childhood Education
DEDICATION

To the memory of Hal and Wavelene Saunders, my grandparents. Their love for people and books planted the seed.
ACKNOWLEDGEMENTS

Very few, if any, significant human endeavors can be accomplished without the cooperation of others and this dissertation is no exception. Aid and support from professors, students, colleagues, friends, and family have contributed to the process which has resulted in the product found in the following pages. Without these dedicated and caring people, my work would have been immeasurably more difficult and lonely. I acknowledge the contributions of the many people who have touched my life during this study.

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CHAPTER I

THE PROBLEM

Introduction

A need exists in American society for the school to be recognized as serving a primary function of developing social skills in children. Dewey (1909) viewed the schools as having no moral end apart from participation in social life. "We must take the child as a member of society in the broadest sense, and demand for and from the schools whatever is necessary to enable the child intelligently to recognize all his social relations and take his part in sustaining them" (p. 9). More specifically, schools must be concerned with providing experiences that provide children with affective as well as cognitive skills. "Knowledge and skills are of no use if the student cannot apply them in cooperative interaction with other people" (Johnson and Johnson, 1978, p. 11). Classrooms that help children learn cognitive material in appropriate affective environments are preparing children to participate in a society in which over 90 percent of all human interaction is cooperative (Johnson and Johnson, 1975). "The most significant thing for students to learn is how to build and maintain positive relationships with other people in work, leisure and family situations."
Involving students in supportive and meaningful relationships with their classmates and members of the school staff is probably the most important thing schools can do for students" (Johnson and Johnson, 1975).

For some time teachers have known that children develop both cognitively and affectively at different and irregular rates. Piaget and other developmentalists have taught teachers that, ideally, provisions should be made for these individual differences. One method teachers have used is the learning center approach; that is, tables located in various parts of the classroom with materials and directions provided so that children can complete tasks without direct teacher supervision. Interaction is an essential ingredient in the learning center approach. Piaget recognized the importance of socialization. He felt that peer interaction over extended time helps loosen the child from the grip of egocentrism. In the words of Flavell (1963), "There remains the question of the mechanism by which the child ultimately frees himself from the grip of egocentrism... It is not simply experience with objects and events in the real world; the child, says Piaget, can and does readily distort physical experience to fit his preexistent schemes. Rather, social interaction is the principal liberating factor, particularly social interaction with peers. In the course of his contacts, (and especially his conflicts and arguments) with other children, the child increasingly finds himself forced to reexamine his own percepts and concepts in
the light of others and by so doing, gradually rids himself of cognitive egocentrism" (p. 279). Teachers faced with the problem of choosing or designing activities for their use in learning centers find themselves faced with a myriad of options. Should the centers be subject centered, interest based, theme related, goal oriented or organized in some other manner? Generally speaking, from the point of view of the teachers, learning center activities should have educational value. Students, on the other hand, need to gain satisfaction from the activities which they perceive to be worthwhile. Regardless of how appropriate, interesting, or meaningful a task appears to be to the teacher, if the child sees that task as busy work or as having little or no worth, then that task will be less effective in accomplishing what it was designed to teach. This study was directed toward investigating how pairs of children in an informal classroom structure should be organized to respond to the theoretical concerns of Dewey, Johnson and Johnson and Piaget cited above. More specifically, the purpose was to examine how pairs of fifth grade students perceived the value of working together under cooperative, competitive, individualistic, and leader-follower goal structures. It was anticipated that insight gained from this study into how children perceive the worth of certain kinds of learning center activities may provide the basis for more intelligent teacher selection of activities and organization of students to work at those activities. And, in addition, it may lend credence to the student's role as an evaluator of educational activities.
Importance of the Problem

Evidence supporting the effectiveness of paired learning experiences and the desirability of interpersonal interaction in the learning process has caused increasing interest in how to sponsor such learning among children. Hartley (1973), studying programmed learning, reports that using pairs of children has the advantage of greater economy, less boredom for pupils, and greater interpersonal interaction leading to better learning and increased retention. Young children have been found to be influenced more by the modeling of a partner just above their developmental level than they are by an adult partner (Silverman and Geiringer, 1973). College students have been found to be more effective in concept attainment problems working in pairs than alone (McGlynn and Schick, 1973). Research evidence demonstrates that over a wide range of age levels and activities, students working in pairs tend to be more effective learners. The categories students evaluated in this study were based on the competitive, cooperative and individualistic goal structures employed by Johnson and Johnson. The Johnsons in turn based their goal structures on what Deutsch (1949) labeled promotively motivated (cooperative) and contriently motivated (competitive) orientation to other members of a group. A goal structure specifies the type of interdependence existing among students. It specifies the ways in which students will relate to each other and to the teacher in working toward the accomplishment of instructional goals. This study employed four types of goal structures: cooperative, competitive, individualistic and leader-follower.
The categories defined below are based on formulations by Deutsch (1949) and Rosen, et al. (1978). Categories 1. (cooperative), 2. (competitive), and 3. (individualistic) are defined on the basis of goal structures originally formulated by Deutsch (1949). Category 4. (leader-follower cooperative) is a variation of the cooperative goal structure suggested by the peer tutoring research of Rosen, Powell, Shubot, and Rollins (1978). In that investigation seventh grade students demonstrated marked increase in satisfaction after experiencing a tutoring or leader relationship with a fellow student or follower.

1. A cooperative goal structure exists when students perceive that they can obtain their goal if, and only if, the other students with whom they are linked can obtain their goal.

2. A competitive goal structure exists when students perceive that they can obtain their goal if, and only if, the other student with whom they are linked fails to obtain their goal.

3. An individualistic goal structure exists when the achievement of the goal by one student is unrelated to the achievement of the goal by other students; whether or not a student achieves his* goal has no bearing upon whether other students achieve their goals.

4. The leader-follower goal structure exists when each student perceives that he must obtain a goal for himself but can only do so

* The generic use of male pronouns when referring to both sexes, for the sake of simplicity, is consistent throughout this study and should not be construed as sexual bias on the part of the writer.
The purpose of the Study

The purpose of this study is twofold and rests on the assumption that social interaction is, and should be, one integral part of elementary education. First, goal structures have been widely studied as means of increasing student achievement, increasing student satisfaction with school and increasing efficiency in learning. In this study a slightly different approach is taken. Goal structures will be examined in an existing informal classroom setting to see if children assign greater ratings of worth and/or spend more time working at certain goal structures as compared with other goal structures. Second, since all students will be working in pairs, the sex, ability and friendship make-up of pairs will be examined for patterns of interaction and correlation with ratings of worth and time on task for the four goal structure categories.

Overall, this study will shed light and give direction to teachers who wish to vary goal structures in their classrooms to meet the needs of as many children as possible. In addition, direction will be given to teachers who, using the variables sex, ability and friendship, want to group children to optimize time on task and feelings of work worth doing.

It was the feeling of the researcher, growing out of years of classroom experience, that ratings of worth by students and the amount
of time they spend on task are somehow measures of the same quality. The most direct route to testing this idea seemed to be to ask children to rate an activity and to record the amount of time spent working on the activity.

The decision to use sex, ability and friendship as the independent variable was based on how children frequently are categorized by themselves and others. The most obvious differences in children are sex differences. These differences, in addition to being physical, are often reflected in what children choose to do and in how they work. It is not the intent of this project to speculate as to the sources of these differences, whether biological or cultural, but to merely note their existence and use the differences as one variable in this study.

The second variable is closely allied with schools. Ability, as measured by standardized tests (in this case a reading comprehension score), is a measure very often used by teachers when placing a child in a reading or math group or in formulating expectations and goals for individualized instruction. Certainly, there are other ways to divide children for instruction, but ability in one of its many forms is probably one of the most widely used means of grouping children in school.

Children frequently divide themselves into groups based on friendship. It should be understood that friendships in preadolescent children often shift rapidly. Nevertheless, because friendship is the most obvious and widespread means by which children group themselves, friendship dyads were used as a variable in this study.
Research Questions

Given the means to organize learning center activities by goal structure categories and given the means of grouping children by sex, ability and friendship, what combinations of goal structure and pair make-up yield the greatest rating of worth and/or the most time on task? The following specific research questions attempt to answer this question:

1. Are there significant differences between the mean ratings of worth by pairs, for the four goal structure categories?
2. Are there significant differences between the mean time spent on task by pairs, for the four goal structure categories?
3. What relationships exist between ratings of worth and time on task?
4. When analyzed separately how do sex make-up, ability make-up and friendship make-up of pairs affect ratings of worth for the four goal structure categories?
5. What combinations of sex, ability and friendship make-up of pairs have the most effect on ratings of worth?
6. When analyzed separately how do sex make-up, ability make-up and friendship make-up of pairs affect time on task for the four goal structure categories?
7. What combinations of sex, ability and friendship make-up of pairs have the most effect on time on task?
8. Are there significant differences between rankings of worth, by individuals, for the four goal structure categories?
9. What illuminating information can be gathered from interviews with subjects on the following topics:
   a. working in pairs;
   b. working with an opposite sex partner,
   c. changing partners each week,
   d. working with a partner whose ability level was higher or lower than one's own,
   e. how ratings were affected by friendship relationship with one's partner,
   f. how time on task was affected by friendship relationship with one's partner.

10. Are there significant differences in how pairs perceive the worth of the learning center activities and how individuals perceive the worth of the activities?

11. What patterns in the data have meaning for classroom application?

Definition of Terms

**Ability** - The most recent standardized test score in reading comprehension was used as the measure of general scholastic ability. The tests were administered on a school district-wide basis prior to the beginning of this study. Individual grade equivalent scores were added to provide one score for each pair.

**Friendship** - Mutual choice on a two-choice sociogram was used as the highest level indicator of friendship. A **friendship cluster** was
identified as the second level of friendship wherein choice of a group of subjects linked them together. There were no choice links across cluster groups. Pairs were characterized as being mutual choices, members of the same cluster or not members of the same cluster.

**Rating of worth** - The value of each activity as rated by pairs on a simple one to five rating scale. One represents the lowest worth, five the highest worth. Each pair gave one rating to each of sixteen activities.

**Sex** - The sex make-up of pairs constituted the sex variable. Male-male, male-female, and female-female pairs are the three possible combinations for pairs.

**Time on task** - The number of minutes, beyond the fifteen minute minimum requirement, spent performing each learning center activity constituted the time on task measure. Time on task was recorded by each pair using clocks provided at each learning center.

**Worth** - The terms worth and worthwhile are common evaluative words used in Informal classrooms. They connote value in terms of academic and affective purpose and are the antonyms of wasted time. Worth and worthwhile were not further defined for the subjects.

**Assumptions and Limitations**

The following assumptions were made when this study was designed:

1. The subjects that participated in this study comprise a sample that is generally isomorphic with other larger populations having
like academic background and demographic characteristics.

2. The subjects possessed and exhibited an appropriate degree of honesty and openness in responding and recording responses to rating scales, time on task reports and interview questions.

3. The subjects possessed the ability and willingness to adequately follow written and oral directions necessary to complete the activities in the study.

4. There are advantages inherent in conducting this study in a naturalistic setting and these advantages outweigh the disadvantages.

5. The statistical procedures employed are appropriate for the data collected, and analysis desired.

The following limitations to the generalizability of results and to the scope of analysis of data are recognized:

1. The population to which the results of this study can be generalized is limited by the size and make-up of the sample.

2. Collection and analysis of data was limited by practical considerations, such as limited time and financial resources and by the design requirement to restrict intrusion into the naturalistic setting.

The Setting and the Sample

The subjects of the study were all the members of a self-contained informal class made up of twelve boys and twelve girls. The subjects had been together as a class for approximately eight months before the
study began. The class was part of an informal alternative program grades one through six housed in a three building annex to a larger contemporary elementary school. The informal program enrolled 250 of the school's 847 pupils. The informal program, while following the general outline of the district's curriculum guides, relied heavily for the course of study on student interest and experience, teacher-created learning centers and non-text materials and activities. Textbooks in the informal classroom, when they were used at all, were used as supplements to the teacher-student created course of study. In contrast, contemporary classrooms in the same school used texts as the course of study supplemented by teacher created activities with considerably less emphasis on student interest and experience.

In informal classrooms the use of learning centers, the lack of emphasis on textbooks and the inclusion of student interests and experience result in classrooms that are physically different in appearance than traditional classrooms. Students sit at desks and tables clustered about the room, often in friendship groups. Upholstered chairs, a couch, a carpeted area for group meetings are part of all informal classrooms. In such a setting free movement and social interaction are natural adjuncts to the learning process.

The school itself is situated in an upper-middle-class suburban community where, according to school district studies, education is highly valued and residents appreciate their schools and believe they provide a quality education program.
The choice of contemporary or informal alternatives is left entirely to parents and their children. The school administration makes no effort to place students in either program on the basis of ability, discipline or any other criteria. Once one of the two alternatives is selected the commitment is for one school year only, students and parents are free to change programs for the following year. Of the 24 fifth grade students in this study, 18 had been in informal fourth grade classes, three in contemporary fourth grade classes in the same school, one student moved into the district from a contemporary school in another part of the state, one came from an informal private school in another state and another from a local parochial Montessori school.

Description of the Study

Sixteen learning center activities selected on the basis of availability in the school were divided by the four goal structure categories - 1. cooperative, 2. competitive, 3. individualistic, and 4. leader-follower. Each of four weeks, four learning centers were set up in the classroom with one activity from each goal structure category.

Twenty-four fifth grade students, 12 boys and 12 girls, were randomly assigned to partners making 12 pairs. The pairs were then randomly assigned to the learning center tasks so that each day, Monday through Thursday, each pair completed one activity. After completing each activity each pair would agree on a worth rating for the activity.
The rating scale used was 1 for the lowest worth to 5 for the most worth. Fridays were reserved for make-up and for introducing the following week’s activities. The time each pair spent on task was recorded in terms of minutes beyond the 15 minute minimum required.

In each of the subsequent weeks of the study, individuals were reassigned to make up new pairs and the process of working at new learning center tasks was repeated. Each individual worked only one week with any one partner. Each week the order in which partners worked at learning center activities was randomized to control for prejudices that might arise from working at one category consistently before or after another.

During the fifth week of the study an interviewer who was not known by the subjects administered a structured interview to all subjects individually. In the interview subjects were asked to: 1. rank goal structure categories from highest worth to lowest worth; 2. pick and rank the four most worthwhile learning center activities; 3. express like or dislike for working with a partner; 4. express like or dislike for working with opposite sex partner; 5. express like or dislike for working with a partner with higher ability; 6. express like or dislike for working with a partner with lower ability; 7. express like or dislike for working with a new partner assigned each week. Subjects were asked their opinions on 8. whether or not pairs rated activities higher when working with a friend, and 9. whether or not pairs spent more time at task when working with a friend.
To remove as much as possible the effects of reward from the study, activities were presented in the context of review and practice of skills and processes already available to all subjects. In activities where specific answers were required, they were provided as part of the learning center materials. For activities that required creative writing or art work, appropriate classroom display areas were provided for the students' products. These procedures represented no departure from the usual presentation of review and practice materials to children in this informal classroom. Success in such activities meant following directions including the minimum time at task requirement and, where products were required, presenting a finished product that was of display quality for that individual or pair.

Summary

Chapter one began with an introduction to the general problem area, the importance of socialization in the learning process. The section Importance of the Problem, stressed the viability of learning in pairs and introduced the four goal structure categories (cooperative, competitive, individualistic and leader-follower). The third section, The Purpose of the Study, included rationale for measuring worth and time on task as well as the rationale for viewing these measures by the sex, ability and friendship make-up of pairs.

The Research Questions to be answered by the study were presented. Definition of Terms, Assumptions and Limitations, The Setting and
the Sample and A Description of the Study complete the chapter.

Chapter II presents the literature and research related to this study.
CHAPTER II

REVIEW OF THE LITERATURE

Chapter II is a review of the literature and research related to this study under the headings: 1) goal structures, 2) pair characteristics, 3) ratings and time on task, and 4) informal classrooms.

Goal Structures

A goal structure specifies the type of interdependence existing among students. It specifies the ways in which students will relate to each other and to the teacher in working toward the accomplishment of instructional goals (Johnson and Johnson, 1975). There are three types of goal structures traditionally studied by social psychologists: cooperative, competitive and individualistic. A fourth, the leader-follower goal structure, was created for this study.

A cooperative goal structure exists when students perceive that they can attain their goal if, and only if, the other student with whom they are linked can obtain their goal (Deutsch, 1949). If the goal for a cooperating pair is to create a mural, then when the mural is completed both partners have achieved their goal. A cooperative goal structure requires the coordination of behavior necessary to achieve the mutual goal (Johnson and Johnson, 1975).
A competitive goal structure exists when students perceive that they can obtain their goal if, and only if, the other students with whom they are linked fail to obtain their goal (Deutsch, 1949). If the goal of a competing pair is to win at a game of Crossword Cubes, then one pair member can achieve his goal only if the other member fails to achieve his. Competitive interaction is the striving to achieve one's goal in a way that blocks all others from achieving the goal.

An individualistic goal structure exists when the achievement of the goal by one student is unrelated to the achievement of the goal by other students (Johnson and Johnson, 1975). If the goal is to find specific ways of combining flashlight batteries and bulbs to make the bulbs light, and if each member of a pair has his own directions and materials, then whether or not one student achieves his goal has no bearing upon whether the other partner achieves his goal. Usually there is no student interaction in an individualistic situation. Each student seeks the outcome that is best for himself regardless of whether or not the other partner achieves his goal.

A leader-follower goal structure exists when each student perceives that he must obtain a goal for himself but can only do so with the cooperation of his partner. If the goal of the activity is to compute with a calculator the answer to an arithmetic problem read aloud by one's partner, then each partner must rely on the other in order for both to solve their problems. The leader-follower goal structure requires relying on one's partner to achieve an individual goal.
The several hundred studies that have been conducted on cooperation and competition are almost all small, carefully controlled experimental studies in laboratory and field settings (Johnson and Ahlgren, 1976). The literature in support of this study must be examined judiciously to fit the more naturalistic methodology used here.

Ames and Felker (1979) read stories to first through fifth grade subjects about children who were either successful or unsuccessful in performing puzzle activities for their teachers under cooperative, competitive and individualistic goal structures. The subjects were then asked to rate each child in the story on nine point scales for ability, effort, and task difficulty; by giving rewards in the form of stars on a ten point scale; and by rating perceived effect on a five point scale. Results of this study demonstrated that children's achievement-based judgments of success and failure outcomes are strongly dependent upon the social context of the setting. Both outcomes (success or failure of children in the story) and reward structure informational cues influenced children's cognitive and affective evaluations. Relevant findings of this study were that 1) competition accentuates the value placed on achievement outcomes, that is, subjects placed greater value on success within a competitive goal structure than success within the other two structures; 2) individualized contingencies seem to reflect self-competition and, as such, fit within the competitive framework for evaluation; 3) the positive outcomes fostered by cooperation seem to evolve primarily from groups that are successful in their
goal accomplishment; 4) when cooperative and competitive reward structures are compared, a successful outcome in a competitive setting elicited higher ability attributions and greater reward giving and was associated with more positive affect than a successful performance in a cooperative setting.

Amos and Felker conclude:

> Although there is much current interest in individualized and cooperative settings, the present findings show that some individualized settings increase perceptions of individual differences similar to competitive settings and that cooperative groups in which lower individual performances cause a group failure elicit strong negative achievement based on evaluations (p. 418).

The authors suggest that American children are so sensitized to a competitive orientation that the value associated with performing a task well is far exceeded by the value placed on winning over another.

In a review of cross-cultural studies involving cooperative and competitive behavior, Rosebrough (1976) concludes that "Findings from the studies...tend to support the contention that Anglo-American children and urban children are more competitive than children from other ethnic groups and rural children in general" (p. 20).

In a related study Knight and Kagan (1977) found Mexican-American children more competitive the more generations their families had been living in the United States. This was the case even though they had lived in a Mexican-American barrio which would normally tend to preserve traditional values.

In an earlier study Nelson and Kagan (1972) reported that when a cooperative choice was available in a gaming situation, older children cooperated more to receive rewards than did younger children. However,
when the cooperative choice was not explicit, all age children tended to compete. The author hypothesized that the tendency for children in the United States to compete often interferes with their capacity for adaptive cooperative problem solving. They found that American students so seldom cooperate spontaneously on the tasks included in their research that it appears that the environment provided for these children is barren of experiences which would sensitize them to the possibility of cooperation. Most American children engage in irrational and self-defeating competition, and the American child (in comparison with children from other countries) is even willing to reduce his own reward in order to reduce the reward of a peer.

Staub (1971) found that the competitive spirit in some children is so deeply ingrained that they believe helping someone in distress is inappropriate and is disapproved of by others.

Virtually all research into the various aspects of cooperative, competitive and individualistic goal structures has been conducted with students from traditional and therefore, at least nominally, competitive classrooms. Results of such research have been uniform: learning was significantly more rapid under collaborative (cooperative) instructions; members of inferior learning ability generally benefited much more from collaboration than did members of superior learning ability; more than two-thirds of subjects reported collaborative situations more pleasant than competitive situations (Gurnee, 1966). Garibaldi (1979) comparing effects of cooperating and competing pairs of high school students reported that cooperating pairs performed better, expressed greater certainty about answers and greater enjoyment
of tasks. Subjects working under the cooperative condition also give more positive ratings to the tasks and reported greater personal attraction to their partners than did subjects working under the competitive condition. Johnson, Johnson and Bryant (1973) reporting on the perceptions and preferences of sixth grade students found that the majority of the children in their study perceived their classroom to be competitive, but the majority of these children thought that they would prefer a cooperative classroom structure because it would be "easier", "more fun", and allow them to express "more and better ideas." In addition, no person who perceived himself in a cooperatively structured classroom preferred a competitive structure. Johnson and Johnson (1976) found from responses to their questionnaire that 37.5 percent of students in traditional sixth grade classrooms, 45 percent in open space sixth grade rooms, and 25 percent of 11th grade students in a traditional high school felt they were in cooperatively structured classrooms. But, 61 percent of sixth grade traditional students, 70 percent of sixth grade open space students and 63 percent of the high school students preferred cooperative experiences.

