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EFFECTS OF CLASSROOM SPATIAL ARRANGEMENT ON STUDENT BEHAVIOR

DISSERTATION

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

By

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The Ohio State University
1974

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CHAPTER I
BACKGROUND, PURPOSE OF STUDY, AND TERMINOLOGY

The physical environment of a given classroom may well be responsible for many measurable effects in student and teacher behavior. In a classroom for example, seating arrangements may affect the interaction which takes place between the teacher and students. If a room is arranged with a speaker's podium in front of rows of chairs, the probability increases that there is going to be a topic lecture. Conversely, when the chairs are arranged in a circle, the setting suggests an opportunity for discussion and for more interaction among the students and between the students and teacher.

There is a general concern among members of various communities with the physical classroom arrangement. This concern is evidenced in conflicting discussions over whether the classrooms should be open or self-contained. The proponents of the open concept feel that a school's physical setting should be open so that there are no restrictions placed on the student by the physical interior of the building. The opponents to the open concept argue that the many stimuli of the open classroom only hinder
the child's performance.

The aim of this study is to investigate the effects of selected physical environmental variables on children's behavior. Specifically, the purpose is to generate data concerning the effects of classroom arrangement on student on-task behavior, teacher-pupil interaction, and teacher-pupil proximity.

**Background**

Cruickshank and Quay (1970) state that a standard classroom (e.g., size, cubic footage, and lighting) is regulated by state department of education standards for school construction, school health and safety. They argue that architects and school officials try to incorporate innovative concepts into school building plans to call attention to the school system and the architect. However, they feel that there is little evidenced relationship between the building design and the day-to-day educational operations with children. School personnel should evaluate variables that may facilitate acquisition of terminal goals. The physical environment is a variable that may help students acquire terminal goals.

Cruickshank and Quay (1970) state that the characteristics of a classroom are infrequently conceived in terms of the learning needs of children and teachers who use the learning environment.
What are its needed dimensions and structure in terms of the learning program and the ages of the children who will be in it? Some will say answers to these questions are known; others, structure is dictated by program. (Cruickshank and Quay, 1970)

These concerns can also be considered in light of economic issues. Billions of dollars in school construction are being invested by the nation through local boards of education. Little research data exists reflecting the known interface between environmental design and the needs of the learning situation and the learner.

In an article discussing physical environments, Harms (1970) raises several aspects that must be considered. She states that "environmental awareness is as significant to a teacher as to an artist. By recognizing that environment is an interplay between materials, people, and time schedule, the teacher can create a more productive setting for learning." Everything present in the environment, even the spatial arrangement, indicates to that child how to live in that setting. The physical environment is a powerful means of communication, as everything present in a setting is a potential stimulus.

Architects are concerned about the physical environment. Schroeder (1970) argues that learning through the environment and learning about the environment proceed simultaneously. He feels that the traditional classroom grew out of certain notions about teaching and keeping
order, but that today, children have a wide variety of educational settings within which to work and learn.

Sommer (1969) states "that very little is known about which spatial arrangements are best for doing different kinds of work." He argues that despite new developments in lighting, acoustics, and audio-visual aids, many schools are still boxes filled with a finite number of desks and chairs arranged in straight rows.

Voight (1971), in an article, noted a practical matter to be considered. He argues that a teacher must manage the room and its furnishings, as these have a very significant effect on what transpires within the classroom. These considerations range from the size and shape of the room to the kinds and number of tables, carrels, or easels used.

Olson (1971) states in her opinion that "how desks are placed in a classroom can help or hamper what children learn. Reshaping the space inside classrooms produces better involvement, facilitates activities, and encourages more creative effort from the children." She also feels that how the furniture is placed depends upon the purpose of the activity.

According to Klausmeier and Goodwin (1966) they estimate that the environment plays such a vital role in the educational development of children that the intellectual growth can be affected negatively or positively. Therefore, since the elementary classroom serves as the
educational environment, it is imperative that we investigate its effect systematically.

Deutsch's (1966) analysis of facilities for early childhood education states that environmental factors can operate effectively to facilitate or inhibit intellectual development. One of the most crucial elements here is the actual physical environment. He feels that not only does the physical environment provide stimuli, but it also governs to a large extent the way in which stimuli are presented. In his opinion, the elements of the classroom environment and their arrangement can determine how the children spend much of their time, and the value to the child of the time spent in the classroom is strongly related to the arrangement of the classroom.

Purpose of Study

The purpose of this study is to compare the effects of three different classroom arrangements (i.e., chairs in rows, horseshoe, and semi-circle) on student on-task behavior, teacher-pupil interaction, and teacher-pupil proximity. Specific questions to be answered include the following:

1. Will a classroom that has the student's desk arranged in rows perpendicular to the teacher affect the percentage of time that a child is on-task more than a classroom that is arranged in a horseshoe configuration with the teacher facing the open end of the
horseshoe or a classroom arranged in a semi-circle with the teacher facing the closed end of the semi-circle?

2. Will a classroom arranged in rows perpendicular to the teacher affect the amount of teacher-pupil interaction more than a classroom arranged in a horseshoe configuration with the teacher facing the open end of the horseshoe or a classroom arranged in a semi-circle with the teacher facing the closed end of the semi-circle?

3. Will a classroom arranged in rows perpendicular to the teacher affect teacher-pupil proximity more than a classroom arranged in a horseshoe configuration with the teacher facing the open end of the horseshoe or a classroom arranged in a semi-circle with the teacher at the closed end of the semi-circle?

Terminology

Spatial Arrangement: In this study, spatial arrangement will be limited to three discrete physical classroom arrangements. These arrangements will be chairs arranged in straight rows, in a horseshoe, and a semi-circle.

On-Task Behavior: On-task is defined as student behaviors that are oriented to a task, making overt responses including verbal answers, raising hand, writing answers, turning pages, and manipulating assigned materials. On-task also includes no visible or auditory indication of responding. This includes silent reading in a book or eyes focused on the teacher when she is giving directives. This behavior will be observed during academic work periods in the classroom.
Teacher-Pupil Interaction: This is any verbal attention which could be a potential reinforcer or punisher. Examples would include: "Great," "OK," "I like the way you're working," or "That is a very nice job." Examples of potential punishers include the following: "No," "Boy, that was a lousy job," "What's the matter with you?", "Don't you know any better?", and "What's the matter, are you stupid?"

Teacher Proximity: This is any time a teacher is within a foot and a half of the student (about the same as one desk length). In the present study, the first component (spatial arrangement) is controlled by the teacher and serves as the independent variable, while the latter three components (chairs in a row, horseshoe, and semi-circle) are dependent variables.
CHAPTER II

REVIEW OF LITERATURE

This section contains a review of pertinent literature concerning effects of spatial arrangement on student and teacher behavior and effects of teacher behavior on student behavior.

**Spatial Arrangement**

Spatial arrangements vary among different classrooms, while it is not always clear why this situation exists. Several possible reasons are the size of the classroom, type of furniture, type of students, or teacher preference. Spatial arrangements are the foundation for developing treatments in this study. Smith and Smith (1970, p. 23) state, "While consistent rule enforcement is basic to the stability of the classroom, the teacher can do much to the classroom itself to enhance stability. Room arrangements may be planned to help achieve certain goals."

Gingold (1971) studied the effects of the physical environment on children's behavior in the classroom. He was interested in five hypotheses. First, he was interested in what the relationship of student-concrete physical environment interaction to the physical environment.
Secondly, environmental preference was investigated in relation to an environmental change. Third, student-concrete physical environmental interaction was investigated to determine the relationship to temperature, humidity, atmospheric pressure, sound level, and illumination level. Fourth, student attending behavior was investigated to determine the relationship to a change in physical environment. Fifth, Gingold examined student movement behavior within the classroom to ascertain what effect a change in the physical environment would produce.

