AN EXPERIMENTAL DESIGN STUDY ON THE EFFECTS OF INTERACTION BETWEEN REGULAR KINDERGARTNERS AND AT-RISK KINDERGARTNERS DURING LEARNING CENTER PLAY ON ACHIEVEMENT

Mary Gim Murphy, M.A.
Morehead State University, 1992

Director of Project: Dr. Kent Freeland

The purpose of this study was to determine the effect of integration of higher and lower ability kindergarten student achievement during learning center time. Three kindergarten classes were given the DIAL-R as a pretest at the beginning of the school year. A high achieving kindergarten class acted as the experimental groups. These two groups interacted during learning center play throughout the school year. Another higher achieving kindergarten class acted as the control group and participated in learning center play but did not interact with either of the experimental groups during this time.

At the end of the school year the DIAL-R was administered to the three groups of kindergarten students as a posttest. The data collected were analyzed by means of a t test. The results of the t test indicated that

there was no significant difference in the DIAL-R gain scores of the two high achieving kindergarten groups. The interaction with low achieving students did not negatively affect the high achieving students.

The *t* test results indicated a significant difference in the DIAL-R gain scores of the low achieving kindergarten experimental group and the high achieving kindergarten experimental group. The significant difference in the lower achieving kindergarten students gain scores may have been the result of the interaction with the higher achieving students.

This study confirms that there is no negative effects on the higher achieving student achievement due to integration with the lower achieving students. This study also suggests that the positive gain might be due to interaction between the low and high achieving students.

Accepted by the graduate faculty of the College of EBS
Morehead State University, in partial fulfillment of
the requirements for the Education Specialist
Degree in Curriculum and Instruction

Kent Freeland
Director of Applied Project

Applied Project Committee:

Kent Freeland, Chairman
Paul McPhee
Layla Sabri
Phyllis B. Oakes

7/30/92
Date

ACKNOWLEDGMENTS

I would like to thank Dr. Kent Freeland, Dr. Paul McGhee, Dr. Phyllis Oakes, and Dr. Layla Sabie for their time, constructive criticism, and guidance during the development of this project. I want to thank my colleagues, Pam Sale, Lona Rorer, and Rita Rogers for their time and cooperation in class participation during the school year. I would also like to thank Randy Sale for assisting me with the statistics.

A special thank you is extended to Henry and my family for their support, love, wisdom, and patience. Without these people this project would be incomplete.

CONTENTS

LIST OF TABLES

Table Page

CHAPTER I
INTRODUCTION

PROBLEM

Many school systems have been forced to depend upon the federal government for funds necessary for maintaining the proper programs needed for their students. Upon the acceptance of such federal funds the local school systems must abide by certain guidelines set by the federal government. One of the most popular guidelines is to separate the lower ability students in order to give them materials and specialized instruction that they may or may not be receiving. Here lies the problem. These students are separated from their higher ability peers who could act as tutors and models in learning.

One part of the new Kentucky Education Reform Act emphasizes the ungraded primary school program. In order to successfully teach in such an environment, teachers must learn how to set up their classrooms in a manner that allows all students varying in ages and in abilities to learn from one another. The purpose of this study is to investigate the effect that interaction between lower and higher achieving kindergarten students has on achievement.

HYPOTHESIS

This study is designed to test the following hypothesis:

Hypothesis 1: There will be no significant difference in the DIAL-R gain score of the Control Group and the Experimental Group II.

Hypothesis 2: There will be no significant difference in the DIAL-R gain scores of lower achieving students in the Experimental Group I, the higher achieving students in the Experimental Group II, and the higher achieving students in the Control Group.

DEFINITION OF TERMS

Kindergarten - This term is defined as an all day every day public school early childhood program for five and six year old students.

Learning Center Time - This is a period of time set aside in the kindergarten program where the students interact with peers and materials in math, science, writing, housekeeping, blocks, art, water/sand/beans, manipulatives, and books/listening centers.

Lower Achievers - The term lower achievers is defined as those fifteen children who had the lowest scores on the DIAL-R pretest and were placed in a Chapter I kindergarten class (EXG I).

Higher Achievers - The term higher achievers is defined as those children who scored higher on the DIAL-R pretest than the lower achievers. The higher achievers are divided into two kindergarten classes referred to as Experimental Group II (EXG II) and control group (CG).