When individualistic goal structures are compared with cooperative and competitive goal structures, cooperative activities have generally promoted more positive attitudes and achievement levels at least as high as either competitive or individualistic activities. Johnson and Johnson (1979) in a study of achievement and attitudes of fifth grade students working under interpersonal cooperation, competition and individualization conditions found that student achievement under
the cooperative condition was significantly higher than the competitive condition and about the same as the individualistic condition. Students working cooperatively exhibited more positive attitudes about their work than students working competitively or individually and overall most students preferred the cooperative condition because they believed it would promote the most learning. In a similar study by Johnson, Johnson and Tauer (1979) fourth, fifth and sixth grade students not only exhibited higher achievement under the cooperative goal structure than either competitive or individualistic goal structures but also perceived higher teacher and peer academic and personal support. A number of studies have directly compared cooperative learning with individualistic learning at programmed tasks (Amaria, Biran and Leith, 1969; Hartley and Hosgarth, 1971; Hartley, 1973; Hoogstraten, 1977). In all cases cooperative learning was shown to be superior to individualistic learning.

The leader-follower goal structure category created for this study combined elements of cooperation, individualization and peer tutoring. Leader-follower activities are cooperative in that two students work at the same or similar tasks together. As in individualistic activities each person has a separate goal, but in order to achieve the overall pair goal both partners must perform their own roles and achieve their own goals. The peer tutoring aspect of this category concerns the two roles. The leader role is similar to a tutor who controls the activity, the follower is the pupil who responds. Rosen, et al. (1978) report greater satisfaction with own work and
higher achievement for the tutor after tutoring. The satisfaction and achievement increases were especially great if the person being tutored was the more competent partner. Rosen et al. hypothesized that a change in satisfaction may cause a change in achievement and conversely a change in achievement may cause a change in satisfaction.

Ames and Felker (1979) found in their research that children attribute similar characteristics to competitive and individualistic goal structures. Individualized contingencies were seen as self competition and as such fit within the competitive framework. Of the three traditional goal structures cooperation is the only one that requires positive interpersonal interaction. The competitive and the individualistic structures require either antagonistic interaction or no interpersonal interaction at all. The leader-follower goal structure is essentially a combination of cooperative and individualized goal structures. Johnson and Johnson (1975) write about classroom use of goal structures "Throughout...we discuss each goal structure separately. Yet any experienced teacher knows that various combinations are used. Probably the most frequent combination will be cooperative and individualized programs" (p. 68). Thus, to balance the present study with two categories requiring positive interpersonal interaction and two requiring negative or no interaction the leader-follower category was created. Logic and experience suggest that the mongrel nature of leader-follower makes it a real life goal structure reflecting the give and take of every day human interaction.
Research to date seems to say that Anglo-American children are, by and large, competitive creatures. However, when given the opportunity or shown how to cooperate, they quite often prefer cooperative goal structures to competitive or individualistic ones. The evidence for these findings comes from rather indirect sources—performance on tasks, experimenter observations, frequency and types of interaction, questions about how the subjects value certain behaviors of others in hypothetical situations. None has engaged children in cooperative, competitive and individualistic activities and then asked them to evaluate the worth of those activities. And, few of the studies have been conducted in classrooms that are organized to be non-competitive. This study was designed to fill that void.

Pair Characteristics

The literature related to pairs and to the characteristics sex, ability and friendship which are used to describe pairs in this study will be reviewed in this section.

Children working in pairs and larger groups have the effect of encouraging socialization and fostering positive social interactions. Taking a sociological approach to studying classroom interaction, Calonico and Calonico (1972) developed a theory of two personal relationship systems that operate within a given classroom. The external system consists of and is governed by the initial relationships determined by mandatory schooling, age grouping, conformity to work output requirements and the organization of the work. The internal system consists of relationships determined by likes and dislikes for
individuals within the class and the ranking of individuals within the class by an accepted set of norms developed within the class. The internal system is not directly determined by environmental pressures. The Calonicos hypothesized:

1. The more frequently persons interact with one another, the stronger the sentiments of friendship for one another are apt to be.

2. Persons who feel sentiments of liking for one another will express those sentiments in activities over and above the activities of the external system.

3. The higher the rank of a person within the group, the more nearly his activities will conform to the norms of the group. (p. 166)

These hypotheses refer to what Bronfenbrenner (1979) calls the micro-system, or the innermost of the nested systems that make up the setting containing the subject. These systems - the environment - will be discussed in Chapter III.

Using observation, interview and sociometric techniques over a period of three months in a third grade classroom, the researchers found with regard to their first hypothesis a highly significant direct relationship between frequency of interaction and positive sentiment for individuals and for the internal system. A high correlation also existed between positive sentiment in the internal and external system thus confirming the second hypothesis. The third hypothesis, that rank and conformity will have a high positive correlation, was proven significant beyond the .001 level of confidence.

The authors summarize:
Assuming that teachers desire happy, anxiety free classes, characterized by positive sentiments, and that such classes are more conducive to learning than are those characterized by negative sentiments, an immediate implication of this study for educators is that they should allow and even encourage as much interaction among students as possible. This is not to say that the system should be allowed to degenerate into a 'play all day' situation. Rather, interaction can be directed toward the achievement of academically oriented goals (p. 168).

Evidence that learning in pairs results in both cognitive and affective gains comes from a wide variety of sources. Ginott (1979) reports that in schools where children form partnerships to share responsibility for homework, tests, classwork and share the same marks, pairs do better work than either child had done individually. "They give up the defense of deliberate failures which they used to protect self-esteem. In partnership they take risks and experience success" (Ginott, 1979, p. 353). At the very basic level of moving from one developmental stage to the next, children benefit from working with each other. First grade children who were identified as having achieved conservation of length, number, substance, and weight were paired with children who had not yet achieved conservation of length. Each pair was asked to settle on a joint answer to two length problems. Conservers prevailed in a significant number of trials and retests one month later found that non-conservers who had yielded to conservers made significant gains in all four conservation tests as compared to controls (Silverman and Geiringer, 1973).

Elementary children working in pairs without direct teacher supervision on teacher designed manipulative materials were found by Jackson (1978) to spend less time with the teacher, to initiate fewer interactions with the teacher and to address a higher percentage
of specific statements to the teacher than children working alone. Pairs also spent less time with the teacher to solve task related difficulties and more frequently attempted to resolve difficulties themselves before seeking the teacher's help.

As might be expected, goal structure conditions under which pairs operate make a difference in how students react to working in pairs. Garibaldi (1979) measured the affect and performance of high school students working at anagrams and triangle puzzle tasks under three different pair conditions (cooperation, intergroup competition, interpersonal competition) and one individualistic condition. Pairs performed significantly better than individuals working alone on both tasks and expressed more favorable satisfaction with their answers and the tasks. Subjects in pure cooperation indicated significantly more positive ratings of interpersonal attraction toward their team members and expressed more favorable ratings toward tasks than did subjects in intergroup competition. Subjects working under the individualistic condition indicated stronger ratings of commitment to answers than did students in interpersonal competition.

College student dyads working under cooperative and competitive conditions learned more rapidly under cooperative conditions and more than two-thirds reported that cooperative situations were more pleasant than competitive situations (Gurnee, 1968). However, at least for college students, the cooperative condition must be carefully delineated to the subjects. Messick and McClintock (1968) found that for female college student dyads, describing the opposite member of the dyad
as partner or as opponent did not affect the motivational, orientation of the subjects. The authors hypothesized that the manipulation was too weak to produce systematic effect.

In a summation of five field studies of programmed learning Hoogstraten (1977) found that pairs of like and unlike intellectual ability and homogeneous and heterogeneous sex pairs uniformly operated more successfully in pairs than alone. Also reporting on a study of programmed learning Hartley (1973) lists three advantages to learning in pairs: 1) greater economy, 2) less boredom of pupils and 3) greater interpersonal interaction leading to a. more efficient learning and b. increased retentions.

While it is important not to overgeneralize or promote sex stereotyping it is also important to note sexual differentiation of behavior between boys and girls. Elkind (1971) says about children six to twelve, "In general, boys tend to engage in vigorous active play and highly organized games that require muscular dexterity and skill and involve competition between teams. Girls in contrast, tend to participate in more sedentary activities." (p. 15). Elkind goes on to characterize boys as more quarrelsome and aggressive than girls. How these and other differences manifest themselves in behaviors related to working in pairs and under various goal structure conditions has been noted by researchers.

Sex differences and task structure affected how fifth and sixth grade children distributed rewards to fictitious partners in the research of Barnett, Andrews and Howard (1978). In a competitive game situation each of three subject groups were told that their success was due to
skill, luck, or not attributed to either skill or luck (ambiguous). Over all three conditions girls proved to be more generous than boys. "Winners", overall, kept more of their prizes than the "losers" gave to their fictitious partners. Groups that believed that success in the game situation depended upon luck and the ambiguous groups were more generous than the group that was led to believe success was dependent on skill.

Coady and Brown (1978) in their study of normative and competitive incentives on children's performance found that 8-10 year old Canadian girls performed better under normative (the children were told "Most children your age do very well on this task.") than under competitive conditions (the children were told "You have a chance to win a prize."). In addition, boys and girls identified as having a high need for approval performed significantly better under the normative condition. Low need for approval children performed better under the competitive condition. This research indicates the need for a variety of working conditions in a typical heterogeneously grouped classroom.

In a study of children's preferences for cooperative, competitive and individualistic outcomes in gaming situations in which rewards were given for appropriate behaviors, McClintock and Moskowitz (1976) found that children as young as five years systematically take into consideration possible rewards to themselves and others when making behavior choices. The authors found that generally boys were more likely than girls to exhibit competitive behavior in individualistic and conflictual situations. However, there was considerable overlap
between sexes in competitive behavior and in some cases girls were more competitive than boys.

As girls grow older there is some evidence that their competitive behavior changes in response to the sex of their partner, presumably influenced by cultural pressures. Nowicki, Duke and Crouch (1978) found that female college students were more likely to compete on a level consistent with their ability when their partner was also female. When the partner was male, females performed somewhat below their ability level, apparently deferring to the male. Although there is no evidence in support of this behavior in preadolescent girls, there is sufficient suggestion in the literature to believe that boys and girls will exhibit different attitudes toward competition.

In an experimental situation same sex pairs of children five to ten years old responded to cues for cooperation and competition. In situations where cues for cooperation were present and cues for competition were absent, children cooperated with each other. In situations where cues for competing were present and cooperation cues were absent, children competed and older children were far more efficient competitors than younger children. In situations where both cooperative and competitive cues were present, behavior was generally competitive. Overall older children were more competitive than younger children and in some cases, older boys were more competitive than older girls (Nelson, 1970).

Research suggests that differences exist between how boys and girls respond to cooperative and competitive tasks. There is no
evidence that sex is a factor in response to individualistic or leader-follower activities. The most pervasive theme in the role sex plays in children's responses to goal structures is stated by Sherif (1976). "To be white, middle-class, male American means continually finding oneself in situation after situation where tasks, activities, and expectations of others point toward competition with other white middle-class male Americans. The aim is to be 'first' or, at least, to win the best of limited awards available" (p. 198).

The ability of individuals working in pairs or small groups has been shown to have effects on performance and attitude toward the learning situation and the other group members. Johnson, Skon, and Johnson (1980) found that middle and low ability students benefited from cooperative interaction with high ability students on problem solving activities. Johnson et al. also determined that high ability students performed at the same level regardless of whether they are in cooperative, competitive or individualistic conditions.

Gurnee's (1968) findings were similar for college student dyads - members of inferior learning ability generally benefited much more from cooperative learning situations than did pair members of superior ability.

In a study of individual versus cooperative learning in English secondary schools, Ameria et al. (1969) found that the setting as well as the sex make-up and ability levels of partnerships had an effect on performance. Bright boys performed better with like partners in streamed schools, where presumably the pressure to excel was high,
but bright boys from unstreamed schools performed better with low achieving partners. Girls in both streamed and unstreamed schools performed better with lower ability partners. No clear results were obtained from social relationship measures except that some of the best performance results of the study come from pairs randomly assigned from different classes.

In another English study Hartley and Hosgarth (1971) measured the performance of 12 and 13 year old boy pairs working at a programmed chemistry course. They found that neither the high nor the low ability members of mixed ability pairs profited from being paired with an opposite ability partner. In addition, high ability members expressed dislike for working with low ability partners. While not specified in the study report, it is implied that this experiment took place in a highly competitive school atmosphere where a great deal of emphasis was placed on high marks.

With the exception of the Hartley and Hosgarth study evidence points to cognitive and affective advantages for low and middle ability students who are paired with higher ability partners. There may even be affective advantages for high ability students who are paired with low ability partners, although it seems high ability students perform well under all goal structure conditions. There is no evidence to help us predict affective or cognitive outcomes for partners of low ability, middle ability, or other combinations of ability performing under the various goal structures.

Elkind (1971) says of friendships for eleven year olds (the median age of subjects in this study was 10 years, 11 months):
"The choice of friendships is now made on the basis of mutuality of interest and temperament rather than on the basis of proximity and common activity as heretofore. At this age boys usually have one best friend and a group of other friends who play together. Girls, in contrast, tend to be part of a small group of friends, all of whom are good friends and among whom pairing is less frequent" (p. 88).

Stam and Stam (1977) found in a study of sociometric grouping of elementary age children that there were no significant differences between friendship and non-friendship groups on convergent thinking tasks. However, on tasks requiring divergent thinking friendship groups performed significantly better than non-friendship groups.

In a study of cooperative, competitive and individualistic goal structures and friendship and non-friendship dyads Newcomb, Brady and Hartrup (1979) found that, overall, friendship pairs expressed greater affect, made more references to equity and issued more mutually directed commands when working at cooperative tasks than non-friendship pairs. During the competitive and individualistic phase of the study non-friends issued more individualistic commands that met with negation than friendship pairs. The strength of the friendship bond between children is illustrated by Crockenburg's (1979) study of the conformity of school age children in cooperative and interdependent goal environments. She found that, contrary to expectations of non-conformity under cooperative conditions, children conformed to peers even in trust building cooperative environments. The exceptions to the finding were children who were good friends. Children conformed
less with friends than with others who only accepted them. The author hypothesizes that trust requires repeated testing of what will happen if one disagrees with a friend.

Positive interpersonal relations among students is necessary both for effective problem solving in groups and for general classroom enjoyment of instructional activity. DeVries, Edwards and Keith (1973) using learning games and student teams in traditional classrooms found an increased level of mutual concern as well as increased levels of satisfaction, competition and cohesion. DeVries et al., also found indications that learning games and student teams tended to increase informal peer tutoring. In another study using similar methodology, DeVries, Edwards and Keith (1972) observed significantly greater cross-race and cross-sex helping and friendship in gaming-team situations.

In an earlier study, DeVries with Muse and Wells (1971) found that cooperative groups fostered feelings that, compared with traditional minimal interaction classroom organizations, were less relaxed, generated less alienation from the class, excited more frequent interaction, reflected a lower level of perceived interpersonal competence, and facilitated easier interaction with classmates.

Other studies by DeVries, Edwards and Wells (1974) and DeVries and Mescan (1974) reported that students who were social isolates and/or low achievers were more often integrated into classroom friendship circles and less likely to be alienated from their peers in cooperative situations than in competitive situations.
To summarize the work of DeVries and his associates, it seems clear that classroom games which encourage or require interpersonal interaction across traditional social barriers often existing in traditional classrooms—such as sex, race, friendship clusters, ability levels—result in positive affective change as measured by frequency and nature of student interactions. The applicability of this body of research to this study is two-fold. First, the effects of sex of partners, friendship of partners and ability level of partners seem to interact with the goal structure of the activity being performed. For example, DeVries, et al. (1971, 1972, 1974) found that cooperative interaction generated more positive effects than competitive interaction. Second, this body of research raises the question of setting. Will similar results be observed in the present study's informal classroom which has been consciously designed to foster student interaction and helping behaviors as in the DeVries' traditional classrooms where cooperation and encouraged student interaction was a novelty?

Ratings and Time on Task

While there are no studies that have asked children to rate the worth of specific learning center activities, Johnson and Johnson (1975) suggest using semantic differential questions to assess affective outcomes of instruction. The authors suggest that only the most important outcomes be assessed to insure valid information. In the present study pairs were asked to rate each activity on the basis of worth. At the end of the study several semantic differential
questions were asked to determine student attitude about other aspects of the study.

Johnson et al. (1978) using the Minnesota School Affect Assessment (MSAA) found in a study of over 8100 students in grades 4 to 12 that cooperativeness of individuals was consistently related to a broad range of schooling experiences at all grade levels. The MSAA uses semantic differential questions and true-false questions to assess subject attitudes. While several items on the MSAA relate to student attitudes about school work, none is directly related to the concept or worth used in this study.

Time was a measure in the McGlynn and Schick (1973) study of dyads working under discussion, non-discussion problem solving format. They found that pairs who cooperated and discussed the problem performed better than cooperative non-discussing pairs and competing pairs on all measures except time to solutions. However, on successive trials cooperating, discussing pairs improved focusing strategies and decreased time to solution while non-discussing and competing pairs showed no change. Time to solution was also a measure in the Nelson and Madsen (1969) study of cooperation and competition in four year olds. They found that when one prize for two players was offered for a solution to a cooperation board activity children exhibited competitive behaviors and took more time to solution (or no solution) than when two prizes (one for each partner) were offered. Two prizes elicited cooperative behavior and a quick solution.

Slavin (1978) compared performance and time on task for small groups of seventh grade students working for recognition based on team
performance with groups working for recognition based on individual performance. He found that participation in the cooperative team increased time on task but did not increase performance on subsequent quizzes or the final test.

The present study measures both student sentiment of worth for learning center activities categorized by goal structure and measures time on task for the same activities.

Informal Classrooms

That there is a dearth of research in open or informal classrooms on the subject of cooperative, competitive and individualistic goal structures was made abundantly clear by Johnson and Johnson (1974) in an article entitled "Goal Structures and Open Education." In the bibliography of that review of research relevant to both goal structures and open education the authors cited 146 references, none of which were research works conducted with subjects from open classrooms. The authors further state that "There has been no attempt to look at cooperative behaviors in the context of classroom goal structure" (p. 34).

Since that time Henderson and Hennig (1979) have studied cooperation and competition in open and traditional classrooms. On a specific task designed to test willingness to cooperate, this study found children from open classrooms significantly more cooperative than children from traditional classrooms. In addition, children from open classrooms made significant gains in cooperative behavior from the
first to the second trial while the difference between trials was not significant for traditional students.

If we assume that open or informal classrooms are by and large cooperative groups, then the characteristics attributed to such groups can be used to describe open or informal classrooms. Reporting on his earlier studies Deutsch (1962) found that groups of individuals who were promotively oriented (cooperative) as compared with contrary oriented (competitive) showed:

...more coordination of effort; more diversity in amount of contributions per member; more subdivision of activity; more achievement pressure; more communication with one another; more attentiveness to fellow members; more mutual comprehension of communication; greater orientation and orderliness; greater productivity per unit of time; better quality of product and discussion; more favorable evaluation of the group and its products; more behavior directed toward helping the group improve its functioning; greater feeling of being liked by fellow members; and greater feeling of obligation and desire to win the respect of others (pp. 284-285).

The role of the teacher in fostering cooperative behavior has been noted by Bryant and Crockenburg (1974). In their study of cooperative and competitive classroom environments they found that the development of cooperation and social concern in children was directly related to teacher behavior conditions. In classrooms where interdependent goals were emphasized, where teachers modeled social concern behaviors, awareness of the feelings of others and minimized the use of control of power, children demonstrated less competition and more cooperation on tests for those attributes. In addition, when given the opportunity, children from cooperative settings gave more prizes to other children for their drawings.
Other group climate variables that are under the control of the classroom teacher are isomorphism (the tendency of class members to be treated equally) and organization (efficient direction of activity). Wahlberg and Anderson (1968) found these variables to be reliable predictors of learning.

Self discipline and conscious, thoughtful decision making are highly valued student attributes in informal classrooms. Children are encouraged to make decisions that maximize their own learning without infringing on the rights of others. The North Central Evaluation (1978) of the subject Informal Project characterizes the methods by which the Project prepares children to make choices in a changing world:

The informal classroom environment is structured through interest areas. Each room has areas for reading, writing, math/science, research, listening, art, music, cooking. Materials and activities planned in these areas stimulate the child to make constructive and meaningful choices relating to his/her own abilities, interest, and needs. Teacher intervention at appropriate times nurtures the child's choice toward higher levels of understanding and responsibility. Interaction of child and teacher, peers, materials, and activities supports the child's choices and extends his/her learning.

The scientific method of questioning, hypothesizing, experiencing, and evaluating naturally evolves and is encouraged. Each teacher trusts that the child can make worthwhile choices and can assume some responsibility in following through on these choices. This trust is of prime importance. Working through the consequences of choice helps the child realistically deal with decision-making in a changing world.
Summary

In this chapter the writer has reviewed the literature and research related to goal structures, pair characteristics, ratings and time on task, and informal or open classrooms. In general the literature indicates that the cooperative goal structure is more efficient and more enjoyable for children than either the competitive or individualistic goal structures; paired learning promotes positive socialization; sex, ability and friendship make-up of groups have various but definite effects on how the group reacts to different goal structures; ratings and measures of time are conventional means of recording student affect; and open or informal classroom environments are inherently more cooperative than traditional classrooms.