His data consisted of classroom visitations and observations of two hundred elementary and junior high school subjects in eleven classrooms. The data collected consisted of: "on-task" behavior time; frequency of student-concrete physical environment interactions; preference for physical environments; attending to physical entities in the classroom environment; and other indicators of physical environment such as sound level, humidity, illumination level, temperature, and atmospheric pressure. Instruments utilized to measure the above variables consisted of the Response to Physical Environment Scale, the Draw-a-Classroom, the Behavior Quadrant Analysis, The Impact of Facilities Scale and Your Feelings.

Results indicated that student-concrete physical environment interactions were significantly related to mean temperature, mean temperature difference, mean
atmospheric pressure, mean illumination level, mean reflectance level and mean relative humidity. All other interactions were not significant. The results, even though suggestive that some changes occur with a change in the physical environment, are not conclusive. Thus, further research in this area is needed.

Shapiro (1971) studied the effects of class size, amount of space per child, and the environmental press of activity areas. The effect of class size on the amount of social interaction of pre-school children and on the amount of individualization of child-teacher contacts was of prime interest. In addition, the effect of the amount of space per child on behavior appropriateness of play to its locale, and what behaviors are instigated by different activity areas were examined by Shapiro. Subjects were two hundred and seventy-four pre-school children in seventeen classrooms. Classes were categorized as small, medium, and large. Data were collected through observations utilizing time-sampling techniques. The findings of interest were that class size had no effect in the amount of social interaction for four-year-old children, while the child-teacher ratio was significant to the number of individualized child-teacher contacts. Deviant behavior was instigated most frequently in the block and doll corners and teachers were found to appear least in these areas. The results of the study
highlight the importance of classroom space and activity areas in achieving pre-determined goals for teachers.

In a study by Kling (1971), an investigation was made between classroom space and self-concept of learners. The self-concept questionnaire, "How I See Myself Scale," by Gordon, was administered to two fifth and two sixth grade groups. Data were gathered regarding the variables of sex, ability, achievement, sibling relationship, and occupation of the head of the household. The finding of major interest is that open spaced or self-contained facilities had no effect upon the fifth or sixth grade students' total self-concepts.

Mintz (1956) studied examiner performance as a function of prolonged testing in beautiful and ugly rooms. Beautiful rooms were described as having pastel painted walls and were well illuminated. They also had brightly colored paintings and modern furniture. Ugly rooms had dark colored walls, no paintings, and were dimly lighted. Results indicated that subject examiners working in the ugly environment usually completed their testing in a shorter period of time than those in the beautiful environment. Examiners in ugly rooms had reactions of room avoidance, fatigue, discomfort, monotony and irritability. Examiners in the contrasting environment, on the other hand, expressed feelings of enjoyment, pleasure, energy, and comfort. The author noted that
these differences persisted over a three week period suggesting that the results were not an artifact of adaption to the environment.

Hankins (1971) investigated whether controlled or marginal environmental conditions resulted in significant differences in behavior and performance of students. Optimum thermal and lighting conditions were established through a persusal of related literature by authorities in those environmental fields. Six schools, three with controlled classroom environments and three with marginal conditions were used in this study. Measures of study behavior consisted of rates of absenteeism and frequency of behavior infractions, while measures of performance consisted of tests of word knowledge, arithmetic computation, typing, and physical fitness. The major conclusion to be drawn from this study is that comparisons did not reveal significant differences in the performance of students toward either environmental condition.

In summary, these studies have investigated aspects of classroom environments from thermal and lighting conditions in relation to whether classes were open or self-contained. Basically, conclusions drawn from these studies indicate that these factors have little or no effect on behavior change and performance of the students involved.

Hewett (1969) investigated the effects of an engineered classroom design with emotionally disturbed
children. The classroom was divided into three major centers.

(a) mastery and achievement center including the student's desk and two study booths where academic assignments are given.

(b) exploratory-social center where science, art, and communication activities took place.

(c) attention-response-order center which provides for simple direction following tasks.

Measures of interest were student task attention and academic functioning. Classroom observations demonstrated an improvement in academic functioning and task attention. Although Hewett did significantly increase these measures, there was more than one contingency in operation (e.g., spatial arrangement, token economy, and operant conditioning techniques).

Sommer (1965) stated that the interior layout of the classroom is often taken for granted by those who plan educational facilities, as well as by those who use them. In his study, one hundred forty-four students in an introductory Psychology class were assigned to different arrangements of classroom space. The students were assigned to two different seminar rooms versus a laboratory room.
Students were assigned to either the old seminar room, new seminar room or laboratory during the first semester. Then at semester time they were transferred to one of the two remaining settings. Data of interest was the amount
of classroom participation in the three settings and what group of students participated most in each setting. A few people said more in the seminar rooms while participation was more widespread in the straight row laboratory arrangement.

In comparing the old seminar room (horseshoe arrangement) with the new seminar room (square arrangement), the author obtained a significant difference between the students sitting directly opposite the instructor, and those away from the table (p < .01) in class participation. In the new seminar arrangements during the first six weeks, those sitting directly opposite the instructor contributed the most, those at the side table coming next, and those away from the table said the least. Data from the second six weeks showed those sitting opposite the instructor contributed most, those away from the table next, and those on the side, the least. This is a reversal of old seminar room data.

In summary, Sommer found that the room arrangement influenced the amount of classroom participation with those sitting opposite the instructor contributing the most, however, when distance became a factor subjects chose the alongside arrangement. When more than five feet exists between chairs in the opposing arrangement, such seats were not preferred. In a "discussion circle", ten to fifteen feet is usually between any two opposing
students. Based on Sommer's work, this would seem to reduce the amount of communication so often felt facilitated by such an arrangement. Sommer concludes that the "task should determine the arrangement rather than the arrangement of students determining what they do." (p. 46)

Rost and Charles (1967) investigated another aspect of classroom arrangement. Their research was undertaken to evaluate the use of cubicles for reducing stimulation among hyperactive and brain-injured children. Their subjects were enrolled in either a primary or an intermediate class of brain-injured children. Booths of white corrugated plastic were placed at the back of the classroom so that only the side facing the classroom was open. All eight students sat together for lessons requiring teacher explanation or group participation, but four experimental students went to their booths for silent reading and workbook assignments. A pre-post test design with analysis of variance as the statistical tool found that there were no significant differences between the experimental and control groups in any academic subject.

An inescapable inference from the present study, however, is that isolation in a booth in the classroom is not beneficial, contrary to numerous suggestions in the literature; there was no evidence to suggest that having a brain-injured or hyperactive child spend his study time in a separate booth has any effect whatever on his achievement,
Cruickshank, et. al., (1961) studied the effects of cubicles for hyperactive children. He suggested that one feature of an appropriate learning environment for distractible children is a classroom as devoid of stimuli as possible (p. 16). To aid in accomplishing this, he suggested that cubicles approximately three feet square be constructed for each child.

In a pilot study in the Montgomery County, Maryland public schools, Cruickshank investigated the value and effect of a non-stimulating classroom environment, specially prepared teaching materials, and highly structured teaching methods upon the learning problems and school adjustment of hyperactive and emotionally disturbed children. His population consisted of four classrooms in three elementary schools. Two of these were experimental, while the remaining two served as control groups. Forty children were selected whose emotional difficulties were characterized by hyperactive, aggressive behavior and who were educationally retarded. The subjects were then placed in four matched groups of ten each. The two controlled classrooms were subject to no environmental alterations. The two experimental classrooms had individual cubicle work units, uniformly colored walls, and opaque windows.

Anecdotal records were kept by all four teachers.
Achievement was assessed on appropriate forms of the Stanford Achievement Test.

Wherever statistically significant differences were obtained between the control and experimental groups, the difference was in favor of the children in the experimental classes. It was the opinion of the authors that hyperactive children in a non-stimulating environment and structured program demonstrate sufficient progress to warrant continuation of this approach (p. 421).