SIGNIFICANCE

If through this study we can learn that the integration of higher and lower ability kindergarten students during learning center time is beneficial for both groups of students in achievement, then perhaps we as early childhood educators can feel more confident in encouraging heterogeneous grouping of students in the ungraded primary program. Heterogeneous grouping would allow all levels of achieving students to learn from each other through peer teaching and cooperative learning.

CHAPTER II

REVIEW OF RELATED LITERATURE

Early Childhood

The new Kentucky Education Reform Act outlines many changes for our Kentucky school systems. According to KERA the grades known as kindergarten, first, second, and third will no longer exist beginning fall 1992. These grades will collaborate together to form the ungraded primary school. In order to successfully teach in such and environment, teachers must learn how to design developmentally appropriate curricula for young children and learn how to set up their classrooms in a manner that allows all students, varying in ages and abilities to learn from one another.

An early childhood developmental program is designed under the premise that children are active learners who learn best through direct experience. Safford's (1989) research identifies four major aspects of the developmental approach to an early childhood program.

A. The program recognizes a young child's needs to practice developmental tasks associated with his development period.

B. The teachers have an understanding of developmental needs and characteristics of young children and they interact appropriately with young children.

C. The curriculum furthers cognitive development, based on academic areas such as science, mathematics, language arts, etc., and is based upon concrete experiences.

D. The physical settings are designed to stimulate curiosity and motivation, encourage independence, and promote direct experience with concrete materials.

In designing an appropriate early childhood program these four well defined aspects must be implemented into the program.

Learning Centers

Most developmentally appropriate early childhood programs set up their environment in a learning center manner. Learning centers are designated areas in the classroom that contain a variety of instructional activities and materials which focus on themes, concepts, or skills. The purpose of the learning center can be to

introduce, develop, explore, or stimulate the reinforcement and enrichment of concepts and skills while the children interact with one another.

Learning centers impose some organizing system upon the learning environment, while still permitting learning to be open-ended and child-directed, therefore providing for individual differences for all children including those with special needs. These centers provide opportunities for spontaneous discovery, problem solving, step-by-step teacher demonstration, peer cooperation in a shared activity, observing and imitating each other, and for children to work together in pursuit of a common goal. Safford (1989) concludes that learning centers make possible both self-directed and self-motivated discovery within a context defined by the center and its contents and cooperative and interactive learning shared by pairs or small groups.

Homogeneous or Heterogeneous Grouping

Young children learn best in a developmentally appropriate early childhood program. Not only can the teacher, the curriculum, and the environment affect learning but children influence one another. Recent

decisions on personal beliefs and impressions rather than research evidence. Purdom's evidence documented that ability grouping does not improve academic achievement. His warnings have gone unheeded; ability grouping continues to receive support from many teachers and administrators.

Ability or homogeneous grouping refers to the grouping of students for instructional activities by ability or achievement to create the greatest amount of homogeneity among learners. Grouping in this manner decreases the differences among learners' knowledge, skills, developmental stages and learning rates (Manning & Lucking, 1990). The goal of grouping is to decrease the likelihood of a lesson being too easy or too difficult for some learners so they all can profit from one lesson.

Heterogeneous grouping, a mixture of learners of all ability levels, can be a positive alternative from homogeneous grouping. This would allow students to interact with learners of all abilities. It would be the teacher's responsibility to adapt the learning environment, including instruction and materials to meet the needs of individual students (Manning & Lucking, 1990).

In designing an integrated educational setting, Safford (1989) believes that the teacher would be preparing the students to live in a heterogeneous society. Improved attitudes and realistic perceptions of the abilities of students with disabilities can occur during a meaningful, personalized interaction between typical children and handicapped children, high achievers and low achievers.

Cooperative Learning

The aim of cooperative learning or shared learning is to bring the children of all abilities and achievements together to teach and to learn from one another. Teacher directed instruction, skill oriented lessons, and ability grouping are not characteristics of cooperative learning. The teacher's role is to create opportunities for children to investigate and to clarify understandings by actively exchanging and using one another's ideas. Teachers lead children to value their own contributions and to appreciate peers as learning resources. Cooperative peer interaction also maximizes learning by supporting the development of higher order thinking and problem solving abilities (Atkinson & Green, 1990).