Chapter III will present the procedures of the study.
CHAPTER III

THE SETTING AND PROCEDURES

Introduction

The rationale for the format of this chapter on procedures rests on the theoretical perspective for research in human development proposed by Bronfenbrenner (1979). The model for this theory of research is an ecological one, suggesting far ranging interconnections between the focus of the research, the home, the community, even national policies and cultural make-up. Bronfenbrenner conceives the ecological environment of human development "as a set of nested structures, each inside the next, like a set of Russian dolls. At the innermost level is the immediate setting containing the developing person... The next step, however, already leads us off the beaten track for it requires looking beyond single settings to the relations between them. (Bronfenbrenner) argue(s) that such interconnections can be as decisive for development as events taking place within a given setting. A child's ability to learn to read in the primary grades may depend no less on how he is taught than on the existence and nature of ties between the school and the home" (p. 3).
The third level of the ecological environment suggests that a person's development is "profoundly affected by events occurring in settings in which the person is not even present" (p. 3). Bronfenbrenner states that on this level one of the most powerful influences on young children in industrialized societies are the conditions of parental employment.

This chapter will unfold as a set of nested structures beginning on Bronfenbrenner's third level, in this case the community and conditions of parental employment, and progressing inward to the classroom setting, the actual procedures of the study and finally, to the treatment of the data. The purpose of this format is to place this study in proper perspective to the larger milieu from which the sample was drawn and to suggest some of the countless variables which might have impinged on the results of the study but were not in the equation.

The Setting

The Community

The community is a suburb of Columbus, Ohio immediately adjacent to The Ohio State University. It is, according to the school system's most recent North Central self-evaluation, "...a predominantly Caucasian, Christian, English speaking community of approximately 45,000 residents. It is an upper middle class area that maintains a high standard of living. Forty-two percent of the work force are in professional and managerial fields. A majority of the population is college educated.
and plans for its children to attend college. (The community) school system offers primarily college preparatory training."

Community agencies and service organizations such as the recreation department and the Kiwanis sponsor the following competitive sports for elementary school age boys and girls: baseball, basketball, bicycle racing, diving, football, hockey, ice skating, soccer, softball, swimming, tennis, and track. Many teams and individuals compete outside the community at the state, regional and national levels.

At the high school level all of the above sports are available either as co-curricular school activities or with an outside community organization. The senior high fields perennial state powers in golf, football, swimming and tennis.

For adults, the community supports a wide range of competitive sports ranging from soccer to shuffleboard.

Competition extends beyond the realm of sports into such areas as neighborhood-constructed floats for the annual 4th of July parade, landscaping contests and Christmas house decorating contests.

Of course, underlying all of these competitive activities is a spirit of cooperation and volunteering that supports the competitive activities. What effects the overt competitiveness and the more subtle cooperative spirit have on the children in this study is not known. However, in Bronfenbrenner's ecological model, these factors and many other characteristics of the community can exert powerful influences on developing children. It was not possible to control these factors in the experimental design of this study. They, and the others that
follow, are presented as a caution and a guide to interpreting the ultimate results of this study.

**Conditions of Parental Employment**

For the 24 children in the study there were 45 parents or step-parents (the father of one boy was deceased and the twin girls were represented by one set of parents) in the home. Of the 22 fathers or step-fathers, employment information was known for 19. Eight fathers were professors at The Ohio State University, one was an university administrator and one a graduate student at the university. The remaining were a banker, two business executives, an engineer, a lawyer, two salesmen, a stock-broker and a teacher.

Six of 23 mothers were employed or professionally engaged outside the home: an accountant, an editor, a graduate student, a salesperson, and two teachers.

No data were collected on the actual conditions of parental employment so it is possible only to speculate in a very general way on what these conditions might be and how these conditions might eventually trickle down through children to affect this study.

It is possible, for instance, that the children of parents attending or employed by the university might hold certain attitudes about research that would influence their attention to a project identified as a piece of research. Another possibility might be some predisposition on the part of children of parents involved in business to be either more or less competitive than their peers.
It is not possible or even desirable to pursue all possible trickle-down influences parental employment conditions might have on the outcomes of this study.

The School

The next level in the nested environment is the school, and in this case the experimental setting exists in a school nested within a school. The entire school houses 847 students in grades kindergarten through sixth grade. The main building has been in operation for 40 years, it is occupied by the contemporary or traditional alternative within the school. Three separate annex buildings built nearly twenty-five years ago during rapidly increasing population years have housed the informal alternative for the past seven years. The enrollment for the contemporary program at the time of this study was 597 and the enrollment for the informal was 250.

The study was conducted in one self-contained fifth grade classroom within the informal alternative program. The school's philosophy of informal learning is developmental, "...along Piagetian stages of cognitive development...which allows the child to pursue his or her own natural and most strengthening course of learning by discovery, inquiry and creative interaction with others, under the guidance of the teacher. The child learns how to learn by making choices and experiencing the consequences of these choices within the larger context of his/her scholastic learning observations and emerging competencies. In this way, the child internalizes standards, goals and procedures for on-going self-evaluation in preparation for adult life."
Daily classroom schedules involve a variety of activities that are available to children simultaneously.

In informal classrooms the use of learning centers, the lack of emphasis on text books and the inclusion of student interests and experiences result in classrooms that are different in appearance and operation from traditional or contemporary classrooms. Students sit at desks and tables arranged about the room singly and in clusters, often in friendship groups. Upholstered chairs or a couch and a carpeted area for group meetings are part of all informal classrooms. In such a setting free movement and social interaction are natural adjuncts to the learning process.

Under normal working conditions children may choose among several alternative activities and they may also choose the time of day and duration of chosen activities. Under such conditions it is not possible for all activities to be directly supervised by the classroom teacher thus self-motivation and self-discipline are highly valued attributes in the informal classroom. The teacher provides structure in the classroom by carefully planning, with children, learning themes which are tied to student interests, curricular requirements or a concept which, in the teacher's judgment, the class seems ready to explore. The theme activities usually encompass the traditional subject areas, i.e. reading, writing, math, science and social studies, plus art and music, although the latter two subjects as well as physical education are also taught by subject area specialists. The classroom teacher serves as a resource to the student and directs,
when necessary, learning choices of students. Working together in groups, ranging from two students to an entire class, as well as individually are possible within the time limits of one school day.

Evaluation of student progress for both contemporary and informal programs does not include report cards in the traditional sense, and letter grades for daily work and reports to parents are not used in informal classes. Parents are informed in both programs via a subject matter based check list indicating if the student is performing above, within or below grade level with an indication of high, medium or low effort expended by the student. The subject of grades was not mentioned by the experimenter nor was it brought up by any of the subjects.

The Subjects

The subjects in this study were all the members of a fifth grade self-contained classroom in the informal alternative. The class had been together for the eight months preceding the time of the study in May and many had been in the same classrooms in previous school years. Of the 24 students in this study 18 had been in fourth grade informal classrooms, 3 in contemporary fourth grades, one student was a transfer from a traditional school in another district, one from a private informal school and one from a local parochial Montessori school.

The class consisted of 24 students; 12 boys and 12 girls. Their ages ranged from 117 months to 144 months. Reading comprehension scores
from the Stanford Achievement test given to all fifth grade students in the district were used as a measure of general ability. For the subject class, grade level equivalent scores ranged from 4.4 to 7.8.

Friendship was measured with a two choice sociogram administered the week before the study began. Students were asked to name two classmates they would invite to attend a movie with them. The diagram of the results of this question is presented in Appendix A.

The researcher for this study was the regular classroom teacher. This teacher had 8 years experience teaching in traditional classrooms and 2 years experience in informal classrooms. The teacher/researcher holds a Masters degree in Early and Middle Childhood Education with additional training in informal theory and methods.

Procedures

Preparation and Data Collection

To minimize intrusion into the natural setting of the study the researcher's own fifth grade class was chosen. Additional benefits of the arrangement were the researcher's thorough familiarity with the subjects and the procedures in the classroom, the subjects familiarity with the researcher and the level of trust between them that enhanced the probability of gathering reliable data.

Before the study began the subjects and their parents (Appendix B) were prepared by explaining to them the general purpose of the study, its duration and the role the children were expected to play. The
four goal structure categories were explained with examples. All student questions were answered as honestly and clearly possible. Parents expressed support and enthusiasm for the study.

The 16 learning center activities were selected before the study began from activities and materials available to all teachers in the school. Instructions were written so that each activity fit clearly into one of the four goal structure categories. Each activity was checked against the activities, concepts and materials that had been experienced by the subject class during the school year to determine if the activity did indeed represent a review rather than new material. Directions were written and materials provided so that pairs could, if they wished, spend much longer than the minimum 15 minutes on each task. The subjects were aware that each week of the four week study they would, as pairs, work at one learning center activity from each of the four categories. Each activity was clearly labeled with the category name, the category Roman numeral, and the activity name. A period of time on the Friday preceding each week of the study was reserved to introduce the activities, to present the pairings and the schedule for the coming week. A sample weekly schedule appears in Appendix C.

Each pair was assigned to a specific activity each day of the week, Monday through Thursday. A one-half hour period was reserved for each pair with the stipulation that additional time could be spent on the activity when other pairs were not scheduled for it. A 15-minute minimum time on task requirement was imposed on all activities.
Pairs were randomly assigned to weekly activity schedules to avoid prejudice that might arise if one person were to consistently experience the same category of activity before or after another, week after week.

The purpose and importance of random selection of pairs was explained to the class since it was not common practice for the teacher to assign work partners. The subjects were involved in the randomizing procedure by each drawing a token numbered from 1 to 24. Each person's number was recorded next to his name and a second drawing was made until all children had a partner. For the second and subsequent weeks partners were rotated so that no person had the same partner twice and in a way that prevented the subjects from predicting future partners.

For the purpose of this study, each pair was regarded as a separate entity, that is, the class of 24 individual subjects was combined and recombined over a period of four weeks to create a total of 48 pairs. The 24 subjects were combined the first week to create 12 pairs. Each of those pairs was of course different from the rest. For the second and subsequent weeks 12 new pairs were created each week from the original pool of 24 subjects. Although only 24 subjects took part in the study, over the 4 week period of the study 48 different entities contributed data. During this portion of the study subjects contributed to measures of worth and time on task only as members of pairs, never as individuals. Therefore, the sample size for analysis purposes was 48 pairs.
A free standing bulletin board was erected in the center of the room to display the weekly schedule and to hold the completed rating/time on task forms (Appendix D). The researcher could tell quickly if forms were missing or if pairs had failed to record all necessary data. The rating/time on task form was prepared in advance for each pair by the researcher by recording the names of the pair members, the day, the week and the assigned work time period as well as the category name, roman numeral and the activity title. The subject pairs recorded only the worth rating on which they mutually agreed, and the number of minutes they spent working on the activity.

On the rating of worth scale 1 represented the lowest possible rating and 5 the highest rating. The words worth and worthwhile are terms commonly used in informal classrooms to connote educational value to the individual and to evaluate the use of time by students. They are antonyms for meaningless and wasting time. It was assumed that all subjects had a working definition of worth and worthwhile therefore none was offered to them. There were no questions from the subjects before or during the study about the meanings of the terms.

Small wind-up clocks were provided at each learning station so that pairs could accurately record their time on task. Subjects were instructed to set the clock on the hour at the beginning of the activity and to record the number of minutes after the hour when they were finished.
It was possible for students who were absent to make-up missed activities upon their return to school either between scheduled periods, at the end of the school day, or on Fridays. In not one case was it necessary to make-up a missed activity after its assigned week.

The teacher was present and available to answer questions and interpret directions during the study. In addition, the teacher monitored compliance with directions and observance of the 15 minute minimum time rule.

**Learning Center Activities**

In this section the definitions of the four goal structure categories will be reviewed, each definition will be followed by a description of the four learning center activities that made up that category. Directions to the subjects and sources of activities will be found in Appendix E.

**Category I - Cooperative**

A cooperative goal structure exists when students perceive that they can obtain their goal if, and only if, the other students with whom they are linked can obtain their goal. If one partner achieves the goal, the partner with whom he is linked also achieves the goal.

The learning center activities in the cooperative category were:

Week 1. The Hobbit Mural. Pairs read the passage from the first chapter of *The Hobbit* by J. R. R. Tolkien that describes, in detail, a Hobbit hole. A large sheet of white paper, colored markers, glue, colored construction paper, and crayons were provided at the learning
center. The goal for this activity was to interpret the passage from The Hobbit in mural form. Each pair created one mural.

Week 2. D-Stix. D-Stix is a commercially sold kit designed for constructing skeleton forms of geometric solids. The kit consists of various lengths of plastic rods approximately 3 millimeters in diameter, and soft plastic connectors into which ends of the rods can be secured to make junctions of several rods. The rods are color coded on the basis of length. The goal of this learning center activity was to construct a tetrahedron, an octahedron and a hexahedron using D-Stix. The D-Stix kit instructions with drawings and step by step procedures were provided at the learning center. Suggestions for additional constructions were also provided for pairs who wanted to try more difficult constructions.

Week 3. Veritech Metrics. Veritech is a commercially prepared, self-corrective instructional aid. It consists of a flat plastic case into which fit 24 tiles. Each tile is numbered from 1 to 24 on one side, the other side is part of a colored geometric pattern. The object is to find correct answers to problems, in accompanying Veritech exercise books, that are keyed to tile numbers. When all 24 problems have been answered and the tiles positioned in the plastic case according to answer codes printed in the case, the case is closed, turned over and re-opened. The geometric pattern side of the tiles is revealed. If a regular design matches that shown on the exercise book page the answers are all correct. Should some tiles be out of place, there are some mistakes to correct.
The Veritech booklet on metrics was selected for this activity. Pairs were instructed to work together on finding the answers to the problems. Pairs were instructed to begin at a point in the Veritech Metrics booklet that appeared to be challenging to their knowledge of the metric system.

Week 4. Poetry collage. The goal for this activity was for each pair to assemble a collage of magazine pictures to represent a poem the pair selected from Out Loud, a collection of poems by Eve Merriam. Materials at the learning center included the book Out Loud, brief instructions for making a collage, construction paper, magazines, glue and scissors. Each pair constructed at least one collage.

Category II Competitive

A competitive goal structure exists when a student perceives that he can achieve his goal if, and only if, the other student with whom he is linked fails to obtain his goal. Competitive interaction is the striving to obtain one's goal in a way that blocks one's partner from achieving the goal.

The learning center activities for the competitive category were:

Week 1. Scrabble Crossword Cubes. Crossword Cubes is a commercial game that consists of 14 wooden cubes with letters of the alphabet printed on every face of each cube. Each letter is assigned a number value based on its frequency of use in English words. The number values are printed in subscripts to the letters on the cubes. In addition to the cubes there is a cylindrical container in which the cubes are shaken before they are rolled, a three minute hour glass
timer used to time each person's play, instructions and a pad of score sheets. The object of the game is to use as many letters as possible from a roll to create words in a crossword fashion. After time has expired the numerical value of the letters used is tallied to determine the score for that play. The player with the highest total wins the round.

Week 2. **Monsterplication.** Monsterplication is one of a set of mathematics board games sold as high interest learning materials designed to help children review basic operations. It calls for drawing cards on which are printed multiplication problems, solving the problems and moving a game piece on the game board. The object of the game is to move one's piece to the goal spot on the board before the opponent.

Week 3. **Qubic.** Qubic is a commercial game similar to tic-tac-toe except that it is played in three dimensions. The game structure consists of four clear plastic squares stacked one on the other, each with sixteen holes arranged in four rows of four. Players take turns placing their pegs in the holes. The object of the game is to align four of one's pegs in a straight line either all in one plane or one peg on each of the four levels. The game requires strategy skills and the ability to think in three-dimensions.

Week 4. **Tac-Tix.** The game of Tac-Tix is similar to the ancient game of Nim which was familiar to the subjects. In this game 16 chips are arranged in four rows of four. On one turn a player may take one or more chips from any row or column as long as the chips are in adjoining positions. The object of the game is to leave one's opponent
with the last chip. Unlike Nim there are no known strategies that assure either the first or the second player of a win. However, successful players must play rationally and anticipate opponent's moves. The version of tac-tix used in the study was created by the researcher.

Category III Individualistic

An individualistic goal structure exists when the achievement of the goal by one student is unrelated to the achievement of the goal by another student; whether or not a student achieves his goal has no bearing upon whether his partner achieves his goal. By definition there is no substantive interaction in an individualistic learning center activity since each student seeks an outcome that is best for himself regardless of whether or not his partner achieves his goal.

General instructions for this and subsequent individualistic activities were to work separately with one's own materials but at the same table. The pair was to agree mutually on the worth rating and on a time when both felt like stopping.

The learning center activities for the individualistic category were:

Week 1. Bulbs and Batteries. The bulbs and batteries activities were adapted by the researcher from an Elementary Science Study unit of the same name. For this activity each member of the pair was given instructions and materials. Materials provided for this activity were two flashlight bulbs, three D cell flashlight batteries, two twelve inch strips of aluminum foil, two heavy rubber bands, and paper
for recording results. The instructions were to 1) find two ways of lighting one bulb with one battery 2) find two ways to light one bulb with two batteries, 3) light two bulbs with one or two batteries, 4) find a hands-off way of keeping a bulb lit, 5) invent a switch to turn a bulb on and off. It was assumed (and proved to be true) that to perform all five activities would take much longer than the 15 minutes required minimum time on task.

Week 2. *I Am Freedom's Child.* The Freedom's Child activity was based on a cassette tape and booklet written and performed by Bill Martin Jr. The purpose of the tape and booklet set was to heighten children's awareness of their own worth. The activities created by the researchers were to make an "I like me because..." list and to complete one or more unfinished sentences related to the theme of the tape and booklet.

Week 3. **Toothpick Sculpture.** This activity reviewed concepts studied earlier in the school year in a theme on constructions. Materials provided were toothpicks, quick drying glue, construction paper, small "found" objects and 6" by 6" pieces of ceiling tile to be used as bases for the sculpture. Instructions were to use toothpicks to build the basic sculpture, add "found" objects if desired and make a title-artist card to identify the sculpture.

Week 4. **UFO's and Atlantis Tapes and Filmstrips.** For this activity pairs were asked to select one of the tape-filmstrip sets to listen to and view together. After viewing each person was asked to write two or three beginnings for stories that were related to the
filmstrip viewed. Viewing both tapes-film sets was an option.

Category IV. Leader-Follower

The Leader-Follower goal structure exists when each member of the pair teams perceive that he must obtain a goal for himself but can do so only with the cooperation of his partner. The leader-follower goal structure requires relying on one's partner to achieve an individual goal. The two roles suggested by the title 'leader-follower' were both played, on an alternating basis, by each of the pair partners.

Week 1. Calculator Math. In this activity the leader was designated as problem reader and the follower as problem computer. Materials for the activity were one electronic calculator and two different teacher-made booklets containing 10 problems that required string computation using all four arithmetic operations. The leader read the problems, one number and operation at a time, to the follower who entered the numbers and operations into the calculator. If the answer was correct the team moved on to the next problem. If not correct the problem was repeated. After seven to eight minutes the roles were reversed and the second problem booklet was used. This procedure was followed until all 20 problems were finished or until the pair agreed to stop after the 15 minute minimum had been fulfilled.

Week 2. Binatime. This activity was a review of part of an earlier study of time and time keeping devices. Binatime is a novelty clock that displays the time in the binary numeration system using a system of lights. Flash cards representing different times were prepared by the teacher. The leader displayed the card to the
follower who attempted to decipher the time shown on the card. Roles were reversed after seven to eight minutes.

Week 3. **Pattern Match**. This activity was adapted and constructed by the teacher for use in this study. The purpose of this activity is to foster clear oral communication. The materials for the activity were two duplicate sets of 15 wooden tongue depressors, each of which was half one color and half another - no two depressors in a set had the same combination of colors. A table with a divider that was high enough so that a person sitting on one side could not see the table surface on the other side was used as the work surface. The object of the activity was for the leader to construct a pattern using twelve of his depressors and then describe the pattern to the follower so that he could duplicate the pattern with his depressors. Roles were reversed after each trial.

Week 4. **Mastermind**. Mastermind is a commercial game that encourages logical thinking and ability to follow directions. The leader selects and hides a "code" that consists of four colored pegs and their order of placement on the playing board. The object for the follower is to break the code, first by guessing a sequence of colored pegs then by logically responding to the responses of the leader. The leader responds after each trial by displaying black, white or no pegs in the four response positions on the board. A black peg tells the follower that one color is correct but not in the correct position, a white peg tells him that both color and position are correct, an empty peg hole indicates that both color and position are incorrect.
Every activity was clearly identified by its title and by the goal structure to which it belonged.

Structured Interview

During the week following the conclusion of the learning center portion of the study a structured interview was conducted with each subject by an interviewer that had had no previous contacts with the subjects or the study. The text of this interview can be found in Appendix F. The purpose of this interview was to gather data from individual subjects that could be compared with data generated by pairs. In the interview individual subjects were first shown and read the list of goal structure categories and asked to rank them from high to low in terms of worth. Subjects were shown and read the list of 16 learning center activities and asked to choose the four most worthwhile activities and then to rank those four from high to low worth. These data could then be compared, at least casually, with the mean ratings of worth generated by pairs during the study.

The remaining seven questions in the interview asked subjects to express their feelings about working in pairs, working with opposite sex partners, working with partners who had ability levels different than their own, working with a new partner each week, and how working with a friend affected worth ratings and time on task. These data were regarded as a separate entity for the purpose of analysis although certain parallels with and departures from the pair data were noted.
Analysis of the Data

Appropriate statistical procedures were determined in consultation with advisers and consultants in the College of Education; however, final decisions and interpretations of statistical analyses were made by the researcher. Most statistical procedures were performed at the Instruction and Research Computer Center at The Ohio State University. Additional procedures were calculated by the researcher.