Although this study demonstrated significant gains with the experimental groups, no cause and effect relationships can be established. Issues which may have influenced these findings are the isolation of the child within the classroom, the nature of the highly stimulating teaching materials, and instructional method, or a combination of any or all of these factors. Academic gains were made with these children but answers to the above issues could not be delineated from the study.

Tizard (1968) investigated the effects of stimulus variation and subject familiarity with the environment on the amount of locomotion with severely retarded children. Pre-experimental observations indicated that two groups of subjects, clinically identified as average and overly active, were significantly differentiated in amount of locomotion. Placement in a strange environment,
however, reduced these differences to the chance level. Support was not obtained for the author's prediction that the overactive children would take longer than the control group children to habituate to the experimental environment. Overactive children were initially quieted by the new environment but began to move more as the experiment progressed. The control group, on the other hand, tended to be more active initially and less active later. Toys present and toys absent conditions were used to implement two levels of environmental stimulation. Both subject groups exhibited a significant reduction in locomotion under the toys present as compared to the low stimulus condition. No difference was noted as a function of subject classification. Although this study did not specifically study the theory that a low stimulus environment subdues overactive children, support for this hypothesis was not evident.

Adams and Biddle (1970) investigated seating arrangements in relation to the amount of teacher-pupil interaction. Through classroom observations, they found that teachers spent seventy percent of their time in the center front of the room, fifteen percent along the sides and back, and the remainder of the time in the aisles. Their data reflected that pupils seated farthest from the teacher were not singled out for communication as
often as those seated at the front of the class, whereas, pupils seated in the middle seats and back were more likely to initiate communication with the teacher than to receive it. The critical issue of this study is how one should arrange the classroom to remediate these difficulties.

In summary, the above review focused on research investigating teacher-pupil interactions and varying room arrangements. Room arrangements appear to affect the amount of communication between teacher and student, but findings concerning student performance are not definitive.

Behavior Methodology Research

Application of behavior modification methodology in educational programs has provided evidence that systematic manipulation of antecedent and consequent stimuli in the classroom often result in significant behavioral and academic improvement (Patterson and Ebner, 1965; Quay, Werry, McQueen, and Sprague, 1966; Whelan, 1966; and Nolan, Kunzelmann, and Haring, 1967).

A premise of behavioral methodology is that behavior may be affected by certain stimuli. For example, a student's productivity may increase if the classroom setting is quiet. His productivity may also increase or decrease due to the physical seating arrangement of the classroom. The physical arrangement may also affect the
amount of teacher-pupil interaction and proximity of the teacher to a student. This section will focus on research demonstrating the effect of teacher-pupil interaction and teacher proximity on student productivity.

Hall, Lund, and Jackson (1968) investigated the effects of teacher attention on study behavior of one first grade and five third grade pupils. A reversal design was utilized to demonstrate the effectiveness of contingent teacher attention on appropriate behavior. Results indicate that teacher attention was effective in increasing study behavior.

Thomas, Becker, and Armstrong (1968) demonstrated that contingent teacher consequence responses (e.g., praise, smiles, contacts, etc.) maintained appropriate classroom behaviors with a group of twenty-eight children. Results indicate that some aspects of the behaviors included in the category of "approving behaviors" (e.g., physical contact, verbal, and facial subclasses) were reinforcing for task-appropriate behaviors. Implications were that teachers who use approving behaviors as immediate consequences for good behavior should discover that the frequency and duration of appropriate behaviors increase. Teachers who reinforce inappropriate behavior are likely to strengthen those behaviors they are attempting to reduce. Madsen, Becker, Thomas, Koser, and
Plager (1967) demonstrated that some forms of critical comment do function to strengthen behavior. The more often a teacher told first graders to "sit down," the more often they stood up. Only praising sitting seemed to increase sitting behavior.

Madsen, Becker, and Thomas (1968) studied the behavior of two elementary school teachers to determine the effects of classroom behavior of rules, ignoring inappropriate behaviors, and showing approval for appropriate behavior. Two children in one class and one child in another class had their behavior recorded. The main conclusions were that by establishing rules, little effect was made on classroom behavior. Better classroom behavior was obtained by ignoring inappropriate behavior and showing approval for appropriate behavior.

Kazdin (1973) investigated the effect of vicarious reinforcement on attentive behavior in the classroom. Two pairs of mentally retarded children were exposed to three reinforcement phases. An observer sat three feet behind the students and directly between them. The observer leaned forward between both subjects in a subject pair, when praise was to be delivered to the target subject. In this way, the observer did not differ in proximity from the two subjects in a pair when observing or when reinforcing the target subject. Contingent reinforcement of
attentive behavior in target subjects increased this behavior in adjacent peers.

In summary, research concerning teacher-pupil interaction and teacher proximity on student productivity leads to the following conclusions:

(1) Contingent teacher attention may affect study behavior in children. (Hall, Lund, Jackson, 1968)

(2) Approving teacher responses (e.g., praise, smiles, contacts) may serve as a positive reinforcing function in maintaining appropriate classroom behaviors. (Thomas, Becker, Armstrong, 1968)

(3) Teachers who reinforce inappropriate behavior may find an increase in inappropriate behavior. (Madsen, Becker, Thomas, Koser, Plager, 1967)

(4) Rules alone exert little effect on classroom behavior. Effective classroom control was obtained when rules were used in conjunction with ignoring inappropriate behavior and showing approval for appropriate behavior. (Madsen, Becker, Thomas, 1968)

(5) The proximity of an observer to a subject may influence the amount of attentive
The physical environment has long been of interest to educators. Strauss and Lehtinen (1947) advocated the use of isolation behind a clinic screen for hyperactive and disinhibited children. The authors report a case study of a first grade pupil whom the teacher refused to keep in her class, because he completely disrupted any organized group activity. After a week behind the screen in the special class, this behavior disappeared so completely that the screen was no longer necessary. The lack of experimentation in Strauss and Lehtinen’s work makes their conclusions open to question. The fact that the disruptive behavior disappeared in their subject could have been the result of isolation behind the screen or the subject may have felt he was being punished since he was removed from his regular class and placed in a special class. Maintainance of appropriate behavior was not reported by the authors.

The results of Strauss and Lehtinen’s work is similar to those by Cruickshank (1961). Working with many premises established by Strauss, Cruickshank’s study employed control groups in his experimental design. Although his experimental groups made significant gains, he could not attribute it to his highly structured environment because of the many uncontrolled variables involved (e.g., use of
carrolls, stimulating teaching materials, instructional method, or a combination of these).

Tizard (1968) did not investigate the isolation concept for overly active children directly. The author was interested in whether overactive children would take longer than control children to habituate to an experimental environment. The factor of interest in Tizard's study is the author found no support for the theory that a low stimulus environment subdues overactive children.

Rost and Charles (1967) evaluated the cubicle method of reducing stimulation for hyperactive and brain-injured children. Using both control and experimental groups, these authors concluded that the use of isolation booths in the classroom is not beneficial.

Although Hewett found significant differences in academic subjects for students enrolled in his engineered classroom, he had many contingencies in operation (e.g., token economy, spatial arrangement, and operant conditioning techniques).

In conclusion, the review of literature suggests that classroom arrangement and teacher behavior may increase or decrease the occurrence of on-task school behaviors of children.
CHAPTER III

METHODOLOGY

This section describes the population from which the sampling was selected and the setting where the sampling functioned during the study. The procedure for selecting the subjects and the procedures for three treatment conditions are also discussed.