Cooperative learning is a method for accommodating for differing learning styles in a group. Watson and Rangel (1989) note that some slow learners desire a learning experience that demands group interaction and feedback from peers. These students do not appear motivated by teacher or parental approval but are concerned about performing well in front of peers.

Cooperative learning is a teaching strategy that involves children of all learning abilities and performance levels working together in a small groups to reach a common goal while practicing language, problem solving, thinking and decision making skills. Research (Bredekamp, 1987; Carroll & Seaton, 1992) suggests that children working together in small groups develop higher self-esteem, a greater concern for others and higher academic achievement. Research (Bredekamp, 1987; Carroll and Seaton, 1992) states that teachers should prepare the environment for children to learn through active exploration and interaction with adults, other children and materials.

Research (Augustin, Gruber & Hanson, 1990; Miller, 1989; Ross, 1992; Safford, 1989; Snyder, Apollon, & Cooke, 1977) confirms that when interactions between handicapped and nonhandicapped children are structured,

cognitive as well as social gains for the handicapped child are significantly greater than in a setting where there is no opportunity for peer modeling for more competent behavior to occur. Safford (1989) cites a report of the pioneering work accomplished by William and Diane Bricker (1971).

> The ways in which a non-delayed child plays with toys and other objects in the classroom and playground provide greater variation in the types of activity available than that provided by the more limited repertoires of the delayed youngsters. This modeling of object relevant play may provide a better instructional medium than a teacher demonstrating the same activity directly, since both approximations to relevant use and greater variations in the use of objects are evident in the play behavior of the non-delayed child (p.84).

Young children facilitate the learning skills through imitation. Between four and six years of age, children become more aware of the activity of others as a source for enhancing their own performance. Observation becomes more focused. Imitation involves alternating between periods of observing and doing. Atkinson and Green (1990) describe block play as an example of

peer than a handicapped one. The results of the study favored integrated preschool classes based upon the benefits in development of handicapped peers and the lack of evidence for harming the development of the nonhandicapped peers.

Adams (1990) found that children who learn together in small groups develop a sense of responsibility and an understanding of the importance of cooperation. Adams (1990) took part in a study of three groups of children. One group was made up of children who worked alone while each of the other two groups consisted of children with different developmental levels who worked together on solving problems. It was found that children who were in interactive groups were able to solve more complicated conservation tasks and that their predictive skills improved. Adams (1990) concludes that the positive effects of collaboration go beyond achievement to include cognitive development, of not only gifted students but at-risk students as well as average students.

Morgan (1987) conducted a study to determine if students' perceptions of classroom life and their social integration differed between classrooms where cooperative learning was structured at least 30% of the time versus classrooms where it was structured less than 30% of the

time. Achievement levels of students were reviewed by comparing standardized test scores from spring 1985 to scores from spring 1986. It was concluded that students' achievement scores reflect more achievement growth in classrooms where cooperative learning strategies are used at least 30% of the time than student scores in low use classrooms.

Most educators agree that low and middle achieving students have much to gain cognitively, socially, and behaviorally by working in cooperative learning groups with high achieving peers. What many educators may not realize is that high achieving students benefit in a number of ways from collaborating with low and middle achieving peers. According to Johnson's, et al. (1988) research, high achieving students working in heterogeneous learning groups scored higher on retention tests than did high achievers who participated in competitive or individualistic learning situations. They believe that bright students may get quick, intuitive right answers to problems, but may not have a conscious strategy for getting the answer. A cooperative learning environment provides experiences in talking through and explaining the material which enhances retention and promotes the development of higher level reasoning

strategies (Johnson, et al., 1988; Watson & Rangel,1989).

Another important benefit for high achievers participating in heterogeneous cooperative learning groups is the development of collaborative skills and friendships that result. Bright students are often ostracized in a competitive setting but are seen as desirable partners in a cooperative setting. In collaborating with middle and low achieving peers, high achievers are more likely to develop leadership, communication, decision making, and conflict management skills needed for future career success (Johnson, et al., 1988).

According to a reference from Safford (1989), children learn through observing, practicing, and modeling the more competent behaviors of their peers. Most handicapped children are not delayed in all developmental areas; thus all children have a contribution to make that can benefit their peers.