Two statistical packages available at the OSU Computer Center were used for the bulk of the analyses. The SAS Institute Inc. Statistical Analysis System printed data so it could be checked for accuracy and calculated means and standard deviations. These statistics were used as a check against data from the second package and as the basis for the Spearman's Rho calculations done by the researcher. The Student's t-test, Pearson correlation coefficients and Rho significance computations, stepwise multiple regression and analysis of variance were computed with appropriate subprograms of the Statistical Package for the Social Sciences or SPSS. The following are descriptions of the SPSS subprograms used:

Subprogram T-TEST: Comparison of sample means. Subprogram T-TEST provides the capability of computing Student's t and probability levels for testing whether or not the difference between two means is significant. The paired samples t test was used to compare rating of worth category means for pairs, time on task category means for pairs, and rating of worth category means for individuals (Nie, 1975, p. 267).
Pearson's correlation, Subprogram PEARSON CORR., computes Pearson product-moment correlations for pairs of variables. The Pearson correlation coefficient $r$ is used to measure the strength of the relationship between two interval level variables (Nie, 1975, p. 280).

The correlation matrices generated by this subprogram were used to compare sex, ability and friendship with ratings of worth and time on task for the four goal structure categories; to compare ratings of worth with time on task; and to make comparisons between categories.

Multiple regression analysis, Subprogram REGRESSION. In general, multiple regression requires that variables are measured in interval or ratio scale and the relationships among variables are linear and additive. Multiple regression is a general statistical technique through which one can analyze the relationship between a dependent or criterion variable and a set of independent or predictor variables (Nie, 1975, p. 320). In this study multiple regression analysis and the accompanying analysis of variance were used to determine the extent of the effects of sex, ability and friendship on ratings of worth and time on task.

Two Spearman's rank difference correlations were calculated by the researcher. The first compared ratings of worth for all learning center activities with time on task for the activities. The second compared ratings of worth by pairs with ratings of worth by individuals.
Summary

The format for this chapter was suggested by Bronfenbrenner's theoretical perspective for research in human development. The model for this theory of research is an ecological one, suggesting far ranging interconnections between the focus of the research and the home, the community and beyond. Particular attention was paid to the community in which this study took place as well as the school and the Informal Project setting.

Salient characteristics of the subjects and the methods by which they were organized for this study were described. The four goal structure categories and their attendant learning center activities were defined and described. Data collection methods were discussed and finally the methods of treating the data were presented.

Chapter IV will present the results of the data treatment and discuss these results as they apply to the research questions.
CHAPTER IV

ANALYSIS OF THE DATA

The analysis of the data is discussed in this chapter. The chapter is divided into three major sections: 1) analysis of data from student pairs collected during the study; 2) analysis of the data obtained from individual students after completion of the study; 3) comparisons between data from student pairs and individuals. Each section will progress from general findings to more specific examinations of how sex, ability and friendship affect worth ratings and the time on task measure as well as individual's answers to questionnaire questions related to student perceptions of ratings and time on task. Pertinent research questions will be discussed in each section.

Section 1

Analysis of Data From Student Pairs

In this section student pair ratings of worth and total time on task will be examined to determine overall rating and total time on task for the four goal structure categories - cooperative, competitive, individualistic and leader-follower. Next, the data will be examined for relationships between rating of worth and time on task. Finally,
Table 1

Means, Standard Deviations, Standard Error of Means, Rank for Ratings of Worth by Category

<table>
<thead>
<tr>
<th>Category</th>
<th>N = 48</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error of Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative</td>
<td>48</td>
<td>3.2083</td>
<td>1.3832</td>
<td>.1996</td>
<td>3</td>
</tr>
<tr>
<td>Competitive</td>
<td>48</td>
<td>3.7917</td>
<td>1.0097</td>
<td>.1457</td>
<td>1</td>
</tr>
<tr>
<td>Individualistic</td>
<td>48</td>
<td>3.1875</td>
<td>1.2144</td>
<td>.1753</td>
<td>4</td>
</tr>
<tr>
<td>Leader-Follower</td>
<td>48</td>
<td>3.4167</td>
<td>1.1820</td>
<td>.1706</td>
<td>2</td>
</tr>
</tbody>
</table>

The data will be examined to determine the role sex make-up, ability make-up and friendship make-up of pairs plays in overall rating of worth and total time on task.

Research Question 1. Are there significant differences between the mean ratings of worth by pairs for the four goal structure categories?

Table 1 shows that ratings by all 48 pairs favored the competitive goal structure category followed by the leader-follower, cooperative, and individualistic categories in that order. To test the significance of these differences the student's t was calculated for all possible combinations of cooperative, competitive, individualistic and leader-follower mean ratings of worth.
Table 2 presents the t-tests for differences between means. Significant differences (p<.01) are shown between the mean rating scores for competitive and cooperative activities. Differences between the mean rating scores for competitive and individualistic goal structures achieved significance (p<.05). Differences between means for cooperative and individualistic, cooperative and leader-follower, competitive and leader-follower, and individualistic and leader-follower did not achieve t ratios sufficient to meet the .05 test of significance.

Discussion

Student pairs, on the whole, awarded significantly higher worth ratings to competitive activities than to the cooperative and individualistic categories of activities based on the difference between means of rating scores for each category. Significant differences between the mean worth ratings for cooperative and competitive activities and between competitive and individualistic activities indicate a perceived difference on the part of student pairs between competitive activities on the one hand and cooperative and individualistic activities on the other. No significant differences between rating of worth means were noted between competitive and leader-follower; between cooperative and individualistic; between cooperative and leader-follower; or between individualistic and leader-follower. While some significant differences exist, considerable sentiment of worth is expressed for all goal structure categories.
### Table 2

**t Test for Difference Between Means - Ratings of Worth**

<table>
<thead>
<tr>
<th>Categories Compared (Rank)</th>
<th>Means</th>
<th>Difference Between Means</th>
<th>t Value</th>
<th>DF</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative (3)</td>
<td>3.2083</td>
<td>0.5833</td>
<td>2.43*</td>
<td>47</td>
<td>.019</td>
</tr>
<tr>
<td>Competitive (1)</td>
<td>3.7917</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative (3)</td>
<td>3.2083</td>
<td>0.0208</td>
<td>.09</td>
<td>47</td>
<td>.929</td>
</tr>
<tr>
<td>Individualistic (4)</td>
<td>3.1875</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative (3)</td>
<td>3.2083</td>
<td>0.2083</td>
<td>.97</td>
<td>47</td>
<td>.337</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>3.4167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive (1)</td>
<td>3.7917</td>
<td>0.6042</td>
<td>2.58**</td>
<td>47</td>
<td>.013</td>
</tr>
<tr>
<td>Individualistic (4)</td>
<td>3.1875</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive (1)</td>
<td>3.7917</td>
<td>0.375</td>
<td>1.63</td>
<td>47</td>
<td>.11</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>3.4167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic (4)</td>
<td>3.1875</td>
<td>0.2292</td>
<td>1.20</td>
<td>47</td>
<td>.237</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>3.4167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t value significant beyond .05 level of probability

** t value significant at .01 level of probability
Table 3
Means, Standard Deviations, Standard Error of Means, Rank for Time-On-Task by Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error of Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative</td>
<td>14.5833</td>
<td>16.4042</td>
<td>2.3677</td>
<td>1</td>
</tr>
<tr>
<td>Competitive</td>
<td>6.7292</td>
<td>8.8576</td>
<td>1.2785</td>
<td>4</td>
</tr>
<tr>
<td>Individualistic</td>
<td>8.4375</td>
<td>8.8868</td>
<td>1.2827</td>
<td>3</td>
</tr>
<tr>
<td>Leader-Follower</td>
<td>9.0</td>
<td>9.2068</td>
<td>1.3289</td>
<td>2</td>
</tr>
</tbody>
</table>

Research Question 2. Are there significant differences between the mean time spent on task, by pairs, for the four goal structure categories?

Table 3 displays the means, standard deviation, and standard error of means for time on task for the four goal structure categories. Subject pairs spent the most time on cooperative tasks followed by leader-follower tasks, individualistic tasks and competitive tasks in that order. The student's t was calculated to test the significance of these differences.

The t tests presented in Table 4 evaluated the significance of the differences between all category time on task means. The significant differences between category means are: between cooperative
### Table 4

**t Test for Differences Between Means - Time-On-Task**

<table>
<thead>
<tr>
<th>Categories Compared (Rank)</th>
<th>Means</th>
<th>Difference Between Means</th>
<th>t Value</th>
<th>DF</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative (1)</td>
<td>14.5833</td>
<td>7.8542</td>
<td>2.98**</td>
<td>47</td>
<td>.005</td>
</tr>
<tr>
<td>Competitive (4)</td>
<td>6.7292</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative (1)</td>
<td>14.5833</td>
<td>6.1458</td>
<td>2.46*</td>
<td>47</td>
<td>.018</td>
</tr>
<tr>
<td>Individualistic (3)</td>
<td>8.4375</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative (1)</td>
<td>14.5833</td>
<td>5.5833</td>
<td>2.34*</td>
<td>47</td>
<td>.023</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive (4)</td>
<td>6.7292</td>
<td>1.7083</td>
<td>1.12</td>
<td>47</td>
<td>.268</td>
</tr>
<tr>
<td>Individualistic (3)</td>
<td>8.4375</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive (4)</td>
<td>6.7292</td>
<td>2.2708</td>
<td>1.23</td>
<td>47</td>
<td>.223</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic (3)</td>
<td>8.4375</td>
<td>0.5625</td>
<td>0.31</td>
<td>47</td>
<td>.760</td>
</tr>
<tr>
<td>Leader-Follower (2)</td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t value significant beyond .05 level of probability

** t value significant beyond the .01 level of probability
and competitive ($p < .01$); between cooperative and individualistic ($p < .05$); between cooperative and leader-follower ($p < .05$). The differences between competitive and individualistic means; between competitive and leader-follower means; and between individualistic and leader-follower means fail to reach significance at the .05 level of probability. 

**Discussion**

The mean time on task for the cooperative category was inflated by some extreme times on task by a few pairs thus exaggerating t values for differences between the cooperative category and the other three categories. However, all four categories received time on task that exceeded the minimum 15 minute requirement indicating that some student pairs found some activities in all categories engaging. 

It is not clear from these data whether or not some relationships exist between ratings of worth and time on task. Research question 3 focuses on these relationships. 

**Research Question 3.** What relationships exist between ratings of worth and time on task? 

Table 5 presents the calculations of Spearman's rank difference correlation coefficient comparing activity ratings with time on task, revealing a Rho of .1449 which fails to reach the .10 level of confidence. 

Thus, at the broadest level of examination - the comparison of category means and at the next level - the comparison of individual activities means, there was no significant pattern of correlation.
Table 5
Spearman's Rho - Rank Difference Coefficient Calculated for Ratings of Worth and Time-on-Task

<table>
<thead>
<tr>
<th>Activity Category/Week</th>
<th>Rating</th>
<th>Time-On-Task</th>
<th>Difference (R1 - R2)</th>
<th>Difference Squared (D^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp 2</td>
<td>1</td>
<td>14 (5.5)</td>
<td>13</td>
<td>169</td>
</tr>
<tr>
<td>Comp 1</td>
<td>2</td>
<td>4 (13.0)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Indiv 3</td>
<td>3</td>
<td>7 (10.9167)</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Lefo 4</td>
<td>4</td>
<td>5 (12.0833)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lefo 3</td>
<td>3</td>
<td>8 (9.5833)</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Coop 1</td>
<td>6.5</td>
<td>1 (22.5833)</td>
<td>5.5</td>
<td>30.25</td>
</tr>
<tr>
<td>Comp 3</td>
<td>6.5</td>
<td>11 (7.5)</td>
<td>4.5</td>
<td>20.25</td>
</tr>
<tr>
<td>Lefo 1</td>
<td>8.5</td>
<td>6 (11.9167)</td>
<td>2.5</td>
<td>6.26</td>
</tr>
<tr>
<td>Coop 2</td>
<td>8.5</td>
<td>12 (6.75)</td>
<td>3.5</td>
<td>12.25</td>
</tr>
<tr>
<td>Coop 3</td>
<td>10</td>
<td>3 (13.4167)</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>Comp 4</td>
<td>11</td>
<td>16 (0.9167)</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Indv 4</td>
<td>12.5</td>
<td>10 (8.25)</td>
<td>2.5</td>
<td>6.25</td>
</tr>
<tr>
<td>Indv 1</td>
<td>12.5</td>
<td>13 (5.75)</td>
<td>.5</td>
<td>.25</td>
</tr>
<tr>
<td>Lefo 2</td>
<td>14</td>
<td>15 (2.4167)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Indv 2</td>
<td>15</td>
<td>9 (8.8333)</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Coop 4</td>
<td>16</td>
<td>2 (15.5833)</td>
<td>14</td>
<td>196</td>
</tr>
</tbody>
</table>

\[ \sum d^2 = 581.5 \]

\[ P = 1 - \frac{6\sum d^2}{N(N^2 - 1)} \]

\[ P = 1 - \frac{3489}{4080} \]

\[ P = .1449 \]

Critical value of P at .10 significance level = .425
between ratings of worth and the amount of time student pairs spent working on the activities.

A more direct examination of the overall data was utilized to compare individual student pair rating of worth with the same pair's time on task using the Pearson r correlation coefficient formula.

Table 6 reveals that when pair ratings of worth are matched with the same pair's time on task, higher levels of correlation are achieved. Individualistic and leader-follower categories achieved correlation coefficients that proved to be significant (p < .01). The competitive category correlation coefficient between rating of worth and time on task proved to be significant (p < .05). The cooperative category correlation coefficient, while not attaining significance at the .05 level, approaches significance (p = .077) and fits the pattern established by the other three categories.

Discussion

It is not until the analysis reaches the level of comparing the worth rating of one pair with the time on task of the same pair that the correlation of rating with time on task is revealed. Time on task tends to increase as rating of worth increases, or conversely, rating of worth increases as time on task increases. It is at this point that possibilities for classroom application begin to emerge. For example, if the goal of a teacher is to increase time students spend actively engaged in learning center activities, one method to achieve that goal is to provide activities that students perceive as being worthwhile.
Table 6

Correlation Coefficients and Significance Values
Comparing Student Pair Ratings of Worth with Time on Task

<table>
<thead>
<tr>
<th>Rating of Worth</th>
<th>Time-on-Task</th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperate</td>
<td>r = 0.2093</td>
<td>p = 0.0770</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td>r = 0.2529</td>
<td>p = 0.0410*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic</td>
<td>r = 0.3156</td>
<td></td>
<td></td>
<td>p = 0.0140**</td>
<td></td>
</tr>
<tr>
<td>Leader-Follower</td>
<td>r = 0.4829</td>
<td></td>
<td></td>
<td></td>
<td>p &lt; 0.0000**</td>
</tr>
</tbody>
</table>

* p < 0.05
** p < 0.01
The next level of this investigation is to look at the sex, ability and friendship make-up of pairs to determine how these factors affect worth ratings and time on task.

Research Question 4. When analyzed separately how do sex make-up, ability make-up and friendship make-up of pairs affect ratings of worth for the four goal structure categories?

In order to focus more closely on the sources of variation between perceived differences in worth and the differences in the amount of time spent working at the activities in each of the four goal structure categories the data was analyzed by sex, ability and friendship make-ups of the subject pairs. The pairs, over the four weeks of the study, consisted of 13 male-male pairs, 22 male-female pairs and 13 female-female pairs. The pairs were ranked from high to low on the basis of scores on the reading comprehension subtest of the Stanford Achievement battery given to all fifth grade students in the school district. The measure of friendship was a two choice sociogram given to the subjects the week before the study began. Individuals in the class fell into four natural friendship clusters with no student choosing someone outside of the cluster of which he was a member. Four pairs consisted of mutual choices on the sociogram, while 10 pairs were made up of two members from the same cluster. The remaining 34 pairs consisted of two individuals from different clusters. For the purpose of analysis the pairs were coded so that sex, ability and friendship were treated as interval data.

Sex. Maleness of each pair was arbitrarily set as the highest value. The sex variable was coded 2 for male-male pairs, 1 for male-
female pairs, and 0 for female-female pairs. Thus, a high positive correlation between sex and worth ratings or time on task indicates that as the degree of maleness in pairs increases so does the rating or time spent on the activity. Conversely, a high negative correlation indicates that as maleness of pairs increase, ratings or time decrease. It is possible, of course, to read the data for the effects of female-ness.

**Ability.** The combined reading comprehension scores for two partners were used as the basis for ranking student pairs from high to low. In the case of tie scores, combined ages were used and older students were relegated to the lower of the tied positions. To facilitate data interpretation the student pair with the highest combined reading comprehension scores was assigned the value of 48 and the pair with the lowest combined scores assigned a value of 1. Thus, in interpreting correlation coefficients a relatively high positive value indicates than as ability increases so do ratings of worth and time on task. Conversely, a high negative coefficient indicates that as ability increases ratings of time decrease. Of course, correlations between low ability with rating and time may be read also.

**Friendship.** Three intervals of friendship were used for this variable. Pairs whose members were mutual choices on the sociogram were assigned a value of 2. Pairs whose members were from the same friendship cluster were assigned a value of 1, while pairs whose members were from different clusters were assigned a value of 0. High positive correlation coefficients indicate that as the degree of friend-
ship increases, ratings of worth or time on task also increase. Strong negative correlations indicate that an increase in friendship corresponds to a decrease in ratings of time. The tables may also be read for decreasing value of friendship.

Table 7 displays Pearson r correlation coefficients and Rho significance values for the comparisons between sex, ability and friendship make-up of pairs and ratings of worth for cooperative, competitive, individualistic and leader-follower goal structure categories.

Significance beyond the .05 level of confidence is achieved for the negative correlation between sex and the ratings of worth for the leader-follower category which indicates that as the maleness of pairs increases the ratings of worth decrease. Simply stated, male pairs tend to rate the leader-follower category lower than female pairs. Although correlation does not reach the .05 level of confidence between sex and the cooperative category, the probability that this negative correlation occurs by chance closely approaches significance (p = .06). This correlation indicates that an increase in maleness of pairs corresponds to a decrease in rating of worth for the cooperative activities. Similarly there is a positive correlation trend (p = .088) which indicates that increase in maleness corresponds to an increase in ratings of worth for competitive activities. Finally while the level of confidence is relatively low, the positive correlation between maleness and individualistic activities approximates the correlation
Table 7

Correlation Coefficients and Significance

Values Comparing Sex, Ability and Friendship

Make-up of Pairs with Worth Ratings

<table>
<thead>
<tr>
<th></th>
<th>N = 48</th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td>r =</td>
<td>-.2275</td>
<td>.1983</td>
<td>.1649</td>
<td>-.2662</td>
</tr>
<tr>
<td></td>
<td>p =</td>
<td>.06</td>
<td>.088</td>
<td>.131</td>
<td>.034*</td>
</tr>
<tr>
<td><strong>Ability</strong></td>
<td>r =</td>
<td>-.1417</td>
<td>.2574</td>
<td>-.2359</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>p =</td>
<td>.168</td>
<td>.039*</td>
<td>.053</td>
<td>.476</td>
</tr>
<tr>
<td><strong>Friendship</strong></td>
<td>r =</td>
<td>.2704</td>
<td>-.1729</td>
<td>.373</td>
<td>.1828</td>
</tr>
<tr>
<td></td>
<td>p =</td>
<td>.032*</td>
<td>.12</td>
<td>.005**</td>
<td>.107</td>
</tr>
</tbody>
</table>

* p<.05
** p<.01
between maleness and ratings for the competitive category. This indicates a direction which is supported by the literature that individualistic goal structures are viewed by some as self competition. Also, the leader-follower category, which was created for this study, embodies many of the characteristics of the traditional cooperative goal structures and indeed, roughly matches direction and degree of correlation with the cooperative category.

When ratings of worth are evaluated by ability make-up of pairs a different pattern emerges. As ability of pairs increase, there is a corresponding increase in rating of worth for competitive activities (p < .05). But a negative correlation exists between ability and the individualistic category (just missing the .05 level of confidence) indicating that as ability increases the rating of worth for this category decreases. A slight negative correlation exists between ability and the cooperative activities and ability has virtually no effect on the leader-follower activities.

Friendship of pair members creates yet another pattern of correlation. The strongest correlation is found between friendship and individualistic activities. This correlation reaches significance beyond the .01 level of confidence and indicates that as friendship between partners increases so do their ratings of worth for individualistic activities. To a lesser degree the same statement holds true for the relationship between friendship and cooperative activities (p < .05) and friendship and leader-follower activities (p = .107). A negative but not significant relationship exists between friendship and competitive activities.
This correlation indicates a tendency for ratings of worth for competitive activities to increase as friendship between partners decreases.

Discussion

The following patterns emerge from examining separately the effects of sex make-up of pairs on ratings of worth, ability make-up of pairs on ratings of worth and friendship make-up of pairs on ratings of worth:

a. Male pairs tend to rate competition and individualistic activities high in worth.

b. Female pairs tend to rate cooperative and leader-follower activities high in worth.

c. Pairs ranked high in ability tend to rate competitive activities high in worth.

d. Pairs ranked low in ability tend to rate individualistic activities high in worth.

e. Pairs who are friends rate cooperative and individualistic activities high in worth.

f. Pairs who are not friends tend to rate competitive activities high in worth.

Research Question 5. What combinations of sex, ability and friendship make-up of pairs have the most effect on ratings of worth?