Subjects

Six subjects were selected from a self-contained classroom for educable mentally retarded children. Prior to placement in a self-contained class, each student was administered the Stanford Binet Form L-M. The reading section of the Wide Range Achievement Test was administered to each student at the completion of the 1972-73 school year. Descriptive data concerning these students is summarized below:

<table>
<thead>
<tr>
<th>Student</th>
<th>Sex</th>
<th>Birth Date</th>
<th>Chronological Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>M</td>
<td>5-10-63</td>
<td>10-9</td>
</tr>
<tr>
<td>Subject 2</td>
<td>M</td>
<td>3-18-62</td>
<td>11-11</td>
</tr>
<tr>
<td>Subject 3</td>
<td>M</td>
<td>7-16-62</td>
<td>11-7</td>
</tr>
<tr>
<td>Subject 4</td>
<td>M</td>
<td>9-20-61</td>
<td>12-4</td>
</tr>
</tbody>
</table>

26
<table>
<thead>
<tr>
<th>Student</th>
<th>Sex</th>
<th>Birth Date</th>
<th>Chronological Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 5</td>
<td>M</td>
<td>1-5-63</td>
<td>11-1</td>
</tr>
<tr>
<td>Subject 6</td>
<td>M</td>
<td>11-5-62</td>
<td>11-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student</th>
<th>Binet I.Q.</th>
<th>Binet Administered</th>
<th>Achievement Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>70</td>
<td>2-17-71</td>
<td>1.6</td>
</tr>
<tr>
<td>Subject 2</td>
<td>61</td>
<td>9-21-73</td>
<td>3.0</td>
</tr>
<tr>
<td>Subject 3</td>
<td>61</td>
<td>9-20-72</td>
<td>1.5</td>
</tr>
<tr>
<td>Subject 4</td>
<td>58</td>
<td>9-20-72</td>
<td>K.8</td>
</tr>
<tr>
<td>Subject 5</td>
<td>64</td>
<td>9-21-72</td>
<td>K.4</td>
</tr>
<tr>
<td>Subject 6</td>
<td>54</td>
<td>5-10-72</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Program specification and goal of the classroom is governed by criteria established by the Ohio State Department of Education.

Program organization in the self-contained class shall be essentially the same as for other children of the same age in the same building. This applies to length of the school day and participation in selected general school activities. (Administrator's Handbook for Special Education, 1968, p. 184)

The goal of the program is to provide comprehensive special courses of study designed for slow learning children. (Administrator's Handbook for Special Education, 1968, page 185)
Setting

The teacher involved in this project is in her first year as a teacher of educable mentally retarded children. She volunteered to be a participant in this study, however, she was not told of the variables being investigated to determine effects on student behavior.

The classroom was traditional in size and furniture. The only difference physically between this classroom and regular classrooms was the number of children enrolled. A schematic drawing of the classroom is provided in Figure 1.

From the participating school, six children were selected at random from a classroom of twelve. Random selection was obtained by using a table of random numbers. The class was located in an elementary school housing students from kindergarten through sixth grade, in the Jefferson Local School System, which is in a suburb east of Columbus, Ohio.

Method

The treatment procedures were divided into three major conditions: chairs arranged in rows; chairs arranged in a horseshoe; and chairs arranged in a semi-circle. The conditions were in effect throughout the entire day.

A pre-treatment period (baseline) of data collection of student on-task behavior, teacher-pupil interaction,
Figure 1. A schematic drawing of the classroom.

Room Characteristics

1. The room is beige in color.

2. There are twelve student desks, (e.g., 1½'x2') and twelve chairs accompanying them.

3. There is one worktable in the room which is used for individual and small group work.

4. The entire room has linoleum floor.
and teacher-pupil proximity was collected for each of the six students. This condition, as all conditions, remained in effect until the data were stable. Stability was defined as data neither increasing nor decreasing, or if the data varies regularly within a certain range (i.e., extreme data points -- highest and lowest points -- cannot vary more or less than twenty-five percent of the mean above or below the mean). Stability during treatment was necessary so that data obtained were an accurate reflection of the variable in question.

The first treatment period (chairs in rows) was introduced by the classroom teacher. She stated to the class that she would like to change the seating arrangement to give variety to the classroom. Chairs in rows was defined as each chair being a foot from every other chair either to the front or rear, and one yard from any other chair to its right or left.

Teacher

X 1 yd. X 1 yd. X
1'
X X X
1'
X X X
1'
X X X
Masking tape was placed on the floor where the four legs of each desk should be placed to facilitate keeping the desks in the proper arrangement. This treatment period remained in effect for five days or until the data were stable (e.g., data are neither increasing nor decreasing or varies regularly within twenty-five percent above or below the mean).

The second treatment condition (chairs in horseshoe) was introduced by the classroom teacher. Chairs arranged in a horseshoe configuration was defined as any chair one foot from any other chair either to its front or rear, right or left.

```
X  Teacher  X
1'       1'
X         X
1'       1'
X         X
1'       1'
X         X
1'       1'
X  1' X  1' X  1' X
```

Masking tape was placed on the floor where the four legs of each desk should be placed in the configuration to facilitate keeping desks in the proper arrangement. This treatment period remained in effect for five days or until the data were stable (e.g., data are neither increasing nor
decreasing or varies regularly within twenty-five percent above or below the mean).

The third treatment condition (chairs in semi-circle) was introduced by the classroom teacher. Chairs in a semi-circle was defined as all chairs being one foot from every other chair either to the front or rear, right or left.

Teacher

This treatment period remained in effect for five days or until the data were stable (e.g., data are neither increasing nor decreasing or varies regularly within twenty-five percent above or below the mean).

Treatment condition two (chairs in horseshoe) and treatment condition one (chairs in rows) was reintroduced by the classroom teacher in compliance with the experimental design. The study then returned to the pre-treatment condition (baseline) for five days or until the data were stable. The final treatment condition was
reintroducing the condition, either chairs in rows, horseshoe, or semi-circle, that had the most effect on student on-task behavior.

**Data Analysis**

Observations of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity were collected daily for ten minutes on each of the six randomly selected students. A minimum of one interobserver agreement check was conducted weekly with an average agreement measure of eighty percent considered a minimum for reliable data. The second observer was a certified teacher in the State of Ohio. Prior to the initiation of this study, the two observers observed the variables in question to determine if they could reliably collect data (e.g., eighty percent for five consecutive days). Reliability was defined as the percentage of agreement of two observers independently observing the same behavior, using the same measuring technique, during the same time period. Reliability was computed by dividing the number of agreements by the number of agreements plus disagreements. For example, if two observers utilized ten second interval recording for ten minutes there would be a possible sixty intervals. In this example, if the observers agreed that the behavior occurred within fifty of the sixty ten second intervals, interobserver agreement
is computed as

\[
\frac{\text{# of agreements}}{\text{# of agreements} + \text{# of disagreements}} \times 100\%
\]

\[
= \frac{50}{60} \times 100\% = 83\%
\]

The interobserver agreement measures provided a partial demonstration that the data are or are not accurate in reflecting what transpired within the classroom.

Throughout each experimental phase data were collected utilizing ten second interval recording for the three dependent variables (i.e., on-task behavior, teacher-pupil interaction, and teacher-pupil proximity). A data sheet like the one in Appendix A was used during each treatment condition. Daily observations were collected on each of the above variables and six students for ten minutes (i.e., sixty ten second intervals). Intervals were measured by an observer using a stopwatch. When reliability checks were conducted, both observers used two stopwatches independent of each other. Stopwatches were started at the same time, guaranteeing that the intervals were the same. A student was considered on-task if at any time
during the ten second interval he or she was oriented to a task, making overt responses including verbal answers, raising hand, writing answers, turning pages, and manipulating assigned materials. On-task also included no visible or auditory indication of responding. This included silent reading in a book or eyes focused on the teacher when she was giving directives. This behavior was observed during academic work periods in the classroom. Teacher-pupil interaction was any verbal attention which could be a potential reinforcer or punisher and could occur any time within the ten second interval. Examples would include: "Great," "OK," "I like the way you're working," or "That is a very nice job." Examples of potential punishers include the following: "No," "Boy, that was a lousy job," "What's the matter with you?" "Don't you know any better?", and "What's the matter, are you stupid?" Teacher proximity was when she was within one and a half feet (a desk length) from a student during any period within the ten second interval.