Safford (1989) explains that developmentally normal children will not learn socially unacceptable or immature behaviors of children with developmental delays or handicapping conditions on a lasting basis. "Children are more likely to imitate other children (handicapped or

nonhandicapped) whose behaviors are more mature, competent, and appropriate. When they do imitate the behavior of children with handicaps, what they imitate is usually appropriate behavior" (Safford, 1989, p. 85).

Cooperation may be the key to an effective classroom learning climate. Researchers (Atkinson & Green, 1990; Tateyama-Sniezek, 1990) have studied children's performance in competitive and individualistic learning settings and cooperative learning settings. The study yielded evidence that children in cooperative learning settings appear to have the advantage in gaining understanding of subject matter.

Although classrooms should be dominated by cooperative learning activities, students need some competitive or individualistic activities. The students need to learn how to compete appropriately for fun and enjoyment, win or lose. Students also need opportunities for complete responsibility of following through on a task autonomously. Cooperatively structured lessons should prepare students to do work alone and provide a setting in which individual accomplishments and competencies are used to contribute to the overall achievement of the group (Johnson, et al., 1988).

Implementing Cooperative Learning

Cooperative learning provides an excellent tool for bridging the gaps between the students' learning styles and the teaching requirements of the classroom. Students can learn in ways that match the learning styles. They can share their own perspectives as they pursue goals intrinsically interesting to them (Watson & Rangel, 1989).

Piaget's theory, according to Tudge and Caruso (1988), discusses the impact of social interaction on cognitive and moral development. Piaget's theory explains that opportunities for becoming less egocentric are much more common when children discuss things with one another during cooperative learning activities. Children are faced with the fact that not everyone has the same perspective on any given situation. The exchange of perspectives allows children to learn how to take different points of view into account. Piaget argued that this was more likely to be accomplished during the give and take of peer interaction than when a child was dealing with an adult. Children are less likely to disagree with and present their own ideas to an adult (Tudge & Caruso, 1988).

Tudge and Caruso (1988) see the teacher's role as one of encouraging and suggesting rather than giving directions. Following are guidelines for teachers for implementing cooperative activities in their classrooms.

A. Develop activities that involve a number of children and encourage them to interact with others.

B. Help clarify or adapt their shared goals before they attempt to solve the problem. A teacher's input should help children make explicit the objectives that are only implied by behavior.

C. Encourage children who are less likely to initiate participation (Tudge & Caruso, 1988, p. 51).

Teachers should avoid suggesting solutions for the children even if they seem to be struggling with a problem. Arriving at the correct answer is less important in terms of children's cognitive development than the process of struggling with the problem cooperatively (Tudge & Caruso,1988).

How well children use cooperative peer interaction in the learning process depends upon the teacher's awareness of (a) task organization, (b) learner contributions, (c) reward system, and (d) teacher's

ability to foster cooperative peer interaction.

Organization of Learning Task. The tasks should be organized so that each child participates as both a knower and a learner. Opportunities are provided to encourage all children to share what they already understand and to learn something new from others.

Contributions of the Learners. Children need to know that their contributions will be valued. They can enhance one another's learning by attending and observing exploring and doing, coordinating, initiating, imitating, and discussing ideas with peers.

Reward System. Playing, working, and talking together to solve problems are self-rewarding behaviors for children that help develop self-motivated learners. Although most activities are intrinsically rewarding, extrinsic rewards may be provided. If provided, these rewards should be group rewards that acknowledge the cooperative effort, and not to emphasize competition.

Orientation of the Teacher. Teachers should serve as models and mediators. As models, teachers provide both demonstrations and verbal explanations. Young children frequently demonstrate their abilities to one another but lack the verbal skills to provide needed explanations. When teachers ask questions, children

often initiate them and ask questions to one another. Teachers act as mediators by responding to children's communications (their observations, their play, their descriptions of the events occurring around them) and then by involving each child as a doer (Atkinson & Green, 1990).

Tudge and Caruso (1988) add to the list of activities in which cooperative problem solving can play a central role: (a) spontaneous problems that arise in children's free play, (b) open-ended planned activities, and (c) planned activities focused on specific content areas such as mathematical concepts.

Spontaneous Problems. Children will encounter problems while involved in pursuing objectives intrinsically interesting to them. An observant teacher will notice occasions when a child or several children are attempting to solve a problem, and will intervene appropriately by suggesting help from a peer or providing additional materials that might stimulate the child's or children's thinking.