In order to examine further the effects of sex, ability and friendship make-up of pairs on ratings of worth, stepwise multiple regression analyses were computed. In the multiple regression analysis sex, ability and friendship are treated as independent variables and goal structure
categories are treated as dependent variables. The purpose of these analyses was to determine the portion of variance each independent variable contributed to ratings of worth and to determine what combination of independent variables has the greatest effect on ratings. Table 8 displays the summaries of the multiple regression analyses for the four goal structure categories. The order in which the independent variables are displayed indicates the order of contribution to the variance (and the stepwise order in which they were entered in the regression equation) with the first variable contributing most. The $R^2$ statistic represents the percentage of variance accounted for by the first variable. The $R^2$ statistic for the second and third variable is cumulative, thus the $R^2$ change column indicates the percentage of variance accounted for by a single variable.

The $F$ statistic generated by analysis of variance and accompanying critical value of $F$ for the appropriate degrees of freedom indicate the extent to which the same $R^2$ might have been achieved by chance.

Starting with the effect of friendship on worth ratings for the individualistic goal structure category which shows the highest degree of correlation on Table 7, we examine the $R^2$ for this combination of dependent and independent variables. In the stepwise regression equation the independent variable friendship is entered first, generating an $R^2$ of .1319 indicating that friendship accounts for approximately 13.1% of the variance in rating scores for the individualistic goal structure category. The $F$ statistic is 7.4345 which indicates that the probability of a chance occurrence of this $R^2$ is less than .01.
Table 8
Stepwise Multiple Regression and Analysis of Variance
The Effects of Sex, Ability and Friendship Make-up of Pairs on Ratings of Worth

<table>
<thead>
<tr>
<th>Category</th>
<th>Independent Variables</th>
<th>Step</th>
<th>R Square Cumulative</th>
<th>R Square Change</th>
<th>Mean Square Regression/Residual</th>
<th>DF Reg/Res</th>
<th>F</th>
<th>Critical Value .05</th>
<th>Critical Value .01</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOPERATIVE</td>
<td></td>
<td>1</td>
<td>.0731</td>
<td>.0731</td>
<td>6.5747/1.8118</td>
<td>1/46</td>
<td>3.6288</td>
<td>4.05</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>Friendship</td>
<td>2</td>
<td>.1249</td>
<td>.0518</td>
<td>5.6143/1.7486</td>
<td>2/45</td>
<td>3.2106*</td>
<td>3.21</td>
<td>5.12</td>
</tr>
<tr>
<td></td>
<td>Ability</td>
<td>3</td>
<td>.1560</td>
<td>.0311</td>
<td>4.6744/1.7249</td>
<td>3/44</td>
<td>2.7100</td>
<td>2.83</td>
<td>4.29</td>
</tr>
<tr>
<td>COMPETITIVE</td>
<td></td>
<td>1</td>
<td>.0662</td>
<td>.0662</td>
<td>3.1742/ .9727</td>
<td>1/46</td>
<td>3.2635</td>
<td>4.05</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>Ability</td>
<td>2</td>
<td>.1107</td>
<td>.0445</td>
<td>2.6538/ .9469</td>
<td>2/45</td>
<td>2.8027</td>
<td>3.21</td>
<td>5.12</td>
</tr>
<tr>
<td></td>
<td>Sex</td>
<td>3</td>
<td>.1476</td>
<td>.0368</td>
<td>2.3575/ .9283</td>
<td>3/44</td>
<td>2.5396</td>
<td>2.83</td>
<td>4.29</td>
</tr>
<tr>
<td>INDIVIDUALISTIC</td>
<td></td>
<td>1</td>
<td>.1319</td>
<td>.1391</td>
<td>9.6437/1.2972</td>
<td>1/46</td>
<td>7.4345**</td>
<td>4.05</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>Ability</td>
<td>2</td>
<td>.2238</td>
<td>.0847</td>
<td>7.7572/1.1955</td>
<td>2/45</td>
<td>6.4886**</td>
<td>3.21</td>
<td>5.12</td>
</tr>
<tr>
<td></td>
<td>Sex</td>
<td>3</td>
<td>.2532</td>
<td>.0294</td>
<td>5.8514/1.1763</td>
<td>3/44</td>
<td>4.9743**</td>
<td>2.83</td>
<td>4.29</td>
</tr>
<tr>
<td>LEADER-FOLLOWER</td>
<td></td>
<td>1</td>
<td>.0708</td>
<td>.0708</td>
<td>4.6539/1.3264</td>
<td>1/46</td>
<td>3.5087</td>
<td>4.05</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>Sex</td>
<td>2</td>
<td>.1043</td>
<td>.0334</td>
<td>3.4243/1.3071</td>
<td>2/45</td>
<td>2.6199</td>
<td>3.21</td>
<td>5.12</td>
</tr>
<tr>
<td></td>
<td>Ability</td>
<td></td>
<td>F-level insufficient for further computation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* F-level significant beyond the .05 level of confidence
** F-level significant beyond the .01 level of confidence
The second variable entered for the individualistic category is ability with an \( R^2 \) change of .0847 indicating that ability accounts for approximately 8.5% of the variance in individualistic category worth ratings. An \( F \) of 6.4886 was achieved indicating a confidence level beyond .01.

The third variable entered for the individualistic category is sex, with an \( R^2 \) (cumulative) of .2532 and an \( R^2 \) change of .0294 indicating that the sex variable accounts for approximately 2.9% of the variance in individualistic category worth ratings. An \( F \) of 4.9743 was achieved, significant beyond the .01 level of confidence.

The independent variables friendship, ability and sex together account for approximately 25.3% of the variance in individualistic category worth ratings. The remaining 75% of variance is attributed to variables not in the equation.

For the cooperative category the independent variable friendship again is entered on the first step achieving an \( R^2 \) of .0731 accounting for approximately 7.3% of the variance for worth ratings. However, an \( F \) of 3.6288 failed to reach significance at the .05 level.

The failure of friendship to achieve a significant \( F \) ratio is attributed to the relatively large residual mean square, which is the denominator for the \( F \) ratio. A large residual mean square is an indicator of unequal variance within sets, the source of which, in this case, is assumed to be an abnormal distribution of ratings of worth by friendship pairs.
On the second step the sex variable achieved an $R^2$ (cumulative) of .1249 and $R^2$ change of .0518 accounting for approximately 5.2% of the variance in worth ratings for the cooperative category. An $F$ of 3.2106 was significant ($p<.05$).

The third variable entered in the multiple regression equation was ability, achieving an $R^2$ (cumulative) of .1560 and an $R^2$ change of .0311, accounting for approximately 3.1% of the variance in worth rating scores for the cooperative category. An $F$ of 2.71 failed to reach the .05 level of confidence.

Thus, for the cooperative category the cumulative $R^2$ (.1560) indicates that all three independent variables account for approximately 15.6% of the variance in worth ratings. However this percentage is in doubt because only the independent variable sex achieved an $F$ that reached .05 level of confidence.

For the competitive and leader-follower categories none of the three independent variables achieved a significant $F$ level.

To summarize the regression analysis of ratings of worth for the four goal structure categories, only in the individualistic category is the source of correlation clearly and significantly shown to be the effects of sex, ability, and friendship make-up of pairs. Friendship make-up of pairs accounted for slightly less than 14% of the variance of rating scores, while ability and sex made up 11% between them. Seventy-five percent of the variance in rating scores for the individualistic category was left unaccounted for in the regression equation.
It should be noted that multiple regression analysis does not negate the significant correlation coefficients on Table 7. These correlations do exist. Regression analysis attempts to define and quantify the source of the correlation and if the source cannot be adequately defined the explanation lies in the sensitivity of the analysis not with the original correlations.

Discussion

Multiple regression analysis reveals the following patterns of pair make-up that result in the highest ratings of worth for each category. While all are not statistically significant, each has some practical application value. They are presented in order of overall contribution to ratings of worth (and statistical significance):

a. For the individualistic category, pairs made up of male friends with low ability tend to rate higher for worth than other pairs.

b. For the cooperative category, pairs made up of female friends with low ability tend to rate higher for worth than other pairs.

c. For the competitive category, pairs made up of high ability males who are not friends tend to rate higher for worth than other pairs.

d. For the leader-follower category, pairs made up of female friends of undetermined ability tend to rate higher for worth than other pairs.

Research Question 6. When analyzed separately how do sex make-up, ability make-up and friendship make-up of pairs affect time on task for the four goal structure categories?
Table 9 displays Pearson r correlation coefficients and Rho significance values for the comparisons between sex, ability and friendship make-up of pairs and time on task for cooperative, competitive, individualistic and leader-follower goal structure categories.

Examining sex make-up of pairs first, significance at the .001 level of confidence is observed for the negative correlation between sex and the competitive goal structure category. This correlation indicates that as the maleness of pairs increases the time on task for competitive activities decreases. Simply stated, male pairs spend less time on task for competitive activities than do female pairs.

Although not reaching the .05 level of confidence a negative correlation exists between sex make-up of pairs and individualistic activities (p = .07), indicating again that as maleness of pairs increases time on task decreases. A similar negative correlation exists between sex and the cooperative category (p = .077) indicating that as maleness increases time spent on cooperative activities decreases. While the correlation between sex and the leader-follower category is positive the coefficient falls short of significance. For three of four categories female pairs tend to spend more time on task than male pairs.

In examining ability make-up of pairs a negative correlation between ability and the leader-follower category is observed. This relationship is significant at the .01 level. It means that as ability make-up increases a corresponding decrease in time on task is observed. A negative correlation also exists between ability make-up and cooperative activities, that is, as ability make-up increases, time on task for cooperative activities decreases (the relationship is significant
Table 9  
Correlation Coefficients and Significance Values  
Comparing Sex, Ability and Friendship Make-up of Pairs  
With Time on Task  

N = 48  Four Goal Structure Categories  

<table>
<thead>
<tr>
<th></th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( r )</td>
<td>-.2093</td>
<td>-.4489</td>
<td>-.2157</td>
<td>.1056</td>
</tr>
<tr>
<td>( P )</td>
<td>.077</td>
<td>.001**</td>
<td>.07</td>
<td>.237</td>
</tr>
<tr>
<td>Ability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( r )</td>
<td>-.2672</td>
<td>.2223</td>
<td>.0794</td>
<td>-.3338</td>
</tr>
<tr>
<td>( P )</td>
<td>.033*</td>
<td>.064</td>
<td>.296</td>
<td>.01**</td>
</tr>
<tr>
<td>Friendship</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( r )</td>
<td>.0314</td>
<td>.1084</td>
<td>.0304</td>
<td>-.0072</td>
</tr>
<tr>
<td>( P )</td>
<td>.416</td>
<td>.232</td>
<td>.419</td>
<td>.481</td>
</tr>
</tbody>
</table>

* \( P \) < .05  
** \( P \) < .01
beyond the .05 level of confidence). A positive correlation exists between ability and time on task for competitive activities and, while not reaching significance at the .05 level (p<.06), the direction is clear. As ability make-up of pairs increases so does the amount of time pairs spend on competitive tasks.

The correlation between ability and the individualistic category, while positive, is not significant.

Analyzing friendship make-up of pairs reveals no significant interaction with time on task for cooperative, competitive, individualistic or leader-follower categories.

**Discussion**

The following patterns emerge from examining separately the effects of sex make up of pairs on time on task; ability make-up of pairs on time on task; and friendship make-up of pairs on time on task.

a. Male pairs tended to spend less time on task for all categories except leader-follower than female pairs.

b. Female pairs spent significantly more time on competitive tasks than males and tended to spend more time on cooperative and individualistic activities.

c. Pairs ranked high in ability tended to spend more time on competitive activities than did lower ability pairs.

d. Pairs ranked low in ability spent significantly more time at cooperative and leader-follower activities than did pairs ranking higher in ability.
e. Although correlations of friendship pairs were positive for cooperative, competitive and individualistic activities with time on task, indicating a slight tendency for friendship pairs to spend more time on these activities, there were no other discernible patterns in how friendship and non-friendship pairs spent time on task.

Research Question 7. What combinations of sex, ability and friendship make-up of pairs have the most effect on time on task?

Stepwise multiple regression analysis was computed for all four goal structure categories. Particular attention was paid to the cooperative, competitive and leader-follower categories where at least one of the independent variables proved to be a significant predictor of time on task. Table 10 displays the results of multiple regression analysis and accompanying analysis of variances.

These results will be examined by goal structure category starting with the competitive category in which the highest $R^2$s are observed and proceeding, in descending order of $R^2$, to the individualistic category for which the lowest $R^2$s are observed.

For the competitive category the sex variable contributed most to the overall variance achieving an $R^2$ of .2015 or contributing approximately 20.1% of the variance in time on task. An $F$ of 11.6097 is achieved indicating a less than 1% probability that the $R^2$ was achieved by chance.

On the second step the ability variable is entered in the regression equation achieving a cumulative $R^2$ of .2556 and an $R^2$ change of .0540
indicating that ability contributed approximately 5.4% of the total variance of time on task for the competitive category. The $R^2$ for ability reaches an $F$ level of 7.7233 which exceeds the .01 critical value of $F$.

The third variable entered into the regression equation is friendship. The cumulative $R^2$ of .2614 indicates that this variable contributes less than 1% of the variance of time on task. An $F$ level of 5.1909 is achieved, exceeding the critical value of $F$ for the .01 level of confidence.

The independent variable sex, ability and friendship together contributed approximately 26.1% of the variances in time on task for the competitive category. The remaining 74% of variance is attributed to variables not in the equation.

Next in overall percentage of variance accounted for by the independent variables is the leader-follower category. On the first step of the regression analysis is ability which achieves an $R^2$ of .1114 indicating that ability accounts for approximately 11.1% of the total variance in time on task for the leader-follower category. An $F$ of 5.7669 achieves significance at the .05 level of confidence.

The sex variable is entered on the second step achieving a cumulative $R^2$ of .1242 and an $R^2$ change of .0128 or approximately 1.3% of the variance in time on task for the leader-follower category. An $F$ of 3.1911 fails to reach significance at the .05 level of confidence.
Table 10

Stepwise Multiple Regression and Analysis of Variance -

The Effects of Sex, Ability and Friendship make-up of Pairs on Time-on-Task

<table>
<thead>
<tr>
<th>Category</th>
<th>Stepwise Multiple Regression</th>
<th>Analysis of Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step</td>
<td>R Square</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COOPERATIVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability</td>
<td>1</td>
<td>.0714</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.1127</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.1175</td>
</tr>
<tr>
<td>SEX</td>
<td>1</td>
<td>.2015</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.2556</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.2614</td>
</tr>
<tr>
<td>FRIENDSHIP</td>
<td>1</td>
<td>.0465</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.0536</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.0540</td>
</tr>
<tr>
<td>LEADER-FOLLOWER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability</td>
<td>1</td>
<td>.1114</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.1242</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.1258</td>
</tr>
</tbody>
</table>

* F ratio significant beyond .05 level of confidence
** F ratio significant beyond .01 level of confidence
Friendship is the third variable entered into the regression equation for the leader-follower category. With an $R^2$ (cumulative) of 0.1258 and an $R^2$ change of 0.0016, friendship accounts for less than one percent of the total variance. An $F$ of 2.1112 fails to reach significance at the .05 level of confidence.

Together the variables ability, sex, and friendship account for approximately 12.6% of the variances in time on task for the leader-follower category. Of the three independent variables only the $R^2$ for ability reached significance beyond the .05 level of confidence. $F$ ratios for the variables sex, ability, and friendship did not reach significance for the cooperative and individualistic categories.

To summarize the regression analysis of time on task for the four goal structure categories, only in the competitive category is the source of correlation clearly and significantly shown to be in part the effect of sex, ability, and friendship make-up of pairs. Sex make-up of pairs accounted for approximately 20% of the variance while ability and friendship accounted for approximately 6%. The remaining 74% of variance must be attributed to variables not in the equation.

Discussion

Multiple regression analysis reveals the following patterns of pair make-up that result in the greatest time on task for each category. While all are not statistically significant each has some practical application value. They are presented in order of overall contribution to time on task (and statistical significance):
a. For the competitive category, pairs made up of female, high ability friends tend to spend more time on task than other pairs.
b. For the leader-follower category, pairs made up of high ability males who are not friends tend to spend more time at task than other pairs.
c. For the cooperative category, pairs made up of low ability female friends tend to spend more time on task than other pairs.
d. For the individualistic category, pairs made up of female, high ability friends tend to spend more time on task than other pairs.

Summary

Section one analyzed and discussed the ratings of worth and time on task data collected from subject pairs as they work at the 16 learning center activities during the four weeks of this study. Analysis of overall means for rating of worth and time on task revealed significant differences, principally between the highest ranked categories and the lowest ranked categories. While the differences are interesting the similarities between categories are more numerous. Considerable sentiment, as measured by ratings of worth and time on task, is demonstrated for all four categories. The central question of this study as stated in Chapter One is "What combinations of goal structures and pair make-up yield the greatest ratings of worth and/or time on task?" In other words, what are the characteristics of pairs that create the differences and similarities evident in the means? Table 11 summarizes correlational and regression analysis data. It displays where correlations exist between sex, ability and friendship
<table>
<thead>
<tr>
<th>Categories</th>
<th>Sex</th>
<th>Ability</th>
<th>Friendship</th>
<th>Composite Pair Characteristics Yielding Greatest Ratings of Worth and Time on Task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Cooperative</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worth Rating</td>
<td>T</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>T</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worth Rating</td>
<td>T</td>
<td>*</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>**</td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worth Rating</td>
<td>T</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leader-Follower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worth Rating</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T p<.12
* p<.05
** p<.01
of pairs and goal structure categories for ratings of worth and time on task. Data are summarized as Pair Characteristics Yielding Greatest Rating of Worth and Time on Task. These summaries correspond to findings from the multiple regression analysis. The symbol T represents tendency for the relationship to be due to interaction between variables rather than by chance. The minimum confidence level value of T (p = .12) was established by inspection of all correlations by the researcher and finding a natural break between clusters of p values. T then, represents a tendency which has a confidence level greater than .12 but less than .05. The symbols * and ** are more traditional, representing confidence levels p<.05 and p<.01 respectively.

This table distills the information from section one into a form that can be used to plan for real student pairs in real classrooms. However, this information is only a small portion of what a teacher knows about a specific pair of students. It seems to limit possible choices and to suggest rather general goal structure categories, but it can not supplant the careful, humane weighing and balancing of the other characteristics and needs of the individual children involved. The summary table will be expanded upon and discussed in greater depth in Section three. The next section, Section Two, analyzes and discusses the data collected from individual subjects after the paired portion of the study was completed.
Section 2

Analysis of Data from Individuals

In this section data collected from a structured interview with the 24 individual subjects will be examined. Data from the interview includes subjects’ ranking by worth of the four goal structure categories and ranking the four most worthwhile learning center activities. Questions asked were designed to determine how individuals felt about working with a partner, working with an opposite sex partner, working with a partner who was of higher or lower ability than one’s self and being assigned a new partner each week. Subjects were asked their opinions of how worth ratings and time on task were affected by friendship make-up of pairs. These data were examined by the sex and ability of the subjects. The complete copy of the interview instrument can be found in Appendix F.

Research Question 8. Are there significant differences between rankings of worth, by individuals, for the four goal structure categories?

The interviewer gave each subject a typewritten set of definitions of the four goal structure categories and read them aloud. The subject was then asked to rank the categories in order of overall worth from high to low. The high ranking category was assigned a value of 4, second highest 3, third a value of 2, and fourth a value of 1. The values for each category were summed and means calculated. They are presented in Table 12.

Kerlinger (1973) cautions researchers against treating ordinal measurements (such as rankings) as if they were interval measures
but concludes "The best procedure would seem to be to treat ordinal measurements as though they were interval measurements, but be constantly alert to the possibility of gross inequality of intervals" (p. 441). Since there is no way to know the intervals subjects had in mind when ranking the categories a second, informal, method was used to check the reliability of ranking goal structure categories by means as shown on Table 12. This method of ranking is based on the theory that the extremes of a ranking distribution are more reliable than the central portion (Van Dalen, 1966). By comparing the extremes from the distribution in Table 12, that is finding the difference between the number of subjects that rank each category first and the number that rank it fourth, the following overall ranking is determined:

1. Individualistic - ten students ranked this category first and only two ranked it last, a net difference of +8.
2. Competitive - seven students ranked this category first and five ranked it last, a net difference of +2.
3. Leader-follower - five students ranked this category first and seven ranked it last, a net difference of -2.
4. Cooperative - two students ranked the category first and ten ranked it last, a net difference of -8.

The rank order using this method is the same as the ranking obtained by using the means shown in Table 12, however, the tied ranking between the competitive and leader-follower categories is broken, placing competitive above leader-follower.
It has been shown by two methods that, at least the highest ranked category and the lowest ranked category both deserve their positions. Table 13 presents the t-tests for differences between means. The t-tests reveal that the only significant difference exists between the mean of the individualistic category (highest ranked) and the mean of the cooperative category (lowest ranked). Other differences exist but they fail to approach significant levels of probability.

To determine the source of the differences in rankings Pearson correlation coefficients were calculated comparing the sex and ability level of each subject with his ranking of the four goal structure categories. Sex and ability were changed to interval data by coding procedures. The sex variable was coded 1 for male and 0 for female; therefore, a positive correlation between sex and the competitive category, for example, indicates that males tended to rank this category
Table 13

t-Test for Differences Between Means - Individuals' Rankings of Categories

<table>
<thead>
<tr>
<th>Categories Compares</th>
<th>Mean</th>
<th>Difference Between Mean</th>
<th>t-Value</th>
<th>DF</th>
<th>2 Tail Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative</td>
<td>2.1667</td>
<td>.2917</td>
<td>.73</td>
<td>23</td>
<td>.47</td>
</tr>
<tr>
<td>Competitive</td>
<td>2.4583</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative</td>
<td>2.1667</td>
<td>.75</td>
<td>2.39*</td>
<td>23</td>
<td>.026</td>
</tr>
<tr>
<td>Individualistic</td>
<td>2.9167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative</td>
<td>2.1667</td>
<td>.2917</td>
<td>.76</td>
<td>23</td>
<td>.454</td>
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<td>2.4583</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
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<td>.4583</td>
<td>1.22</td>
<td>23</td>
<td>.235</td>
</tr>
<tr>
<td>Individualistic</td>
<td>2.9167</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
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<td>0.0</td>
<td>23</td>
<td>1.0</td>
</tr>
<tr>
<td>Leader-Follower</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic</td>
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<td>1.18</td>
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<td>.252</td>
</tr>
<tr>
<td>Leader-Follower</td>
<td>2.4583</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*t value significant beyond .05 level of probability*
higher than females. Subjects were ranked on the basis of reading comprehension test scores from 1 for the lowest score to 24 for the highest score. Thus a positive correlation between ability and the competitive category indicates that high ability subjects tended to rank the competitive category higher than lower ability subjects.