The data were figured in percentages for each student and dependent variables (e.g., on-task, teacher-pupil interaction, and teacher-pupil proximity). An example would be if a child was on-task thirty intervals out of a possible sixty.
Number of intervals on-task = 30
Total number of intervals = 60

= \frac{\text{Number of intervals on-task}}{\text{Total number of intervals}} = \frac{30}{60} = 0.50 \times 100\% = 50\%

These were calculated daily throughout each of the experimental conditions (chairs in rows, horseshoe, and semi-circle).

Graphs were prepared for each of the six students showing the three dependent variables (on-task, teacher-pupil interaction, and teacher-pupil proximity) and the three treatment conditions (chairs in rows, horseshoe, and semi-circle). A graph was also prepared for the average of each of the dependent variables (on-task, teacher-pupil interaction, and teacher-pupil proximity) for the six students in each experimental condition (chairs in rows, horseshoe, and semi-circle). Schematically, these graphs and experimental design look like the following prototype:
This study used a repeated condition design. With this design causal factors may be attributed to the independent variables (e.g., chairs in rows, horseshoe, and semi-circle) if they do make a difference. With this design the experimental conditions served as a control for each other.

With a small N (6) no formal statistical treatment of the data was necessary. The data were analyzed in terms of percentages, and whether or not they increased or decreased for each student as he or she was exposed to each experimental condition.

Significance was determined by a comparison of what the behavior would have been if the experimental procedures had not been introduced. Casualty was demonstrated if there was a difference between the experimental
conditions (e.g., chairs in rows, horseshoe, and semi-circle), and data collected during the baseline conditions when no interventions were in effect. Baseline provided a basis for predicting what the level of the behavior would have been in the future. The experimental design employed provided for a second baseline condition following the different experimental conditions. If the experimental conditions did in fact affect the behavior, then data obtained during this second baseline would be different from the experimental conditions and similar to the data collected during the first baseline conditions. Treatment conditions were analyzed to determine if they were significant in affecting on-task behaviors, teacher-pupil interactions, and teacher-pupil proximity for the six students in comparison to these variables during baseline conditions.
CHAPTER IV

Analysis of Data

Chapter IV presents the results of this study. It includes presentation of results for each subject, together with the data for the subjects as a group. Reliability of data for the six subjects for all conditions has a mean of ninety-two percent with a range from eighty-four to one hundred percent.

Individual Findings

Subject One

Baseline One: Subject one was on-task seventy-five percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject one ranged from sixty-two percent to ninety-three percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) eight percent of the time, while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity nine percent of the time.
Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Subject one's on-task behavior during five days of treatment one increased from a mean of seventy-five percent during the baseline condition to eighty-four percent with a range from sixty-one to ninety-three percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from eight percent during baseline to five percent in treatment one. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity six percent of the time.

Treatment Two: Subject one was, on the average, on-task for five days eighty percent of the time during the second treatment condition (i.e., chairs arranged in a horseshoe configuration) with a range of sixty to ninety-five percent. This represents a four percent decrease in on-task behavior compared to treatment one, but still a five percent increase over the baseline condition. Directives, verbal reinforcement, or physical proximity remained relatively unchanged over treatment one (i.e., six percent versus five percent), while there was a three percent decline (i.e., six percent to three percent) in the amount of directives, verbal reinforcement, or physical
proximity that occurred during off-task intervals.

Treatment Three: Subject one was on-task eighty-nine percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third treatment condition, subject one ranged from sixty-seven percent to one hundred percent on-task. Directives, verbal reinforcement, or physical proximity during on-task intervals increased from six percent during treatment two to nine percent, and decreased from three percent during treatment two to zero percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject one was on-task ninety-three percent of the time, with a range from eighty-three to one hundred percent. On-task behavior increased from eighty percent during treatment two to ninty-three percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from six percent during treatment two to seven percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity nine percent of the time.

Treatment Five: Subject one was, on the average,
on-task seventy-four percent of the time during the fifth treatment condition (i.e., chairs arranged in rows) with a range of fifty-five percent to eighty-five percent. This represents a ten percent decrease in on-task behavior compared to treatment one. Directives, verbal reinforcement, or physical proximity during the fifth treatment condition occurred during seven percent of on-task intervals, which was a two percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals decreased from six percent during treatment one to five percent in treatment five.

Baseline Two: Subject one was, on the average, on-task seventy-eight percent of the time during baseline two (i.e., chairs arranged in a square) with a range of seventy to eighty-seven percent. This represents a three percent decrease in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from eight percent during baseline one to eleven percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity nine percent during baseline one and two percent during baseline two.
Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject one's on-task behavior during five days of treatment six increased from a mean of eighty percent during treatment two, and decreased from a mean of ninety-three percent in treatment four to eighty-four percent with a range from sixty-three to ninety-five percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals increased from six percent in treatment two to seven percent in treatment four, and eleven percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was three percent in treatment two, nine percent in treatment four, and two percent in treatment six. Complete data for subject one can be seen in Figure Two.

Subject Two

Baseline One: Subject two was on-task forty-seven percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject two ranged from thirty-five to fifty-eight percent on-task. The classroom teacher gave directives, verbal reinforcement, or
Fig. 2. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject One.
was within physical proximity (i.e., one and a half feet) six percent of the time, while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement changed to chairs arranged in rows. Subject two's on-task behavior during five days of treatment one increased from a mean of forty-seven percent during the baseline condition to fifty-seven percent with a range from forty-five to seventy-two percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from six percent during baseline to four percent in treatment one. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity two percent of the time.

Treatment Two: Subject two was, on the average, on-task sixty-seven percent for five days during the second treatment condition (i.e., chairs arranged in a horse-shoe configuration) with a range of fifty-three to eighty-five percent. This represents a ten percent increase in on-task behavior compared to treatment one, and a twenty percent increase over the baseline condition. The
classroom teacher gave directives, verbal reinforcement, or was within physical proximity twenty percent of the time, while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity two percent of the time.

Treatment Three: Subject two was on-task seventy-six percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third treatment condition, subject two ranged from sixty-two to ninety percent on-task. Directives, verbal reinforcement, or physical proximity during on-task intervals decreased from twenty percent during treatment two to fourteen percent, and increased from two percent during treatment two to six percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject two was on-task ninety-three percent of the time, with a range from eighty-seven to ninety-eight percent. On-task behavior increased from sixty-seven percent during treatment two to ninety-three percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from twenty percent during
treatment two to six percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity five percent of the time.

Treatment Five: Subject two was, on the average, on-task sixty-four percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of forty-eight to seventy-seven percent. This represents a seven percent increase in on-task behavior compared to treatment one. Directives, verbal reinforcement, or physical proximity during the fifth treatment condition occurred during eleven percent of on-task intervals, which was a seven percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals increased from two percent during treatment one to eight percent in treatment five.

Baseline Two: Subject two was, on the average, on-task sixty-eight percent of the time during the second baseline condition (i.e., chairs arranged in a square) with a range of sixty-five to seventy-five percent. This represents a twenty-one percent increase in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from six percent
during baseline one to nine percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent during baseline one and three percent during baseline two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject two's on-task behavior during five days of treatment six increased from a mean of sixty-seven percent during treatment two, and decreased from a mean of ninety-three percent in treatment four to seventy-six percent with a range from sixty to ninety percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals decreased from twenty percent in treatment two to six percent in treatment four, and increased to eleven percent during treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was two percent in treatment two and five percent in treatments four and six. Complete data for subject two can be seen in Figure Three.