Open Ended Planned Activities. In this type of activity the teacher provides materials and suggests a specific goal for the children to pursue, while the learning content remains open to the questions or issues

raised by the children during the activity. The teacher encourages interaction among children but avoids suggesting solutions to the children.

Planned Activities. Because cooperative problem solving encourages children to discover solutions, it involves them in a strongly self-motivated learning process that enhances understanding of the basic concepts. The teacher's role is to select challenging materials to help the children keep focused on the task, and to facilitate group discussion when necessary.

CHAPTER III

METHODOLOGY

POPULATION AND SAMPLING

The population for this study was students enrolled in kindergarten in a designated central Kentucky elementary school by September 1991. There were three kindergarten classes in this school. There were two regular kindergarten classes with 24 students in each class. The third kindergarten class was a Chapter I class of 15 students.

The children's DIAL-R test scores were ranked from highest to lowest. The 15 children having the lowest scores were placed in the Chapter I kindergarten class (EXG I). The other 48 students were placed in two regular kindergarten classes according to their test scores, making both classes as equal in children's abilities as possible. One of the regular kindergarten classes was used as a control group (CG) and the other was the second experimental group (EXG II).

INSTRUMENTATION AND DATA COLLECTION

The Developmental Indicators for the Assessment of

Learning - Revised, (DIAL-R), is the instrument that was used in collecting data on student achievement. This developmental screening tool is designed for young children.

The DIAL-R is an untimed, team-administered measure of motor, conceptual, and language development of children ages two to six. Each of the three domains is measured by subscales consisting of eight test items worth 31 points (for a total of 93 points). This screening instrument is used for identifying potential need for further diagnostic evaluation or curricula modification for children.

The DIAL-R consists of three stations, each containing eight tests. The motor station tasks are comprised of: catching a bean bag, jumping, hopping, and skipping, building with blocks, touching fingers (e.g., index finger to thumb), cutting with scissors, matching, copying shapes and letters, and writing one's name. The concepts station tasks include: color naming, identifying body parts, counting (rote and meaningful), identifying basic concepts (e.g., spatial, size), naming letters, and sorting (e.g., shape, color, size). Language tasks include: articulating, giving personal data, remembering (patterns of hand claps, digit span,

sentences), picture vocabulary naming nouns and verbs, classifying foods (naming), problem solving (e.g., similar to the comprehension subtest of the Wechsler Preschool and Primary Scale of Intelligence), and length of utterance.

Content validity was established in the earlier DIAL through interviews with teachers and reviews by early childhood consultants. Evidence for criterion-related validity was examined through a comparison of DIAL-R scores with the Stanford-Binet (r=.40, N=125, with the DIAL-R total). A decision matrix revealed 82% agreement between the two scales based on the DIAL-R screening categories. A study of predictive validity is presented based on the earlier DIAL.

PROCEDURE

During the month of June before school started session in August, most of the children who were enrolled in kindergarten at a particular central Kentucky elementary school were given the DIAL-R Test by trained kindergarten teachers and volunteers. The scores were ranked from high to low. The 15 students with the lowest scores were placed in a Chapter I kindergarten class

(EXG I). The other students were divided between two regular kindergarten classes (EXG II, CG).

During the second week of school, seven kindergarten students who had not been tested during the summer were tested by three kindergarten teachers. As a result of the test scores, one student from the EXG II was enrolled in the EXG I and one student in the EXG I was enrolled in the EXG II. The other students had been properly placed. The students arriving after the first six weeks were not included in this study.

During the first eight weeks the kindergarten students spent approximately one hour in learning center play each morning in their own kindergarten rooms. This allowed the students time to develop a positive relationship with their kindergarten peers and teachers. EXG I and EXG II spent time together in physical education classes, music classes, and gross motor play outside on the playground in order for these children to develop friendships with one another.

At the beginning of the eighth week of school, EXG I and EXG II kindergarten students were divided equally between classrooms for learning center play. Each experimental group had seven or eight EXG I students and 12 EXG II students. The kindergarten class acting as the

control group was involved in learning center play in their own classroom and did not interact with EXG I or EXG II during learning center play.