Table 14 presents the correlation coefficients and Rho values comparing sex and ability with ranking of worth for the four goal structure categories. The significant (p=0.04) positive correlation between ability and competitive category ranking of worth indicates that high ability subjects ranked this category higher than low ability subjects. Other correlations, while not significant at the .05 level, are close enough to examine for pattern. Ability and leader-follower ranking negative correlation (p=0.063) indicates that high ability subjects ranked this category toward the low end of the scale, low ability subjects ranked it toward the high end. The negative correlation (p = 0.053) between sex and the individualistic category indicates that males rated this category lower than females. The positive correlation between sex and worth ranking for the competitive category is less significant (p = 0.109) than the others cited but it fits the pattern established in the pair ratings of males attributing higher worth to competitive activities than the females.

Discussion

Research question 8 asks if there are significant differences between rankings of worth, by individuals, for the four goal structure categories. At the first level of analysis, ranking by means, it was seen that the individualistic category was ranked highest
Table 14.

Correlation Coefficients and Significance Values

Comparing Sex and Ability of Individuals

With Rankings of Worth

<table>
<thead>
<tr>
<th>N = 24</th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r  =</td>
<td>-.0781</td>
<td>.2611</td>
<td>-.3213</td>
<td>.1119</td>
</tr>
<tr>
<td>p  =</td>
<td>.358</td>
<td>.109</td>
<td>.063</td>
<td>.301</td>
</tr>
<tr>
<td>Ability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r  =</td>
<td>-.1579</td>
<td>.3637</td>
<td>.116</td>
<td>-.3206</td>
</tr>
<tr>
<td>p  =</td>
<td>.231</td>
<td>.04*</td>
<td>.295</td>
<td>.063</td>
</tr>
</tbody>
</table>

* p < .05

by individuals based on means derived from rankings of worth. The cooperative and leader-follower categories followed with identical means. The fourth ranked category was cooperative. Using t-tests to evaluate differences between means it was found that the difference between the individualistic category (highest ranked) and the cooperative category (lowest ranked) was significant. However, all categories were ranked first by at least some subjects and the cooperative category (the lowest ranked, in terms of mean) was ranked either first or second by half the subjects.

Sex and ability levels were correlated with category rankings and a significant (p < .05) correlation was found between high ability subjects and high rankings for the competitive category. This is not surprising since high ability subjects are likely to be winners in competitive situations. The correlation of low ability with high
ranking for worth for the leader-follower category approached significance \((p = .063)\) suggesting that low ability students find it worthwhile to have a role defined for them (either leader or follower) in learning center activities.

The role sex plays in ranking categories for worth is not sharply defined but it appears that traditional expectations that boys be competitive were not fulfilled as might be expected. The correlation between maleness and high ranking for the competitive category was positive but not highly significant \((p = .109)\). The cultural tradition that girls are more socially active than boys does not seem to be supported by the negative correlation between sex and rankings for worth for the individualistic category. The individualistic goal structure requires no interaction between team members. While not highly significant \((p = .063)\) the correlation indicates that femaleness and high rankings for the individualistic goal structure are correlated.

Research Question 9. What illuminating information can be gathered from interviews with subjects on the following topics:

a. working in pairs,
b. working with an opposite sex partner,
c. changing partners each week,
d. working with a partner whose ability level was higher or lower than one's own,
e. how ratings were affected by friendship relationship with one's partner,
f. how time on task was affected by friendship relationship with one's partner.
Table 15
Working Alone or with Others
Distribution of Responses, Mean, Standard Deviation and Correlation Coefficients

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Alone</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>1</td>
<td>7</td>
<td>3.4167</td>
</tr>
<tr>
<td>percent</td>
<td>8</td>
<td>4</td>
<td>54</td>
<td>4</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Correlation

- Sex x Response: \( r = .1404 \), \( p = .256 \)
- Ability x Response: \( r = -.4918 \), \( p = .007^{**} \)

** \( p \leq .01 \)

The structured interviews with individual subjects asked seven questions related to the topics listed in research question 9. These questions, analyses of answers and discussion will be presented in the following pages.

Interview Question 1. Some of the activities required people to talk to each other and to work together in order to complete the activities. Others didn't require much talking or working together. How would you rate working together on a scale of 1 to 5?
1. I almost always like to work alone.
2. More than half the time I like to work alone.
3. About half and half alone and with someone.
4. More than half the time I like to work with someone.
5. I almost always like to work with someone.
Table 15 displays responses to interview question number 1. The table shows that only three of 24 subjects (12%) would prefer to work alone more than half the time. Eight subjects (33%) would prefer to spend more than half of their school time working with other people. The remaining 13 students would like to divide their work time evenly between working alone and working with others. Most students prefer to work with others at least part of the school day—learning center activities provide for this interaction.

The negative correlation coefficient, comparing ability with ratings, indicates that high ability students prefer more time to work alone and lower ability students prefer more time to work with others.

Interview Question 2. Some boys/girls had to work with a girl/boy (opposite sex), for some of the activities. How do you think they felt about this?
1. They like working with a boy/girl (opposite sex).
2. It didn’t bother them very much to work with a boy/girl.
3. It didn’t matter much whether they worked with a boy/girl.
4. It bothered them some to work with a boy/girl.
5. They didn’t like working with a boy/girl.

Table 16 shows, not surprisingly, for a class whose sociogram had no friendship choices across sex boundaries, only one person liked working with an opposite sex partner. Five subjects (21%) didn’t like working with an opposite sex partner. However, the remaining 19 subjects indicated some tolerance for opposite sex partners. While fifth grade students may not choose an opposite sex partner for a learning center activity, nearly 80% of those in this sample would not be bothered much by an opposite sex partner. In order to encourage
Table 16
Working with Opposite Sex Partner
Distribution of Responses, Mean, Standard Deviation
and Correlation Coefficients

<table>
<thead>
<tr>
<th>1 Like Opposite Sex Partner</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Didn't Like Opposite Sex Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>percent</td>
<td>4</td>
<td>21</td>
<td>33</td>
<td>21</td>
</tr>
</tbody>
</table>

Correlation

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex x Response</td>
<td>-.0729</td>
<td>.367</td>
</tr>
<tr>
<td>Ability x Response</td>
<td>.1264</td>
<td>.278</td>
</tr>
</tbody>
</table>

interaction across sex lines a teacher might resort to assigning specific partners or assigning partners at random without fear of causing wholesale discomfort in the classroom.

The Pearson r correlation coefficient for sex with rating, while not significant statistically was significant in another sense. Since the r value was not significant (p = .367) responses from boys and girls were spread fairly evenly over the answer scale. No conclusions can be drawn from the non-significant coefficient (p = .278) for ability with rating.
Table 17  
Partner of Higher Ability  
Distribution of Responses, Mean, Standard Deviation  
and Correlation Coefficients

N = 24

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liked High Ability Partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disliked High Ability Partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f =</td>
<td>0</td>
<td>8</td>
<td>12</td>
<td>3</td>
<td>1</td>
<td>2.875</td>
<td>.7974</td>
</tr>
<tr>
<td>percent</td>
<td>0</td>
<td>33</td>
<td>50</td>
<td>13</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation

- Sex x Response  
  \[ r = .1601 \]  
  \[ p = .227 \]

- Ability x Response  
  \[ r = .3431 \]  
  \[ p = .05^* \]

* p<.05

Interview Question 3. Sometimes a person had to work with partners who were better at the activities than he/she was. How do you think he/she felt about this?  
1. The person who was not as good liked working with someone who was better.  
2. It didn't bother the person who was not as good very much to work with a person who was better.  
3. It doesn't matter how good the partner is.  
4. It bothered the person who was not as good a lot to work with someone who was better.  
5. The person who was not as good didn't like working with the person who was better.
Although no subjects unconditionally liked working with a partner of higher ability (Table 17) the mean (2.875) of all responses was below three (the central point of the scale) indicating that most subjects either prefer working with a higher ability partner or have rather neutral feelings (50% of subjects marked the third or neutral response) about the ability of a partner. The low frequency of extreme scores and the small standard deviation (.7974) reinforce this impression of neutral to positive sentiment for working with a partner of higher ability than one's self.

The Pearson r correlation coefficient for ability with rating is both positive and significant ($p = .05$). As the ability of subjects increased so did their tendency to mark higher numerical responses, indicating, for high ability subjects, less tolerance for working with a higher ability partner. Conversely, low ability students preferred higher ability partners.

The correlation for sex with rating ($r = .1601$) was not significant ($p = .227$) indicating only that there was no apparent pattern in how the responses of boys or girls were distributed over the answer scale.

Interview Question 4. Sometimes a person's partner was not as good at an activity as he/she was. How do you think he/she felt about this?
1. The person who was good at the activity liked working with a partner who wasn't as good as he/she was.
2. The good person wasn't bothered much by working with a partner who was not as good.
3. It didn't matter how good the partner was.
4. The good person was bothered by working with a partner who was not as good.
5. The good person didn't like working with a partner who was not as good.
Table 18
Partner of Lower Ability

Distribution of Responses, Mean, Standard Deviation
and Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liked Low Ability Partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2.8750</td>
<td>.8999</td>
</tr>
<tr>
<td>Disliked Low Ability Partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>2</td>
<td>4</td>
<td>14</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>percent</td>
<td>8</td>
<td>17</td>
<td>58</td>
<td>13</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation

Sex x Response

r = .0473
p = .413

Ability x Response

r = -.1674
p = .217

While the means for question 3 (working with a high ability partner) and 4 (working with a low ability partner) were identical (Table 18), extreme responses were more numerous for question 4 indicating stronger feeling on the part of a few subjects for working with a lower ability partner. More than half of the subjects (58%) responded in the third or neutral response position implying that the ability of the partner is not an important consideration when working in pairs.

The Pearson r correlation coefficient for ability with rating, while not significant (p = .217) was negative (r = -.1674) indicating
Table 19

Assigned New Partner Every Week

Distribution of Responses, Mean, Standard Deviation

and Correlation Coefficients

<table>
<thead>
<tr>
<th>Liked New Partner</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>3.3333</td>
<td>1.1672</td>
</tr>
<tr>
<td>percent</td>
<td>25</td>
<td>29</td>
<td>33</td>
<td>13</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation

- Sex x Response: $r = 0.2535$, $p = 0.116$
- Ability x Response: $r = 0.0855$, $p = 0.346$

Agreement in direction with question 3. That is, the tendency for high ability subjects to prefer lower ability partners and for low ability subjects to prefer higher ability partners.

Again as in question 3 the correlation for sex with rating ($r = 0.0473$) was not significant ($p = 0.413$) indicating no pattern in how the responses of boys or girls were distributed over the rating scale.

Interview Question 5. How do you think the people in the class felt about being assigned a new partner every week?

1. They liked it.
2. They sort of liked it.
3. They didn't care one way or the other.
4. They didn't like it very much.
5. They didn't like it at all.

Table 19 shows relatively high frequency of responses on the low end of the rating scale and a relatively low mean rating for all subjects. These data indicate general agreement with the study procedure of reassigning individuals to different partners each week of the study. Only three subjects (13%) indicated any negative sentiment about this procedure.

Correlation coefficients for sex with rating and ability with rating indicate that there were no significant patterns of how boy or girls or high or low ability subjects distributed responses over the rating scale.

The following two questions used the strongly agree, agree, not sure or don't know, disagree, strongly disagree format for responses. These responses were coded 1 for strongly agree to 5 for strongly disagree.

Interview Question 6. Most people gave higher ratings to activities when they were working with their friends than when they were working with people they didn't like as much.

Table 20 shows that 50% of the subjects either strongly agreed or agreed with the statement that friendship pairs rated activities higher than non-friendship pairs. About one-third of the subjects disagreed but none strongly disagreed. Only four students (17%) marked the neutral response. These data suggest that the friendship
Table 20
Rated Higher Working With Friend
Distribution of Responses, Mean, Standard Deviation
and Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
<td>NS-DK</td>
<td>D</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>2.79</td>
<td>.9771</td>
</tr>
</tbody>
</table>

percent 4 46 17 33 0

Correlation

Sex x Response  

\[ r = .0436 \]  
\[ p = .420 \]

Ability x Response  

\[ r = -.1290 \]  
\[ p = .274 \]

Make-up of pairs may influence ratings of worth, a conclusion that is confirmed by the pair data for the cooperative and individualistic categories. This comparison between individual and pair data will be explored further in section three of this chapter.

Correlation coefficients indicate that no significant correlations exist between sex and ratings or between ability and ratings.

Interview Question 7. People worked longer on activities when they were working with their friends than when they were working with people they didn't like as much.
Table 21

Worked Longer With Friend

Distribution of Responses, Mean, Standard Deviation
and Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f =</td>
<td>2</td>
<td>15</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>2.4583</td>
<td>.9771</td>
</tr>
<tr>
<td>percent</td>
<td>8</td>
<td>63</td>
<td>4</td>
<td>25</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex x Response</td>
<td>.2178</td>
<td>.153</td>
</tr>
<tr>
<td>Ability x Response</td>
<td>.4751</td>
<td>.009**</td>
</tr>
</tbody>
</table>

** p < .01

Data for Table 21 show that over 70% of the subjects strongly agreed or agreed that friendship pairs worked longer at activities than non-friendship pairs. However, this position is not supported by the actual time on task data from the paired portion of this study. This comparison will be discussed further in section three of this chapter.

The virtual lack of neutrality for this question is puzzling, only one subject was not sure or did not have an opinion for this
item. A fairly large number (six) of subjects disagreed with the statement and were thus, in agreement with the conclusion drawn from the pair data that friendship pairs did not spend more time on task than other pairs. The correlation coefficient comparing ability and ratings was positive and significant ($p<.01$) indicating that those who disagreed with the statement were higher ability subjects.

The comparison of sex with rating was not significant ($p=.153$).

This, the second section of Chapter IV has presented and discussed the data collected from individual subjects by an interviewer using a structured interview instrument.

Section three will compare findings from section one with the findings from section two.
Section 3

Comparison of Data from Pairs with Data from Individuals

This section compares data analyzed in Section 1 with the data from Section 2, that is data collected from pairs compared with data collected from individuals. The purpose is to sum the first two sections and present the findings in a way that has meaning for both researchers and educational practitioners.

Research question 10, presented below, will provide the framework for the first part of this section.

Research Question 10. Are there significant differences in how pairs perceive the worth of the learning center activities and how individuals perceive the worth of the activities?

In order to make a comparison with the pair data the interviewer, after showing a list of the 16 learning center activities, asked each subject to choose the four that were most worthwhile and then rank these four from highest to lowest worth. In this way each subject cast four weighted votes. For analysis purposes the first rank was valued at four; second rank, three; third rank, two; and fourth rank, one. The ratings of worth were tallied and totaled so that the 16 activities could be placed in rank order on the basis of total value of votes. The 16 activities were similarly rank ordered on the basis of mean rating of worth from the pair data. Table 22 lists the activities, identified by category and week, and their rankings by pairs and by individuals. The Spearman rank difference correlation
Table 22
Spearman's Rho Rank Difference Coefficient
Calculated for Ratings by Pairs and Ratings by Individuals

N = 16

<table>
<thead>
<tr>
<th>Activity Category/Week</th>
<th>Ratings by Pairs Rank(mean)</th>
<th>Ratings by Individuals Rank(total)</th>
<th>Differences (r1-r2)</th>
<th>Difference Squared D^2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r1</td>
<td>r2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comp 2</td>
<td>1(4.1667)</td>
<td>4(21)</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Comp 1</td>
<td>2(4.0)</td>
<td>6(17)</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Indv 3</td>
<td>3(3.9167)</td>
<td>13(4)</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Lefo 4</td>
<td>4(3.8333)</td>
<td>1(66)</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Lefo 3</td>
<td>5(3.75)</td>
<td>9(7)</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Coop 1</td>
<td>6.5(3.6667)</td>
<td>9(7)</td>
<td>2.5</td>
<td>6.25</td>
</tr>
<tr>
<td>Comp 3</td>
<td>6.5(3.6667)</td>
<td>2(32)</td>
<td>4.5</td>
<td>20.25</td>
</tr>
<tr>
<td>Lefo 1</td>
<td>8.5(3.5833)</td>
<td>7(10)</td>
<td>1.5</td>
<td>2.25</td>
</tr>
<tr>
<td>Coop 2</td>
<td>8.5(3.5833)</td>
<td>3(30)</td>
<td>5.5</td>
<td>30.25</td>
</tr>
<tr>
<td>Coop 3</td>
<td>10(3.5)</td>
<td>12(5)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Comp 4</td>
<td>11(3.3333)</td>
<td>11(6)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Indv 4</td>
<td>12.5(3.25)</td>
<td>5(20)</td>
<td>7.5</td>
<td>56.25</td>
</tr>
<tr>
<td>Indv 1</td>
<td>12.5(3.25)</td>
<td>14.5(3)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Lefo 2</td>
<td>14(2.5)</td>
<td>16(2)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Indv 2</td>
<td>15(2.3333)</td>
<td>14.5(3)</td>
<td>.5</td>
<td>.25</td>
</tr>
<tr>
<td>Coop 4</td>
<td>16(2.0833)</td>
<td>9(7)</td>
<td>7</td>
<td>49</td>
</tr>
</tbody>
</table>

\[ p = 1 - \frac{6\sum d^2}{N(N^2-1)} \]
\[ p = 1 - \frac{6 \times 326.5}{16 \times 255} \]
\[ p = .5199* \]

* significant beyond .10 level of confidence

Critical Values

.10 level of confidence = .425
.02 level of confidence = .601
coefficient was calculated to determine the degree of similarity between the two lists. The Spearman's Rho coefficient of .5199 is significant beyond the .10 level of confidence.

This finding suggests that the subjects possessed some persistent and consistent concept of the value termed \textit{worth}. They were able, after as long as four weeks for the activities experienced during the first week of the study, to recall worth values for activities that closely approximated the values they placed on the activities when they were first experienced. The correlation between pair ratings and individual ratings also suggests some persistence of compromised ratings of worth. It is reasonable to presume that when pairs rated activities there was not always perfect agreement on the one rating each pair was required to report. Individuals probably agreed to ratings that were different than those they would have reported on their own, yet when given the opportunity to rate individually, overall the ranking was much the same.

The strength of the \textit{worth} concept has implications for further research and for enlarging children's role in selecting and evaluating their own learning materials. These ideas will be discussed further in Chapter five.

Other comparisons between pair data and individual data will be discussed under research question 11. This discussion will culminate in a summary of this chapter.

Research Question 11. What patterns in the data have meaning for classroom application?
The interview questions discussed in Section Two were of two types. The first type were questions one and five; these stand alone, without need to compare, to confirm that the procedures used in this study were not offensive to the subjects. Question one asked how students felt about working together: only two of 24 students preferred to work alone most of the time. Question five asked subjects to react to being assigned a new partner every week of the study. No subjects expressed strong dislike and only three of 24 expressed dislike.

The remaining questions (questions two, three, four, six and seven) were designed to add depth to pair data information. These five questions and subject responses to them will be reviewed, additional data presented where applicable, the central question of the study reintroduced, and finally, the major findings presented in summary form.

Interview question two asked subjects to react to working with an opposite sex partner. Of the five questions being considered here, this one generated the highest mean score indicating dislike for working with an opposite sex partner. Forty-two percent of the subjects expressed dislike or strong dislike while 25 percent expressed some degree of like. Pair sex data was recoded on a dichotomous scale (0 = mixed sex pair, 1 = same sex pair) and Pearson correlation coefficients calculated between sex and ratings of worth, and between sex and time on task for each of the goal structure categories. Table 23 presents the coefficients and Rho values.
The significant ($p<.01$) positive correlations between sex and worth ratings for the cooperative and leader-follower categories indicate that same sex pairs gave higher worth ratings to these categories than mixed sex pairs. The significant ($p<.05$) positive correlation between sex and time on task for the cooperative category indicates that same sex pairs spent more time on task for this category than mixed sex pairs. The correlation coefficients for sex with ratings for the individualistic category and time on task for the leader-follower category while not reaching significance ($p = .073$ and .084, respectively) suggest a tendency for same sex pairs to rate individualistic activities high and spend more time working at leader-follower activities.

The mild dislike for working with an opposite sex partner seems to reflect actual worth ratings and time on task for three of the four goal structure categories. Once again the reliability of subjects as consistent raters is confirmed.

Interview questions three and four asked subjects to express their degree of like or dislike for working with a partner who was either better or worse at an activity than they were themselves. An examination of the responses indicate that the neutral response was marked by 50 percent of the subjects on question three and by 58 percent of the subjects on question four. These were the highest percentages of neutral response for the five questions. The remaining responses were fairly evenly balanced on either side of neutral. Both questions had identical mean scores of 2.875 indicating slight preference for the positive response. In the case of question three this meant preference
Table 23

Correlation Coefficients and Significance Values Comparing Sameness of Sex with Ratings of Worth and Time on Task

N = 48

<table>
<thead>
<tr>
<th></th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worth</td>
<td>Time/</td>
<td>Worth</td>
<td>Time/</td>
</tr>
<tr>
<td></td>
<td>Rating</td>
<td>Task</td>
<td>Rating</td>
<td>Task</td>
</tr>
<tr>
<td>Sex(^1)</td>
<td>r</td>
<td>p</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>r =</td>
<td>.3539</td>
<td>.2803</td>
<td>-.0663</td>
<td>-.2084</td>
</tr>
<tr>
<td>p =</td>
<td>.007**</td>
<td>.027*</td>
<td>.327</td>
<td>.424</td>
</tr>
</tbody>
</table>

\(^1\) positive correlations indicate that ratings and time on task are higher for same sex pairs.