Subject Three

Baseline One: Subject three was on-task sixty-seven percent of the time during five days of the baseline
Fig. 3. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject two.
condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject three ranged from fifty-two to eighty percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) five percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity one percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Subject three's on-task behavior, during five days of treatment one, increased from a mean of sixty-seven percent during the baseline condition to seventy-two percent with a range from fifty-two to ninety percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from five percent during baseline to three percent in treatment one. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity six percent of the time.

Treatment Two: Subject three was, on the average, on-task eighty-seven percent for five days during the second treatment condition (i.e., chairs arranged in a
horseshoe configuration) with a range of seventy-eight to one hundred percent. This represents a fifteen percent increase in on-task behavior compared to treatment one, and a twenty percent increase over the baseline condition. The teacher gave directives, verbal reinforcement, or was within physical proximity five percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity three percent of the time.

Treatment Three: Subject three was on-task eighty-eight percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third treatment condition, subject three ranged from sixty-seven to ninety-three percent on-task. Directives, verbal reinforcement, or physical proximity during on-task intervals increased from five percent during treatment two to eight percent, and increased from three percent during treatment two to five percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject three was on-task ninety-three percent of the time, with a range from eighty-five
to ninety-eight percent. On-task behavior increased from eighty-seven percent during treatment two to ninety-three percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from five percent during treatment two to six percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity fourteen percent of the time.

Treatment Five: Subject three was, on the average, on-task seventy-five percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of sixty to ninety percent. This represents a three percent increase in on-task behavior compared to treatment one. Directives, verbal reinforcement, or physical proximity during the fifth treatment condition occurred during thirteen percent of on-task intervals, which was a ten percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals decreased from six percent during treatment one to one percent in treatment five.

Baseline Two: Subject three was, on the average, on-task sixty-eight percent of the time during the second baseline condition (i.e., chairs arranged in a square)
with a range of fifty-eight to seventy-seven percent. This represents a one percent increase in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from five percent during baseline one to eleven percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity one percent during baselines one and two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject three's on-task behavior during five days of treatment six increased from a mean of eighty-seven percent during treatment two to ninety-three percent in treatment four, and decreased to eighty percent in treatment six with a range from sixty-five to ninety-five percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals increased from five percent in treatment two to six percent in treatment four, and ten percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was three percent in treatment two, fourteen percent in treatment
Subject Four

Baseline One: Subject four was on-task seventy-seven percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject four ranged from sixty-two to ninety-five percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) three percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Subject four's on-task behavior, during five days of treatment one, decreased from a mean of seventy-seven percent during the baseline condition to sixty-three percent with a range from fifty-one to seventy-eight percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from three percent during baseline to five percent in treatment one. When the subject was not on-task, the teacher
Fig. 4. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject three.
gave directives, verbal reinforcement, or was within physical proximity zero percent of the time.

Treatment Two: Subject four was, on the average, on-task seventy-three percent for five days during the second treatment condition (i.e., chairs arranged in a horseshoe configuration) with a range of fifty-eight to ninety-two percent. This represents a ten percent increase in on-task behavior compared to treatment one, and a four percent decrease over the baseline condition. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity three percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity zero percent of the time.

Treatment Three: Subject four was on-task seventy-seven percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third treatment condition, subject four ranged from sixty to ninety-three percent on-task. Directives, verbal reinforcement, or physical proximity during on-task intervals increased from three percent during treatment two to thirteen percent, and increased from zero percent during treatment two to seven percent for off-task intervals.
Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject four was on-task ninety-one percent of the time, with a range from seventy-five to ninety-eight percent. On-task behavior increased from seventy-three percent during treatment two to ninety-one percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from three percent during treatment two to ten percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity zero percent of the time.

Treatment Five: Subject four was, on the average, on-task sixty-three percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of fifty-three to sixty-eight percent. On-task behavior was the same in treatments one and five. Directives, verbal reinforcement, or physical proximity during the fifth treatment condition occurred during twelve percent of on-task intervals, which was a seven percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals increased from zero percent during treatment one to three percent
Baseline Two: Subject four was, on the average, on-task seventy-nine percent of the time during the second baseline condition (i.e., chairs arranged in a square) with a range of sixty-seven to ninety-three percent. This represents a two percent increase in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from three percent during baseline one to eleven percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent during baseline one and three percent during baseline two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject four's on-task behavior during five days of treatment six increased from a mean of seventy-three percent during treatment two to ninety-one percent in treatment four, and was seventy-five percent in treatment six with a range from sixty to eighty-seven percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals increased from three percent in treatment two to ten
percent in treatment four, and nine percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was zero percent in treatments two and four, and seven percent in treatment six. Complete data for subject four can be seen in Figure Five.

Subject Five

Baseline One: Subject five was on-task sixty-nine percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject five ranged from fifty-three to eighty-three percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) seven percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity three percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Subject five's on-task behavior during five days of treatment one increased from a mean of sixty-nine percent during the baseline condition to seventy-one percent with a range from fifty-seven to eighty-seven percent. The percentage
Fig. 5. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject four.
of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from seven percent during baseline to eight percent in treatment one. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity five percent of the time.

Treatment Two: Subject five was, on the average, on-task seventy-six percent for five days during the second treatment condition (i.e., chairs arranged in a horseshoe configuration) with a range of sixty-two to ninety-five percent. This represents a five percent increase in on-task behavior compared to treatment one, and a seven percent increase over the baseline condition. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity nine percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity zero percent of the time.

Treatment Three: Subject five was on-task eighty-six percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third treatment condition, subject five ranged from seventy-seven to ninety-three percent on-task. Directives, verbal reinforcement,
or physical proximity during on-task intervals increased from nine percent during treatment two to twenty percent, and increased from zero percent during treatment two to ten percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject five was on-task eighty-seven percent of the time, with a range from seventy-seven to ninety-five percent. On-task behavior increased from seventy-six percent during treatment two to eighty-seven percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from nine percent during treatment two to seven percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity eight percent of the time.

Treatment Five: Subject five was, on the average, on-task sixty-eight percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of fifty-seven to eighty percent. This represents a three percent decrease in on-task behavior compared to treatment one. Directives, verbal reinforcement, or physical proximity during the fifth treatment condition occurred during twelve percent of
on-task intervals, which was a four percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals decreased from five percent during treatment one to three percent in treatment five.

Baseline Two: Subject five was, on the average, on-task seventy-eight percent of the time during the second baseline condition (i.e., chairs arranged in a square) with a range of seventy to eighty-seven percent. This represents a nine percent increase in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from seven percent during baseline one to eleven percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity three percent during baselines one and two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject five's on-task behavior during five days of treatment six increased from a mean of seventy-six percent during treatment two to eighty-seven in treatment four, and seventy-five percent in treatment
six with a range from sixty-three to eighty-seven percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals was nine percent in treatment two, seven percent in treatment four, and eight percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was zero percent in treatment two, eight percent in treatment four, and one percent in treatment six. Complete data for subject five can be seen in Figure Six.

Subject Six

Baseline One: Subject six was on-task fifty-nine percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, subject six ranged from fifty-five to sixty-eight percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) four percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity two percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Subject six's on-task behavior, during five days of treatment one
Fig. 6. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject five.
decreased from a mean of fifty-nine percent during baseline condition to forty percent with a range from thirty to fifty percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from four percent during baseline to seven percent in treatment one. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity one percent of the time.