Each kindergarten classroom is set up in the following learning centers: math, science, listening library, water and beans, games and puzzles, manipulatives, housekeeping, blocks, and writing. Each learning center is labeled with words and pictures naming the center and numbers stating the number of children who can be involved in the learning center. For example the housekeeping center has the numbers 1, 2, 3, and 4 meaning that one to four children can work in that particular center at one time. When choosing a learning center the children can quickly identify how many children may work in that particular center.

The learning center materials were changed from time to time to encourage interest. The materials for the centers were chosen according to the students' abilities, interests, and unit of study. (See Appendix.)

To make sure that the high and low achieving students worked and played together, the teachers from EXG I and EXG II assigned students to the learning centers on Monday, Tuesday, Wednesday, and Thursday mornings. Although the children were assigned to

learning centers, the children chose what tools, games, and materials they wanted to use in the learning centers. Realizing the importance of the students initiating their own learning, the teachers allowed the children to make independent choices of learning centers on Friday.

DESIGN

The preregistered kindergarten students were given the DIAL-R before the school year began. Those kindergarten students who were not preregistered were given the DIAL-R before the beginning of the second six weeks of school. The students entering kindergarten at this school after the first six weeks were not included in this study.

The treatment was the interaction of the lower (EXG I) and the higher (EXG II) achieving students with each other during learning center play. Learning center time was not structured in a way as to limit interaction between the children. This heterogeneous group of students were encouraged by the teachers to interact in activities that required cooperative learning between the high and the low achievers. The CG did not interact with these two classes during learning center play.

At the end of the school year in May trained kindergarten teachers administered the DIAL-R as a posttest to the three kindergarten classes (EXG I, EXG II, and CG). The results of the experimental groups and the control group were compared and studied.

CHAPTER IV

ANALYSIS OF DATA

As a result of some kindergarten students moving during the school year the population sample was as follows: EXG I - 14 students, EXG II - 21 students, CG - 18 students. The students entering this school after the first six weeks were not included in this study.

The data collected in the DIAL-R evaluations were analyzed by means of a t-test. The t scores above the .05 probability level were used to prove the significance in the pretest and posttest gain scores.

Table 1 shows the pretest scores of EXG I and EXG II. The entry column refers to the number of students in each class. The results of a t test indicated a significant difference in these two sets of pretest scores. The results of the t test also determined a significant difference in the pretest scores of EXG I and CG (see Table 2). Tables 1 and 2 show a significant difference in the pretest scores between the lower achieving group (EXG I) and the two higher achieving groups (EXG II, CG). The t test results did not determine a significant difference in the pretest

scores of the two higher achieving groups (EXG II and CG) establishing that these two groups were statistically equivalent (see Table 3).

Tables 4, 5, and 6 show the pretest scores, the posttest scores and the gain scores for EXG I, EXG II, and CG respectively. The gain scores were computed by finding the difference in pretest and posttest scores. The number of entries correspond to the number of students in the groups. The mean was computed by adding the scores in each column and dividing it by the number of entries.

Two students, entries 2 and 6, in the EXG II (refer to Table 5) have a maximum posttest score of 93 on the DIAL-R. These two students' low gain scores may or may not have been the result of 93 being the maximum DIAL-R score. It is possible, however, that their gain scores could have been greater if 93 had not been the maximum points possible on the DIAL-R.

The pretest, posttest, and net gain scores for each group were averaged for each class in order to establish a single group score for each area (pretest, posttest, and net gain) (refer to Table 7). This table shows the largest net gain score belonging to the EXG I.

When the gain scores of the EXG I and the EXG II

were compared with a t test it was found that there was a significant difference between the gain scores of the lower achieving students (EXG I) and the higher achieving students (EXG II) (see Table 8). The same was found for the t test results of the gain scores for (EXG I) and (CG). There was a significant difference between the gain scores of the higher achieving students and the lower achieving students.

Table 10 shows the gain scores of the EXG II and the CG. Results of a t test determined that there is no significant difference in the two sets of scores.