* \(p < .05\)

** \(p < .01\)

for a partner of higher ability and in the case of question four, a preference for a partner of lower ability. The ambivalent nature of these data seemed to indicate that the ability of one's partner was unimportant to the subjects.

Pair ability data was reorganized and recoded so that pairs whose members were no more than six months apart in ability were considered like ability pairs (coded 1); pairs separated by more than six months on the ability measure were considered unlike ability pairs (coded 0). Pearson correlation coefficients were calculated between ability and worth ratings, and ability and time on task for each of the goal structure categories. Table 24 presents the coefficients and Rho values.
Table 24
Correlation Coefficients and Significance Values Comparing Sameness of Ability with Ratings of Worth and Time on Task

N = 48

<table>
<thead>
<tr>
<th>Ability</th>
<th>Cooperative</th>
<th>Competitive</th>
<th>Individualistic</th>
<th>Leader-Follower</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worth Rating</td>
<td>Time/</td>
<td>Worth Rating</td>
<td>Time/</td>
</tr>
<tr>
<td>r</td>
<td>.0215</td>
<td>.0971</td>
<td>.1474</td>
<td>-.0134</td>
</tr>
<tr>
<td>P</td>
<td>.442</td>
<td>.256</td>
<td>.159</td>
<td>.464</td>
</tr>
</tbody>
</table>

Positive correlations indicate rating and time on task higher for like ability pairs.

No significant correlations were observed between ability and ratings of worth or time on task for any of the four goal structure categories. A tendency (p = .111) for unlike pairs to spend more time on task is noted for the leader-follower category. The neutral feelings expressed about the ability of a partner are reflected in the data presented in Table 24. Again, subject responses to interview questions have paralleled the actual data.

Interview question six asked subjects whether or not they agreed with the notion that friendship pairs gave higher worth ratings than non-friendship pairs. This item elicited fairly strong positive and negative feelings, only four of 24 subjects marked the neutral answer position. Exactly 50 percent of the subjects either agreed or strongly
agreed with the statement. The remaining 33 percent disagreed with the statement that friendship pairs rated higher than non-friendship pairs.

Correlation coefficients from the pair data (Table 7, section 1) show that for two categories, cooperative \((p = .032)\) and individualistic \((p = .005)\) friendship pairs did indeed award higher ratings of worth than non-friendship pairs. A tendency \((p = .107)\) for friendship pairs to rate leader-follower activities higher, and a tendency for non-friendship pairs to rate competitive tasks higher was noted.

Question seven asked subjects whether or not they agreed with the notion that friendship pairs spent more time on task than non-friendship pairs. This item evoked strong feelings, only one of 24 subjects indicated a neutral response, the majority (71%) either agreed or strongly agreed that friendship between pair members resulted in more time at task. A minority (25%) disagreed with the statement. This minority, according to data analysis, was made up of higher ability subjects.

A review of table nine in section one shows that there were no significant correlations between ability of pair members and time spent on task for any of the four goal structure categories. Thus, although a majority of subjects perceived that friendship pairs spent more time on task than non-friendship pairs, the data does not support their perception. A minority of high ability subjects did reflect the results from the pair data that friendship pairs did not spend more time on
task than non-friendship pairs. Some possible explanations of these results will be discussed in chapter five.

Research question 11 asks what patterns emerge from the data that have meaning for classroom application. Table 11 in section one summarized pair data correlations and regression analyses presented to that point in terms of pattern. Table 25 presents the data from Table 11 with the addition of reorganized sex data (same sex pairs and mixed sex pairs) and reorganized ability data (like ability pairs and unlike ability pairs). Data are presented symbolically rather than numerically to distinguish this table from the others that present strictly statistical interpretations of data. The symbols used for Table 25 are the same as those used in Table 11. The symbol $T$ represents tendency for the relationship to be due to interaction between variables rather than by chance. The minimum confidence level value of $T$ ($p = .12$) was established by inspection of all correlations by the researcher and finding a natural break between clusters of $p$ values. $T$ then, represents a tendency which has a confidence level greater than .12 but less than .05. The symbols * and ** are more traditional, representing confidence levels $p<.05$ and $p<.01$ respectively. Rows are summed for each goal structure category under the heading Pair Characteristics Yielding Greatest Rating of Worth and Time on Task.

The central question of this study is reiterated as a point of reference for the following discussion of the summary table: What combinations of goal structure and pair make-up yield the greatest ratings of worth and/or the most time on task?
Table 25
Pair Characteristics Yielding Greatest Ratings of Worth
And Time on Task for Each Goal Structure Category

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sex</th>
<th>Ability</th>
<th>Friendship</th>
<th>Composite Pair Characteristics Yielding Greatest Ratings of Worth and Time on Task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Same Sex</td>
<td>Mixed High Sex</td>
</tr>
<tr>
<td>Cooperative</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worth Rating</td>
<td>T</td>
<td>**</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Time on Task</td>
<td>T</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Competitive</td>
<td>T</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Worth Rating</td>
<td>**</td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>**</td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualistic</td>
<td>T</td>
<td>T</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leader-Follower</td>
<td>*</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time on Task</td>
<td>T</td>
<td>**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T  P<.12
*  P<.05
**  p<.01
The summary table, Table 25, provides the following information that has application for teacher who either want to provide learning center activities for specific pairs of children; or want to effectively pair children to maximize feelings of worth toward the activities or maximize time on task:

**Cooperative activities**: same sex pairs, particularly female pairs, who are friends give high ratings of worth to this category. Same sex, particularly female, low ability pairs spend the most time on activities in this category.

**Competitive activities**: High ability, males who are probably not friends rate these activities highest. However, female pairs who tend to be high ability spend the most time at competitive activities.

**Individualistic activities**: Friendship pairs who tend to be low ability and of the same sex rate these activities high. There is a tendency for female pairs to spend more time on individualistic activities than other pairs.

**Leader-Follower activities**: Same sex, particularly female, pairs who might also be friends give high ratings to these activities. Low ability or possibly mixed ability same sex pairs spend more time on leader-follower activities than other pairs.

Other patterns with implications for classroom application are: mixed sex pairs, unless the partners are friends, will probably not increase worth ratings or time on task; deliberately pairing by ability, either like or unlike, will not increase worth rating or time on task with the possible exception of time on task for the leader-follower
category; allowing children to work with a friend may increase worth ratings but may not increase time on task.

Chapter Summary

The major findings of this study will be presented briefly in the following paragraphs. They will be presented by source, that is, whether they were found in the data collected from pairs during the four weeks of the main study or from the interview at the end of the study or whether they were determined by combining and comparing data from both portions of the study.

1. By combining data from pairs and from interviews with individuals, the sex, ability and friendship characteristics of pairs most likely to yield the greatest ratings of worth and/or time on task for each of the goal structure categories were determined. These characteristics of dyads and their relationships with the four goal structure categories constitute the response to the central question of this study.

The application of this finding to classrooms and its implications for future research will be discussed in chapter five.

2. A major finding emerged from data collected from student pair ratings of worth. While there were significant differences between the first ranked competitive category and the third and fourth ranked cooperative and individualistic categories; comparisons between the mean ratings of worth for the other four combinations of categories failed to reach significance. These data indicate that, while some differences exist between ratings of worth for some categories,
by and large there is considerable worth sentiment for each of the
categories. Each category had a constituency of subjects who preferred
that category above the other three.

3. Similar findings for time on task emerged from the data.
Although more significant differences between means were rated (three
of six comparisons) there was only one significant difference between
categories of adjoining ranks. Every category elicited a mean time
on task of at least six minutes more than the 15 minute minimum
indicating similar support for all categories in terms of time on task.

4. A significant positive correlation between rating of worth and
time on task was found. When ratings of worth for each pair were
compared with the same pair's time on task significant correlations
were achieved for the competitive category ($p = .041$), the individual­
istic category ($p = .014$) and the leader-follower category ($p < .001$).
This finding has implications for involving children in the selection
and evaluation of their own learning center materials.

5. A major finding to emerge from individual interviews was that
a majority of children prefer to work with others at least half of
the time, thus confirming by children themselves the need for social­
ization expressed by Dewey and Johnson and Johnson in the introduction
to this study.

6. A majority of children approve of being assigned new partners
each week (only three of 24 subjects in this study disapproved of this
practice). This finding indicates that the practice of assigning
partners did not interfere with ratings of worth or time on task in
this study and that this practice is viewed by children as a fair and legitimate way for teachers to pair children for learning center activities.

7. Children possess a persistent and consistent concept of worth as the term relates to learning center activities. The positive and significant correlations between rating of worth by pairs and rating of worth by individuals supports this statement. This finding further supports the involvement of children in selecting and evaluating learning center activities.

8. Children's recollections of rating of worth behaviors are perceptive and accurate. The similarities between response patterns for interview questions concerning sex, ability and friendship make-up of pairs and actual pair ratings of worth are striking. This finding supports involvement of children in the process of pairing themselves for work on learning center activities.

Chapter V will draw further conclusions from these data and discuss their implications.
CHAPTER V

SUMMARY AND IMPLICATIONS

Introduction

Chapter V summarizes the setting, procedures and findings of the study and will discuss implications for classroom application and future research.

This study investigated the problem of determining optimal pairing of children to maximize the sentiment of work worth doing and time on task for learning center activities organized by goal structure categories in an informal classroom. Pairing variables were the sex, ability and friendship characteristics of subject dyads. Dependent variables were worth of activity rating and time spent on task as reported by subject pairs. The goal structure categories were cooperative, competitive and individualistic which have been investigated most recently and extensively by David W. and Roger T. Johnson. A fourth goal structure category, termed leader-follower, was created for this study. It is a more role defined variation of the cooperative category suggested by research in peer tutoring.

The investigation was conducted in an existing self-contained fifth grade informal alternative classroom. The public neighborhood school is situated in an established, upper-middle class, suburban
community located adjacent to The Ohio State University. Working parents of the subjects were predominantly professionals and managerials. The researcher for this study also served as the classroom teacher. Students were randomly assigned to different partners each of the four weeks of the study and every student experienced each of the 16 learning center activities. Content of the learning centers consisted of self-checking practice and review activities. No rewards were used and no evaluations of performance were reported or recorded. A 15 minute minimum time on task was required at all learning centers. The teacher/researcher was present at all times during the study and performed his usual role as facilitator and resource person. Each pair evaluated the worth of learning center activities on a five point scale and reported their own times on task. At the end of the study a structured interview sampled individual children's views on the learning center activities, procedures followed in the study, and pairing variables.

Data were analyzed using Pearson correlation matrices, stepwise multiple regression, Spearman rank difference correlations, and t tests for differences between means.

Characteristics of pairs who awarded high ratings of worth:

1. For cooperative activities - same sex, (particularly female), friendship pairs.

2. For competitive tasks - male, high ability, non-friendship pairs.

3. For individualistic activities - same sex (particularly female).

4. For leader-follower activities - same sex (particularly female), friendship pairs.
Characteristics of pairs who spent most time on task:

1. For cooperative activities - same sex (particularly female), friendship pairs.
2. For competitive activities - female, high ability pairs.
3. For individualistic activities - female pairs.
4. For leader-follower activities - same sex, low or mixed ability pairs.

Other findings:

1. Significant positive correlations were found between ratings of worth and time on task.
2. A majority of children prefer to work with other children at least half of the time.
3. A majority of children approved of being assigned a different partner each week.
4. Children demonstrated a persistent and consistent concept of the term worth.
5. Children accurately perceived and recalled rating and time on task behaviors after as long as four weeks.
6. Pairs rated competitive activities significantly higher in worth than either cooperative or individualistic activities. Individualistic activities were rated significantly higher than cooperative activities by individuals.
7. Pairs spent significantly more time on cooperative activities than on competitive, individualistic, or leader-follower activities.
Discussion and Implications

In this section the findings and implications for classrooms and future research are discussed.

1. Are there significant differences between the mean ratings of worth by pairs, for the four goal structure categories?

The direct answer to this question is yes. There were significant differences between the ratings of worth means for the top ranked competitive category and the third ranked cooperative category and between the competitive category and the fourth ranked individualistic category. However, the differences between cooperative and individualistic; cooperative and leader-follower; competitive and leader-follower; and between individualistic and leader-follower categories proved to be not significant. Overall the competitive category received the highest ratings of worth of the four goal structure categories indicating strong sentiment for the worth of competitive activities. Kagan and Madsen (1972) and others have found that Anglo-American children, particularly those from urban and suburban settings, are considerably more competitive than children from other countries and American children of different cultural backgrounds. Therefore, it was not surprising to find that subjects in this study rated competitive
activities highly, even though the immediate environment, the Informal classroom, was designed to de-emphasize competition. The strength of perceived worth of competitive activities indicates that the impact of Informal classroom de-emphasis of competition has not overcome societal pressures promoting competition. Whether or not informal classrooms reduce the value placed on competition cannot be determined by the results of this study but the question is certainly appropriate for future research.

The substantial and significant difference between worth ratings for competitive and cooperative activities need to be noted by classroom teachers. To deny all children opportunities to compete with others would deny some a source of finding worth in their school work. However, to encourage unlimited competition for all students, as will be pointed out in subsequent discussions, would place many children in situations in which they would find little of worth.

The significant difference between competitive activities' ratings of worth and those of individualistic activities poses an interesting question. Johnson, et al. (1980) noted that the competitive and individualistic goal structures are essentially the same in regard to promoting achievement on problem solving tasks, discovering strategies to use in solving problems, and perceiving peer support and encouragement for learning. The difference observed in this study indicates that the value worth measures something quite different from achievement on problem solving tasks, discovering strategies, and perception of peer support and encouragement for learning. Future
research into the composition and meaning of worth to children may be able to shed light on what appears to be a major difference between the two goal structures, competitive and individualistic, that have been regarded as having many similar characteristics.

Teachers in informal or open classrooms may question the ability of the teacher/researcher in this study to enforce, to the letter of the definition, a truly individualistic goal structure in learning centers. Social interaction between children is a prevailing feature of informal classrooms and the tendency to help, question or, at least, observe other children at work is a very natural part of day to day activity. It is probable that the individualistic goal structure in this study was not practiced as it was defined. That is, interaction between pair members working at individualistic activities most likely communicated in some way with each other. Kanekar, Libby, Engles and Jahn (1978) found just such inadvertent communication in groups working together on a shared goal but not allowed to communicate. Thus, as the means (cooperative = 3.2083, individualistic = 3.1875) for the two categories indicate, cooperative and individualistic categories were viewed by children as being very similar. The only remaining practical difference between cooperative and individualistic activities was the requirement for separate, individual products from each partner. Teachers should be aware that goal structures are susceptible to modification by children to fit their environment and its customary practices.
2. Are there significant differences between the mean time spent on task, by pairs, for the four goal structure categories?

The answer is yes. There are significant differences between top ranked cooperative category and each of the following categories: second ranked leader-follower, third ranked individualistic and fourth ranked competitive category. There were no significant differences between means for competitive and individualistic categories; competitive and leader-follower categories; or between individualistic and leader-follower categories. Overall, students spent significantly more time at cooperative activities than at any of the other three categories. If we regard time on task as a form of preference these results are similar to the Johnson and Johnson (1976) study of preference for cooperative and competitive goal structures which found that 65% of students in sixth and eleventh grade classes surveyed preferred cooperatively structured classrooms over competitively structured classrooms.

The difference between the ranking of goal structure categories by ratings of worth and time on task is striking. Cooperative tasks were ranked first based on time on task and third according to worth ratings. The competitive activities were ranked third in time on task and first based on worth ratings. The individualistic activities were ranked third in time on task and fourth in worth. The leader-follower category remained in second place in both rankings.

The influence of the Informal classroom setting may have contributed to these differences. Time in informal classrooms is not normally defined by specific periods when all students must be working on math
or reading or social studies. Children have more control over when and how much time they devote to specific projects. Therefore in this study children spent as little as the minimum 15 minutes on learning center activities and as much as 90 minutes beyond this minimum. Cooperative activities were the recipients of the greatest variations in time on task. While this fact may call into question the validity of some of the differences between means, it also points out the extreme popularity for some student pairs of the cooperative category. The naturalistic setting, as was the case for the practical differences between cooperative and individualistic categories mentioned above, impinged upon the purity of the study. Extreme values call into question the accuracy of the t test analyses but they also add a dimension of intensity of preference by a few students not seen in the statistics.

Teachers are aware of the importance of extremes of student preference and behavior because the extremes often create the most perplexing problems in classrooms. An important implication to be drawn from ratings of worth and time on task data is that by providing a variety of learning center activities within the full complement of goal structures, one can more easily accommodate the extreme needs and preferences present in a normal classroom. It is important to note that all categories were the recipients of considerable sentiment of worth and time on task and that the similarities between the means outnumbered the significant differences. From this we can infer that children should be allowed some choice in goal structure
and be allowed extended periods of time to work at learning center activities.

More research in the areas of student preference and time on task is needed as is an investigation of the relationship between self determined time on task and affective and cognitive outcomes.

3. What relationship exists between ratings of worth and time on task?

When goal structure categories ranked by ratings of worth were compared with the categories ranked by time on task, the only category that remained at the same rank was leader-follower. Even when individual activities were ranked by worth ratings and compared with ranking by time on task, no significant correlation was evident. However, when the ratings of worth for each student pair were compared with the same pair’s time on task, significant correlations were found for the competitive category (p<.05), the individualistic category (p<.01) and the leader-follower category (p<.01). In addition, the correlation between worth and time on task for the cooperative category approached significance at p = .077.

There is then a link between ratings of worth and time on task which indicates an increase in either rating of worth or time on task will result in a roughly corresponding increase in the other.

Implications for classroom application include student participation in evaluation of activities so that teachers can better plan to maximize student time on task. The effect, in terms of positive sentiment for school activities, of student participation in evaluating school activities is an area for future research.
Daily classroom schedules that prescribe specific starting and ending times for activities need to be re-evaluated in light of the relationship between rating of worth and time on task. If ratings of worth are enhanced by increased time on task, then that time could be provided by some form of flexible scheduling that allows students to voluntarily spend time on activities they find stimulating.

4. When analyzed separately how do sex make-up, ability make-up and friendship make-up of pairs affect ratings of worth for the four goal structure categories? What combinations of sex, ability and friendship make-up of pairs have the most effect on ratings of worth?

Each goal structure category attracted a different pattern of pair characteristics that resulted in high ratings of worth. The cooperative category high ratings came from same sex pairs who are, more often than not, girls and from pairs made up of friends. Ability (high/low or like/unlike) was not a factor in ratings for the cooperative category.

The competitive category had the highest mean rating of worth of all categories and the source of the ratings were, most significantly, high ability students. There were tendencies for pairs with at least one boy in them and pairs who were not friends to give high ratings. All three characteristics (sex, ability and friendship) played some part in the make-up of high rating pairs for the competitive category. All three characteristics contribute to the make-up of high rating pairs for the individualistic category with friendship being the most significant. In addition to partners who are friends, partners are also likely to be low ability and of the same sex. For the leader-follower category same sex pairs, most likely female and partners
who are friends constitute pairs who give high ratings. Ability
make-up of pairs was not a factor.

Sex make-up of pairs was a characteristic of high rating pairs
for all four categories. Friendship characteristics appeared in the
composite for four categories and ability was a characteristic only
for the competitive category.

These findings do not account for all possible combinations of
sex, ability and friendship nor do they constitute a plan for prescribing
goal structures for certain pairs of children. The implication of
these findings is that for a group of children that differ in sex,
ability and friendship relationships, learning center activities need
to be planned so that all four goal structure categories are represented
if sentiments of work worth doing are to be maximized.

There is a need to more closely examine the rating behaviors of
pairs. Little was discovered about rating patterns of boys or pairs
who were not friends. High ability pairs' ratings were significant
only for the competitive category. It is possible that the practice
and review format was not sufficiently stimulating for them without
the added stimulus of competition.

5. When analyzed separately how do sex make-up, ability make-up
and friendship make-up of pairs affect time on task for the four goal
structures? What combinations of sex, ability and friendship make-up
of pairs have the most effect on time on task?

As would be expected there are similarities between time on
task and ratings of worth for pairs with similar characteristics.
However, there are differences which need to be examined by more
in-depth research.
For the cooperative category time on task tended to be greatest for same sex pairs, most likely girls who were low ability. For the competitive category females, again, were most likely to spend more time on task than males and they had a tendency to be high ability. The individualistic category received the most time on task from pairs that had at least one girl member. Pairs spending the most time on task for leader-follower activities were most likely to be low ability; however, there was a tendency for unlike ability pairs to also spend more time on these activities than other pairs. In addition, same sex pairs had a tendency to spend more time on leader-follower tasks than mixed sex pairs.

The sex variable, just as for ratings of worth, was the most consistent predictor of time on task, figuring in the characteristics of high time on task pairs for all four categories. Ability and friendship each contributed characteristics to two categories.