Treatment Two: Subject six was, on the average, on-task fifty-seven percent for five days during the second treatment condition (i.e., chairs arranged in a horseshoe configuration) with a range of forty-five to sixty-five percent. This represents a seventeen percent increase in on-task behavior compared to treatment one, and a two percent decrease over the baseline condition. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity sixteen percent of the time while the student was on-task. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity zero percent of the time.

Treatment Three: Subject six was on-task sixty-nine percent of the time during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third
treatment condition, subject six ranged from fifty-two to eighty-five percent on-task. Directives, verbal reinforcement, or physical proximity during on-task intervals decreased from sixteen percent during treatment two to twelve percent, and increased from zero percent during treatment two to three percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Subject six was on-task sixty-eight percent of the time, with a range from sixty-three to seventy-three percent. On-task behavior increased from fifty-seven percent during treatment two to sixty-eight percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals increased from sixteen percent during treatment two to seventeen percent in treatment four. When the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity three percent of the time.

Treatment Five: Subject six was, on the average, on-task forty-seven percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of thirty-eight to fifty-eight percent. This represents a seven percent increase in on-task behavior compared to treatment one. Directives,
verbal reinforcement, or physical proximity during the fifth treatment condition occurred during eight percent of on-task intervals, which was a one percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals were one percent during treatments one and five.

Baseline Two: Subject six was, on the average, on-task fifty-nine percent of the time during the second baseline condition (i.e., chairs arranged in a square) with a range of forty-eight to sixty-seven percent. On-task behavior was the same in baselines one and two. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from four percent during baseline one to twelve percent in baseline two. Conversely, when the subject was not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity two percent during baselines one and two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horseshoe). Subject six's on-task behavior increased from a mean of fifty-seven percent in treatment two to sixty-eight percent in treatment four and sixty-nine percent in treatment six with a range from fifty-two to
seventy-seven percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals increased from sixteen percent in treatment two to seventeen percent in treatment four, and fifteen percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was zero percent in treatment two, three percent in treatment four, and five percent in treatment six. Complete data for subject six can be seen in Figure Seven.

Group Results

Baseline One: The six subjects were on-task sixty-six percent of the time during five days of the baseline condition (i.e., chairs arranged in a square). For individual sessions during baseline, mean on-task ranged from fifty-eight to seventy-six percent on-task. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity (i.e., one and a half feet) five percent of the time while the subjects were on-task. Conversely, when the subjects were not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent of the time.

Treatment One: At the end of the baseline condition (i.e., chairs arranged in a square) the spatial arrangement was changed to chairs arranged in rows. Mean on-task behavior for the six subjects during five days of
Fig. 7. Percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for Subject six.
treatment one decreased from a mean of sixty-six percent during baseline condition to sixty-four percent with a range from fifty-seven to seventy-one percent. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals was five percent during treatment one. When the subjects were not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity three percent of the time.

Treatment Two: Mean on-task behavior for the six subjects was seventy-three percent for five days during the second treatment condition (i.e., chairs arranged in a horseshoe configuration) with a range of sixty-three to seventy-nine percent. This represents a nine percent increase in on-task behavior compared to treatment one, and a seven percent increase over the baseline condition. The classroom teacher gave directives, verbal reinforcement, or was within physical proximity nine percent of the time while the subjects were on-task. Conversely, when the subjects were not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity one percent of the time.

Treatment Three: Mean on-task behavior for the six subjects was eighty-one percent during the five days of the third treatment condition (i.e., chairs arranged in a semi-circle). For individual sessions during the third
treatment condition, mean on-task behavior ranged from seventy-four to eighty-eight percent. Directives, verbal reinforcement, or physical proximity during on-task intervals increased from nine percent during treatment two to thirteen percent, and increased from one percent during treatment two to six percent for off-task intervals.

Treatment Four: The fourth treatment condition was a reintroduction of treatment two where chairs were arranged in a horseshoe. Mean on-task behavior for the six subjects was eighty-seven percent, with a range from eighty-four to ninety percent. On-task behavior increased from seventy-three percent during treatment two to eighty-seven percent in treatment four. The percentage of directives, verbal reinforcement, or physical proximity given during on-task intervals decreased from nine percent during treatment two to eight percent in treatment four. When the subjects were not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity five percent of the time.

Treatment Five: Mean on-task behavior for the six subjects was sixty-five percent of the time during the five days of the fifth treatment condition (i.e., chairs arranged in rows) with a range of sixty to sixty-eight percent. This represents a one percent increase in on-task behavior compared to treatment one. Directives,
verbal reinforcement, or physical proximity during the fifth treatment condition occurred during eleven percent of on-task intervals, which was a six percent increase above treatment one. At the same time, directives, verbal reinforcement, or physical proximity during off-task intervals were three percent for treatments one and five.

Baseline Two: Mean on-task behavior for the six subjects was seventy-two percent during the second baseline condition (i.e., chairs arranged in a square) with a range of sixty-nine to seventy-four percent. This represents a six percent increase in on-task behavior compared to baseline one. Directives, verbal reinforcement, or physical proximity given by the classroom teacher during on-task intervals increased from five percent during baseline one to eleven percent in baseline two. Conversely, when the subjects were not on-task, the teacher gave directives, verbal reinforcement, or was within physical proximity four percent during baseline one and two percent during baseline two.

Treatment Six: At the end of the second baseline condition, the spatial arrangement was changed to the best treatment condition (i.e., chairs arranged in a horse-shoe). Mean on-task behavior for the six subjects during five days of treatment six increased from a mean of seventy-three percent during treatment two, and decreased
from a mean of eighty-seven percent in treatment four to seventy-six percent with a range from sixty-six to eighty percent. The percentage of directives, verbal reinforcement, or physical proximity occurring during on-task intervals decreased from nine percent in treatment two to eight percent in treatment four, and ten percent in treatment six. Directives, verbal reinforcement, or physical proximity occurring during off-task intervals was one percent in treatment two, and five percent in treatments four and six. Complete data for the six subjects as a group can be seen in Figure Eight.
Fig. 8. Mean percentage of on-task behavior, teacher-pupil interaction, and teacher-pupil proximity for the six subjects.
CHAPTER V

Discussion and Summary

Chapter V contains a discussion of the results of this study. In addition, limitations, recommendations, and summary are also presented.

Discussion

Classroom spatial arrangements affected the amount of on-task behavior for subjects in this study. For all subjects, productive classroom work was less when chairs were arranged in rows than when chairs were arranged in a horseshoe configuration, semi-circle, and in a square. Sommer (1965) found that when chairs are arranged within five feet of each other, communication is facilitated. This study substantiates his findings. Subjects talking among themselves was evident in all arrangements, but more so when chairs were arranged in rows. Harms (1970), Sommer (1969), Olson (1971) and Deutsch (1966) speculated that the spatial arrangement can influence student behavior. This study verifies their opinions.

The horseshoe configuration had the highest percentage of on-task behavior for each subject. However, horseshoe and semi-circle arrangements produced similar
results. This may have resulted because these two configurations are very similar. The semi-circle is a reverse of the horseshoe design. When these conditions were operative, subjects may not have experienced a major environmental change from the horseshoe or semi-circle arrangements, and this could have affected the results.

Observers spent five days in the classroom prior to the beginning of the study. This was done to accustom students to having observers in the classroom. Chairs were arranged in a square when the study was initiated. During this baseline condition, subjects were on-task sixty-six percent of the time. The baseline condition was repeated (i.e., chairs arranged in a square), and the results approximated those of the first baseline condition. Chairs arranged in a square generated less on-task behavior for six subjects than did chairs arranged in a horseshoe or semi-circle configuration.

Teacher attention has been demonstrated to be effective in maintaining the appropriate classroom behavior (i.e., Hall, Lund, and Jackson, 1968; Thomas, Becker, and Armstrong, 1968; and Kazdin, 1973). Although in this study directives, verbal reinforcement, or physical proximity contingent on on-task behavior ranged from five percent to thirteen percent, it cannot be concluded that these variables affected on-task behavior. Directives,
verbal reinforcement, or physical proximity occurred eight percent of on-task intervals during the horseshoe configuration. Directives, verbal reinforcement, or physical proximity occurred eleven percent of on-task intervals with chairs arranged in rows. However, the horseshoe configuration produced on-task behavior at eighty-seven percent, while chairs arranged in rows produced on-task behavior at sixty-five percent. The conclusion can be drawn that, in this study, spatial arrangements influenced on-task behavior more than amount of directives, verbal reinforcement, or physical proximity occurring during on-task intervals.

In summary, data indicated a high probability that spatial arrangements contributed to the amount of on-task behavior for the six subjects. Data demonstrated that less on-task behavior occurred when the classroom was arranged in rows. All subjects had higher percentage of on-task behavior when chairs were arranged in the horseshoe configuration.

Limitations

This section discusses methodology, treatment conditions, and generalization of findings.

Methodology: One limitation was procedures employed. Each treatment condition was to remain in effect until the data were stable (e.g., extreme data points—highest
and lowest points—cannot vary more than twenty-five percent of the mean above or below the mean). During all treatment conditions, data were stable, by definition, in five days. However, it would have been advisable to continue the initial baseline for a longer time period, because on-task behavior was increasing during the last three baseline sessions. More observation sessions in this condition could have verified on-task behavior trends (e.g., increasing, decreasing, or stable).

Stability of data, as defined, was also obtained during the first treatment condition (i.e., chairs in rows). However, as with the initial baseline, on-task behavior was increasing during the last three sessions of this condition. Since this treatment condition was not continued, it is not possible to determine the trend of on-task behavior.

Another limitation of this study is that data were collected daily at the same time interval (i.e., 9:30 A.M. to 10:00 A.M.). This was necessary because this was the only time during the school day when all students were together for an academic activity.

Treatment Conditions: The order in which treatment conditions occurred was regulated by the experimental design. However, the author decided whether treatment in rows would precede or follow chairs arranged in the
horseshoe configuration or semi-circle. In this study, chairs in rows preceded chairs arranged in a horseshoe configuration and semi-circle. Since these latter two arrangements appear similar, the study may have been enhanced if chairs in rows had been interspersed between chairs arranged in a horseshoe configuration and chairs arranged in a semi-circle.

Who sat in what seats during each treatment condition was determined by the classroom teacher. This variable was not controlled because if it had, the teacher would have been aware of which students were involved in the study, and this could have influenced the amount of directives, verbal reinforcement, or physical proximity that occurred. Therefore, it was considered necessary for the classroom teacher to determine who sat in what seat so as not to influence the above variables.

Generalization of Findings: This study was conducted in an elementary intermediate educable mentally retarded classroom with an enrollment of twelve students. Six subjects were randomly selected. Because this study was concerned with individual subjects and what effect spatial arrangements had on on-task behavior, the results cannot be generalized to other populations. The nature of the subjects and a small N (6) also dictate that the results can be interpreted in light of the six subjects.
The following recommendations are presented for consideration by all classroom teachers.

1. One of the goals in this study was to demonstrate that spatial arrangements can affect the amount of on-task behavior in students. The results of the study revealed that having students' desks arranged in rows affected on-task behavior in the six subjects. Teachers should investigate the physical environment within their classrooms. For example, if students are not working consistently, one variable that a teacher might consider is a change in the spatial arrangement.

2. If the teacher in this study had continued to keep her class arranged in a square configuration, she would not have obtained as much on-task behavior as occurred when students were arranged in the horseshoe configuration. If a student is not on-task and his behavior is affecting other students, the physical arrangement should be changed.

3. The amount of teacher-pupil interactions can affect appropriate responses from students. To increase appropriate behaviors, teachers should verbally reinforce those behaviors that they want to increase. Physical proximity can also affect student behavior. Teachers should analyze their classrooms to determine if the spatial
arrangements facilitate easy access to all students. Planners of educational facilities must be aware of the total educational environment. This includes the thermal environment, proper illumination, adequate acoustics, furniture selection, and how best the furniture can be utilized to facilitate established educational goals.

4. Spatial arrangements might have different effects on various activities. The interested researcher should consider the above variables, as they may affect his results.

Summary

The purpose of this study was to compare the effects of three different classroom arrangements (i.e., chairs in rows, horseshoe, and semi-circle) on student on-task behavior, teacher-pupil interaction, and teacher-pupil physical proximity. Six students were selected from a class of twelve retarded students. Data on on-task behavior, teacher-pupil interactions, and teacher-pupil physical proximity were collected in eight treatment conditions. These conditions were baseline (i.e., chairs arranged in a square), chairs in rows, horseshoe, semi-circle, horseshoe, rows, baseline, and horseshoe configuration. For each of the six subjects, more on-task behavior was displayed when the spatial arrangement was in a horseshoe configuration, while the least amount of
on-task behavior occurred when chairs were arranged in rows.

Teacher-pupil interactions and teacher-pupil physical proximity did not differ substantially in any of the different spatial arrangements. Thus, with any of the spatial arrangements utilized, interactions of proximity did not seem to be facilitated or hindered.

In conclusion, the spatial arrangements in this classroom did facilitate and hinder on-task behaviors for the six subjects.
APPENDIX A

DAILY OBSERVATION SHEET
### Daily Observation Sheet

**Symbols**

- **D**: Directives
- **N**: Proximity
- **V**: Verbal Reinf.
- **X**: Punishment

**Teacher**

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

**Student**

- **r**: On-task
- **0**: Off-task

**Subject**

_ School __________  

**Date** __________

---

**Teacher**

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

**Student**

- **r**: On-task

---

**Subject**

_ School __________  

**Date** __________

---

**Teacher**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
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**Teacher**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
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**Teacher**

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**Teacher**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
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**Teacher**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
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**Teacher**

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

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APPENDIX B

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT ONE
TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<th>Subject One</th>
<th>% On-Task</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on On-Task Behavior</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Total Time</th>
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<tr>
<td>Chairs In Horseshoe</td>
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APPENDIX C

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT TWO
TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<th>Subject</th>
<th>% On-Task</th>
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<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
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<td>8%</td>
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<td>7%</td>
<td>3%</td>
</tr>
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<td>76%</td>
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APPENDIX D

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT THREE
### TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<th>Subject</th>
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<th>% of Directives, Proximity &amp; Verbal Reinforcement</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement of Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
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<td>67%</td>
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<td>Chairs In Rows</td>
<td>72%</td>
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<tr>
<td>Chairs In Horseshoe</td>
<td>87%</td>
<td>5%</td>
<td>5%</td>
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<td>Chairs In Semi-Circle</td>
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APPENDIX E

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT FOUR
### TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<tr>
<th>Subject Four</th>
<th>% On-Task</th>
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<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
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<tr>
<td>Chairs In Horseshoe</td>
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<td>77%</td>
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<tr>
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APPENDIX F

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT FIVE
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<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
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APPENDIX G

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR SUBJECT SIX
## TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<th>Subject</th>
<th>% On-Task</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on On-Task Behavior</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement of Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
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APPENDIX H

TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION FOR THE SIX SUBJECTS
# TREATMENT MEANS FOR EACH EXPERIMENTAL CONDITION

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<th>Group Results</th>
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<th>% of Directives, Proximity &amp; Verbal Reinforcement of Total Time</th>
<th>% of Directives, Proximity &amp; Verbal Reinforcement Contingent on Off-Task Behavior</th>
</tr>
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<td>9%</td>
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</tr>
</tbody>
</table>
BIBLIOGRAPHY

Books


Periodicals


**General Reference Works**


**Reports and Conference Presentations**


Unpublished Material