Prescriptions of specific goal structure activities to gain increased time on task is not warranted from these findings. As for the rating of worth findings, a full complement of goal structure categories should be offered to maximize time on task. These findings indicate that attention to sex characteristics of pairs, particularly the use of same sex pairs, probably is the most efficient way to increase time on task for all categories. It should be pointed out again that scheduling for learning center activities needs to be flexible enough so that pairs who wish can spend enough time to satisfy their interests in particular activities.
Two possible areas for future research are indicated. First, a closer focus on time on task and high ability pairs is needed. Only for competitive tasks did high ability pairs show a tendency for higher time on task than low ability pairs. Second, the surprising lack of friendship factors in high time on task runs counter to what logically might be expected; that is, that friends would spend more time with each other than individuals who were not friends. A hypothesis that would be of interest to researchers is that the quality of time spent together by friends and the efficiency of the working relationships negates the need for increased time on task.

6. Are there significant differences between rankings of worth, by individuals, for the four goal structure categories?

In retrospect individuals ranked the individualistic category first in worth; competition and leader-follower were tied for second with identical means; and the cooperative category was ranked last. The t test for differences between means revealed a significant difference only between the top ranked individualistic category and the lowest ranked cooperative category. Evaluation of raw data showed that more than a third of the subjects ranked the cooperative category either first or second indicating considerable sentiment of worth even for the lowest ranked category.

Research conducted with children from traditional classrooms (Johnson et al., 1973; Johnson and Johnson, 1976, 1979; Garibaldi, 1979) indicates that when given a choice children prefer to work under a cooperative goal structure. The data from the present study
shows that children in an informal classroom rank other goal structures above cooperation. It seems probable that the cooperative nature of the informal setting may affect children's perspective on goal structures. When, in traditional classrooms, the prevailing goal structure is competition, children seek relief in cooperative tasks when they are offered. In informal classrooms where the prevailing goal structure is cooperative or at least non-competitive, children choose other goal structures. This phenomenon may be due to what Languis' (1981) calls "bias against redundancy" - a basic capacity to seek novelty, to avoid boredom. However, the shift away from the prevailing goal structure is not as extreme in the informal/cooperative setting as it is in the traditional/competitive setting where Johnson and Johnson (1976) found that 60 to 70% of children in competitive classrooms preferred cooperative structure. In the present study student sentiment was distributed over four goal structure categories, each with its own constituency of supporters.

Implications for the classroom are clear, children want and need choices and variety. A steady diet of one goal structure breeds boredom. Individual children may need or prefer one or more goal structures over the others and these needs and preferences can only be satisfied for a whole class with a full complement of goal structures.

7. What illuminating information can be gathered from a post-experiment interview with subjects on the following topics:
   a. working in pairs,
   b. working with an opposite sex partner,
   c. changing partners each week,
d. working with a partner whose ability was higher or lower than one's own,
e. how ratings were affected by friendship relationship with one's partner,
f. how time on task was affected by friendship relationship with one's partner.

These topics have been discussed individually in chapter four and will be discussed as an entity here. If one assumes that what children recall about their thoughts and feelings during this study are accurate and reflect influences that affected their ratings of worth and time on task, then the results of the interviews are remarkable. In nearly every incident where interview questions could be paralleled with data from learning center activities, children proved to be accurate reporters of their behavior in pairs. Interview responses accurately placed emphasis on the importance of sex characteristics of pairs in the rating of worth. Responses also accurately reflected the relative weakness of the ability make-up of pairs to influence worth ratings and the relative strength of the influence of friendship on ratings of worth.

However, children interviewed did agree with the notion that friendship pairs spend more time on task than non-friendship pairs and this was not supported by actual time on task data. That the quality of or efficient use of time spent together by friends gives the illusion of more time on task was suggested previously as a topic for future research.

Accurate recall and keen perception of rating and time on task behaviors lends credence to the idea that children are reliable evaluators of learning materials. The major implications for class-
room teachers is that children can provide important insight into their own behaviors and should be included in evaluation of learning center activities.

8. Are there significant differences in how pairs perceive the worth of learning center activities and how individuals perceive the worth of the activities?

The direct answer is no. The differences are not significant. When all activities are viewed together there is significant similarity in how they were ranked by pairs and how they were ranked by individuals. Subjects were consistent over time and in different settings in rating learning center activities for worth. The implications of this finding are that children, again, are reliable raters and that the term worth had consistent and persistent meaning to the subjects.

There is a need to define worth in terms useful to researchers, teachers and children. The subjects in this study had been exposed to the term consistently and constantly for at least eight months before the study began. The working definition of worth in Informal classrooms connotes value in terms of academic and affective purpose, and is the antonym of wasted time. How the term is used in other educational settings is a topic for future research.

9. What patterns in the data have meaning for classroom application?

These patterns have been discussed throughout this section of chapter five as implications for classroom teachers and they will not be repeated here. However, I will point out those patterns and implications which I feel have the most potential for meaningful classroom application.
First, the characteristics of pairs who give high worth ratings and/or spend more time on task have the potential to increase efficiency and satisfaction levels of children in school. The findings of this study are incomplete in that we cannot analyze every pair of students and with any degree of certainty assign them to a goal structure that they would consistently find rewarding and worthy of their time. Sex, ability and friendship represent only three of the hundreds of characteristic groups that can be used to describe pairs of children and it may be that for certain pairs other characteristics will have more effect on goal structure preference than sex, ability and friendship. This study investigates only surface, readily identifiable learner characteristics and how they interact with goal structures. Investigators in the area of learning styles (Dunn and Dunn, 1975, 1978; Dunn, Dunn and Price, 1977, 1979; French, 1980; Languis, 1981) have identified a number of learner characteristics that can be applied to optimizing the individual's learning environment. These characteristics range from environmental comfort preferences (e.g., noise, temperature, light levels) to deeper dimensions of individual learning styles such as those suggested by Languis (1981):

Characteristic approach to tasks, e.g. sequential and analytical, simultaneous and holistic orientation to and interest in classes of events, such as spatial constructive, verbal communicative, emotional level

Sensitivity and responsiveness to people, and/or other aspects of the environment

Sense of humor

Anxiety level
General level of arousal and energy, physical movement pattern
Fléxibility in degree and frequency of making adaptive shifts
Risk-taking or orientation to diverge from convention
Confidence in and acceptance of self as a personal causative agent
Capacity to focus attention
Intensity
Persistence
Tempo and pacing in learning tasks
Decision making strategies

The present study investigates some student characteristics that are readily observable by classroom teachers. It is recognized by this writer that these and a multitude of other characteristics comprise the total learning style picture. As the teacher gains knowledge about how an individual child learns, this knowledge should be used to plan with the child, school activities that best fit his learning style needs.

Therefore, the results of this study should not be used to prescribe or assign activities to children, or children to activities but rather to plan activities using all applicable learning style information and all goal structure modes so that children and teachers together can find the most efficient and satisfying means to help each child learn.

Second, if children can be relied upon to judge fairly and consistently the worth of learning materials they use, then they deserve a place in the curriculum writing and evaluation structure of schools.
This does not mean that children should sit on curriculum committees which deal with planning courses of study and evaluating text books. Those functions require a degree of abstract operations that is not a characteristic of most children. The strength of children lies in actually working with materials and evaluating them honestly and straightforwardly in accordance with criteria they understand. Based on the findings of this study it appears that involving children in the evaluation of their own work enhances their feelings of worth about the work they do in school and perhaps about themselves.

Third, the positive significant correlation between ratings of worth and time on task have implications for improving the efficiency of classrooms. There is little doubt that student time in most classrooms could be used more efficiently. Bright students are often kept busy at tasks which only occupy them while others are struggling to complete work which they are unable to do efficiently. By providing children with choices and monitoring how they evaluate the worth of what they choose, the time spent actively engaged in productive learning may be increased.

All this is not to say that children always know what is worthwhile for them. They don't. But they are in a unique position to give valid and reliable input into what and how they learn best. Actively involving children through evaluation of the worth of their work increases their value to society and to themselves.
Although this study focused on children and how they rated activities in goal structure categories, it was conducted under the general rubric of the need for schools to actively participate in the socialization process of children. The results of this study which pertain to that larger picture are perhaps more important than the results of the study focus.

In an environment of cooperation, not only between students but among all classroom members (teacher included), children proved to be reliable partners in this research project which depended upon their dedication, honesty, and reliability. The response to the genuine needs of the teacher/researcher was reassuring and contradicted the rather dismal results of the research by Amos and Felker (1979) and others which paints American children as uncooperative and unreasonably competitive. The children in this study vocalized and demonstrated a genuine concern for the needs of the researcher and for the authenticity of the research results. I believe that these attitudes grew out of the children's feelings of power to control their own learning environment, the power to participate in content selection, the power to arrange time and space requirements to suit personal needs, and the power to influence the results of research which would have meaning outside of their classroom. This power was not granted by the school and the teacher in the form of a student Magna Carta but was earned and realized over the period of the school year through the process of mutual trusting and trying. The results of this study speak as much to the need for socialization, that is the need to integrate the
needs of all classroom participants into the organization of the classroom, as they speak to the results of the study related to goal structures. Children as well as adults need to feel a sense of power and purpose in order to bring out the best in them.
APPENDIX A

TWO CHOICE SOCIOGRAM
Two Choice Sociogram

Male Friendship Cluster I

Male Friendship Cluster II

Female Friendship Cluster I

Female Friendship Cluster II

* Mutual choice

** Made only one choice
APPENDIX B

LETTER TO PARENTS
LETTER TO PARENTS

April 29

Dear Parents,

My proposal for a dissertation research project has just been accepted by my advisers at O.S.U. and I need the help of your child. My study involves the use of child pairs as judges of learning center activities. These activities are interesting and educational and will require only about 15-30 minutes a day to complete, including time to evaluate the day's activity. The study is scheduled to run four days a week throughout May. An interview with each child at the end of the study will attempt to assess how he/she felt about working in pairs and to recap the evaluations of the learning center activities.

The primary focus of the study is on the activities not on the children. No personal data about the children will be collected (except birth date and reading test score) and, of course, names will not be used in any report of the project.

There are some benefits to the kids tucked away in the project—first of all, they get to try sixteen new or revised learning center activities and make judgments about the worthwhileness of the activities. Second, they will learn by participating in the real world of behavioral science research - the entire experiment will be explained to them. Third, and perhaps most important, the children may come to think of themselves as producers of knowledge not merely consumers of it.

If you have any questions about this project, please stop by the classroom anytime or call me at home.

Sincerely,

David R. Heigle
APPENDIX C

SAMPLE WEEKLY SCHEDULE
Sample Weekly Schedule for Learning Center Activities

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Roman numerals refer to goal structure category of learning center activity
I cooperative
II competitive
III individual
IV Leader-follower
APPENDIX D

RATING AND TIME ON TASK FORM
RATING AND TIME ON TASK FORM

Day _______ Week _______ Period _______

Team ___________ and ___________

Category _______________________

Activity _______________________

WE HAVE WORKED AT THIS ACTIVITY 
FOR ___________ MINUTES AND GIVE 
IT THE FOLLOWING WORTHWHILE 
RATING

1  2  3  4  5 
Low  Middle  High
APPENDIX E

LEARNING CENTER INSTRUCTIONS

FOR STUDENTS
Week 2

CATEGORY 1 - COOPERATIVE

D-STIX

With your partner construct:

1. a Tetrahedron
2. an Octahedron
3. a Hexahedron

If you want to go on try an Icosahedron or be creative.

Source: D-Stix available from Creative Publications, Palo Alto, California
1. Read this selection from *The Hobbit*.
2. Then, together, plan and paint a mural of a Hobbit hole.

"In a hole in the ground there lived a hobbit. Not a nasty, dirty, wet hole, filled with the ends of worms and an oozy smell, nor yet a dry, bare, sandy hole with nothing in it to sit down on or to eat: it was a hobbit-hole, and that means comfort.

It had a perfectly round door like a porthole, painted green, with a shiny yellow brass knob in the exact middle. The door opened on to a tube-shaped hall like a tunnel: a very comfortable tunnel without smoke, with panelled walls, and floors tiled and carpeted, provided with polished chairs, and lots and lots of pegs for hats and coats - the hobbit was fond of visitors. The tunnel wound on and on, going fairly but not quite straight into the side of the hill -- The Hill, as all the people for many miles round called it -- and many little round doors opened out of it, first on one side and then on another. No going upstairs for the hobbit: bedrooms, bathrooms, cellars, pantries (lots of these), wardrobes (he had whole rooms devoted to clothes), kitchens, dining rooms, all were on the same floor, and indeed on the same passage. The best rooms were all on the lefthand side (going in), for these were the only ones to have windows, deep-set round windows looking over his garden, and meadows beyond, sloping down to the river."

CATEGORY 1 - COOPERATIVE

VERITECH METRICS

Remember - work together solving the veritech problems.

1. Put all of the tiles in the lid of the Veritech case - number side down.

2. Pick up a tile (It's usually best to go in numerical order so start with 1). The number on the tile tells you which problem to answer.

3. Find the answer to the question in the answer column - the number next to the answer tells you where to place the tile in the lower section of the case.

4. When you have answered all 24 questions, close the case, turn it over, and open it. The pattern made by the blocks should match the design printed on the question page.

5. If the pattern does not match, turn over the pieces that are in the wrong place and check those questions.

Source: Veritech, Brault and Bouthillier Ltd., Montreal, Canada.
CATEGORY 1 - COOPERATIVE

POETRY COLLAGE

1. Together select a poem you both like from Out Loud.

2. After you have read the poem, make a collage that fits the poem from pictures, words, drawings, etc. Include the title of the poem in the collage.

3. Put your name on your creation and stick it on the wall with Plastic-Tack.

CATEGORY II - COMPETITIVE

SCRABBLE CROSSWORD CUBES

Instructions - follow directions on inside of box lid.
- use the dictionary to settle arguments.
- keep score on the pad of paper in the game box.

Week 2

CATEGORY II - COMPETITIVE

MONSTERPLICATION

Read the directions on the game board

When you are finished:
  Put the cards and markers in their pouches.
  Put the game board in the big plastic envelope.

If you are not sure about a rule, ask Mr. H.

Qubic

The object of this game is to place 4 markers in a straight line, all on one level or one on each of the four levels. The player to do this first is the winner.

Read the Qubic folder for pictures of winning positions and for rules of play.

Source: Space Lines (identical to Qubic). Available from Creative Publications, Palo Alto, California.
CATEGORY II - COMPETITIVE

TAC-TIX

The object of this game is to leave your opponent with the last marker.

You may remove 1-4 markers in each turn, but they must be next to each other either across or down (not diagonally).

Remember, if you leave your opponent with the last marker, you win.

CATEGORY III - INDIVIDUALISTIC

BATTERIES AND BULBS

1. Use the materials on the table to do the activities.

2. Do as many of the activities as you can or want to do, but work for at least 15 minutes.

3. Make a sketch of each successful solution you find.

ACTIVITIES

a. Find two ways of lighting one bulb with one battery.

b. Find two ways to light one bulb with two batteries.

c. Light two bulbs with one or two batteries.

d. Invent a switch to turn a bulb on and off.

Source: similar to activities found in Bulbs and Batteries, an Elementary Science Study unit published by McGraw-Hill.
Week 2

CATEGORY III - INDIVIDUALISTIC

I AM FREEDOM'S CHILD

1. **Listen** to the tape "I am Freedom's Child" and **look** at the booklet.

2. Using the materials on the table, do one of the following activities while you are listening (after looking at the booklet):
   
   a. Make an **I Like Me list** - Start with "I like me because..."

   b. Finish one or more of these sentences:

      "When I think about a best friend..."

      "Different kinds of people help freedom's dream come true because..."

      "If I don't like me, I..."

      "When I read I Am Freedom's Child, I..."

3. Cut out the results of your activity and tape it on the paper on the chalkboard. No need to sign your name.

CATEGORY III - INDIVIDUALISTIC

TOOTHPICK SCULPTURE

Both you and your partner must make a toothpick sculpture.

1. Use a 6" x 6" piece of ceiling tile for a base.

2. Glue toothpicks or pieces of toothpicks together to make an art object.

3. You may use pieces of other material to add color or texture, but these pieces should be added after the toothpick work is finished.

4. Make up a title for your art object - print it and your name on the 2" x 2" card and glue it to the base of your sculpture.

Source: This activity was created by the classroom teacher.
CATEGORY III - INDIVIDUALISTIC

UFO - ATLANTIS STORY STARTERS

1. Select either the UFO film strip and tape or the Atlantis film strip and tape.
2. Look and listen to film and tape.
3. Write 2 or 3 sentences that would make an exciting beginning to a science-fiction story about UFO's or Atlantis.
4. Cut out your story starter and put it on the blue paper. (Left side, UFO's; Right side, Atlantis).

You may view both filmstrips if you like -- they're interesting.

CATEGORY IV - LEADER-FOLLOWER

CALCULATOR PROBLEMS

Directions

1. The leader reads the problem to the follower step by step.

2. The follower enters each operation and number in the calculator.

3. At the end of the problem, the follower checks his answer with the leader. If the answer is correct, go on to the next problem. If it is not correct, rework it.

4. After about 7 or 8 minutes, switch jobs - the leader becomes the follower and the follower becomes the leader.

Source: This activity created by the classroom teacher.
CATEGORY IV - LEADER-FOLLOWER

BINATIME FLASH CARDS

1. Review telling time on the binatime clock - look at the binatime folder.

2. Leader 1 shows face of binatime flash cards to Follower 1 and helps him get the right answer. When each card is used, put it on the bottom of the deck.

3. After 7-8 minutes, change jobs.

Source: This activity created by the classroom teacher. Binatime binary clock marketed by Media House, Corp., Columbus, Ohio.
CATEGORY IV - LEADER-FOLLOWER

PATTERN MATCH

The object of this activity is to give clear instructions to your partner so that he can make a design just like yours without looking at yours.

1. The leader selects 12 of his fifteen sticks and arranges them in a pattern on one side of the divider.

2. As he is arranging the sticks, he tells the follower which stick he is using and where he is placing it. (You will need to use words like left, right, above, below, yellow end up, blue and end on right, etc.)

3. The follower tries to arrange his sticks just as the leader tells him. The follower may ask questions but he can't peek.

4. After all sticks have been placed, both partners may compare the two designs. Were the directions clear? Were they carefully followed?

5. Change roles, try again.

Source: This activity created by the classroom teacher.
MASTER MIND

The object of this game is to figure out what pegs the leader is hiding behind the shield.

1. The leader puts four color code pegs at his end of the board and hides them with the shield.

2. The follower places four code pegs in the first row at his end of the board.

3. The leader gives the follower information about his play in this way:
   * For each code peg of the correct color, the leader gives the follower a white Key peg.
   * For each code peg that is the right color and in the right row, the follower gets a black key peg.

4. Play continues until the follower finds the leader's code or the follower uses all 9 rows.

5. Reverse roles and play again.

APPENDIX F

STRUCTURED INTERVIEW
Hi. I'm Mrs. _______. I'm here to help Mr. Heigle collect more data for his research project. I've heard that you have all done a great job of helping him so far. This is the last part of the project and Mr. Heigle needs to know which activities and categories of activities you think were most worthwhile after you've done them all. I'm also going to ask you some other questions related to the research project. This tape recorder will be running so that if I make a mistake in asking the questions or don't write down your answer the way you say it, we can go back later and listen again.

First, I'm going to review the categories and the actual activities in each group. I'm doing this to help you remember which activities were in which categories. After we go over the list of categories and activities, I'm going to ask you to rank the categories based on how worthwhile you thought they were and to pick for four activities you felt were most worthwhile. Here are the categories and activities:
A. Which one category was the most worthwhile? 
   Which was next? In third place? In fourth place?
   ___ I Cooperative   ___ II Leader-Follower   ___ III Individual
   ___ IV Competitive

B. Which 4 activities were the most worthwhile? 
   Which was first? Second? Third? Fourth?
   1_________________________
   2_________________________
   3_________________________
   4_________________________

1. Some of the activities required people to talk to each other and to work together in order to complete the activities. Others didn't require much talking or working together. How would you rate working together on a scale of 1 to 5?
   1. I almost always like to work alone.
   2. More than half the time I like to work alone.
   3. About half and half alone and with someone.
   4. More than half the time I like to work with someone.
   5. I almost always like to work with someone.

2. Some boys/girls had to work with a girl/boy (opposite sex) for some of the activities. How do you think they felt about this?
   1. They like working with a boy/girl (opposite sex).
   2. It didn't bother them very much to work with a boy/girl.
   3. It didn't matter much whether they worked with a boy/girl.
   4. It bothered them some to work with a boy/girl.
   5. They didn't like working with a boy/girl.
3. Sometimes a person had to work with partners who were better at the activities than he/she was. How do you think he/she felt about this?

1. The person who was not as good liked working with someone who was better.
2. It didn't bother the person who was not as good very much to work with a person who was better.
3. It doesn't matter how good the partner is.
4. It bothered the person who was not as good a lot to work with someone who was better.
5. The person who was not as good didn't like working with the person who was better.

UNSOLICITED COMMENTS:

4. Sometimes a person's partner was not as good at an activity as he/she was. How do you think he/she felt about this?

1. The person who was good at the activity liked working with a partner who wasn't as good as he/she was.
2. The good person wasn't bothered much by working with a partner who was not as good.
3. It didn't matter how good the partner was.
4. The good person was bothered by working with a partner who was not as good.
5. The good person didn't like working with a partner who was not as good.

UNSOLICITED COMMENTS:

5. How do you think the people in the class felt about being assigned a new partner every week?

1. They liked it.
2. They sort of liked it.
3. They didn't care one way or the other.
4. They didn't like it very much.
5. They didn't like it at all.

UNSOLICITED COMMENTS:
Tell me whether you strongly agree, agree, not sure or don't know, disagree, or strongly disagree with the following two statements.

6. Most people gave higher ratings to activities when they were working with their friends than when they were working with people they didn't like as much.

SA  A  NS  DK  D  SD

7. People worked longer on activities when they were working with their friends than when they were working with people they didn't like as much.

SA  A  NS  DK  D  SD
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