Table 1

EXG I and EXG II DIAL- R Pretest Comparison

Entry	EXG I	EXG II
1	63	70
2	67	91
3	53	81
4	60	76
5	62	77
6	60	88
7	57	73
8	65	72
9	67	74
10	66	74
11	63	71
12	60	84
13	70	81
14	58	79
15		75
16		83
17		81
18		79
19		90
20		77
21		87

t value: 8.72420627 df: 33 p > .05

Table 2

EXG I and CG DIAL-R Pretest Comparison

Entry	EXG I	CG
1	63	76
2	67	70
3	53	72
4	60	72
5	62	80
6	60	81
7	57	76
8	65	72
9	67	70
10	66	74
11	63	85
12	60	87
13	70	81
14	58	77
15		76
16		77
17		83
18		75

t value: 8.5001058 df: 30 p > .05

Table 3

EXG II and CG DIAL-R Pretest Comparison

Entry	EXG II	CG
1	70	76
2	91	70
3	81	72
4	76	72
5	77	80
6	88	81
7	73	76
8	72	72
9	74	70
10	74	74
11	71	85
12	84	87
13	81	81
14	79	77
15	75	76
16	83	77
17	81	83
18	79	75
19	90	
20	77	
21	87	

t value: 1.25558328 df: 37 $p < .05$

Table 4

EXG I DIAL-R Scores

Entry	Pretest	Posttest	Net Gain
1	63	77	14
2	67	87	20
3	53	84	31
4	60	90	30
5	62	89	27
6	60	85	25
7	57	85	28
8	65	86	21
9	67	89	22
10	66	90	24
11	63	85	22
12	60	81	21
13	70	88	18
14	58	83	25
	871	1199	328
Mean:	62.21	85.64	23.43

Table 5

EXG II DIAL-R Scores

Entry	Pretest	Posttest	Net Gain
1	70	87	17
2	91	93	2
3	81	90	9
4	76	81	5
5	77	90	13
6	88	93	5
7	73	87	14
8	72	83	11
9	74	85	11
10	74	83	9
11	71	87	16
12	84	90	6
13	81	88	7
14	79	88	9
15	75	89	14
16	83	88	5
17	81	87	6
18	79	84	5
19	90	91	1

Table 5 continued

20	77	89	12
21	87	90	3
	1663	1843	180
Mean:	79.19	87.76	8.57

Table 6

CG DIAL-R Scores

Entry	Pretest	Posttest	Net Gain
1	76	89	13
2	70	79	9
3	72	88	16
4	72	92	20
5	80	87	7
6	81	89	8
7	76	89	13
8	72	89	17
9	70	84	14
10	74	82	8
11	85	87	2
12	87	89	2
13	81	88	7
14	77	84	7
15	76	87	11
16	77	86	9
17	83	91	8
18	75	85	10
	1384	1565	181
Mean:	76.89	86.94	10.05

Table 7

A Comparison of DIAL-R Score Means

	Pretest	Posttest	Net Gain
EXG I	62.21	85.64	23.43
EXG II	79.19	87.76	8.57
CG	76.89	86.94	10.05

Comparison of EXG I and EXG II DIAL-R Gain Scores

Entry	EXG I	EXG II
1	14	17
2	20	2
3	31	9
4	30	5
5	27	13
6	25	5
7	28	14
8	21	11
9	22	11
10	24	9
11	22	16
12	21	6
13	18	7
14	25	9
15		14
16		5
17		6
18		5
19		1
20		12
21		3

t value: 9.26654224 df: 33 p > .05

Table 9

Comparison of EXG I and CG DIAL-R Gain Scores

Entry	EXG I	CG
1	14	13
2	20	9
3	31	16
4	30	20
5	27	7
6	25	8
7	28	13
8	21	17
9	22	14
10	24	8
11	22	2
12	21	2
13	18	7
14	25	7
15		11
16		9
17		8
18		10

t value: 7.91525984 df: 30 p > .05

Table 10

Comparison of EXG II and CG DIAL-R Gain Scores

Entry	EXG II	CG
1	17	13
2	2	9
3	9	16
4	5	20
5	13	7
6	5	8
7	14	13
8	11	17
9	11	14
10	9	8
11	16	2
12	6	2
13	7	7
14	9	7
15	14	11
16	5	9
17	6	8
18	5	10
19	1	
20	12	
21	3	

t value: .98382354 df: 37 $p < .05$

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

Hypothesis 1 must be accepted as true due to the results of the t test of EXG II and CG gain scores. There was no significant difference in the DIAL-R gain scores of the high achieving EXG II and the high achieving CG. It can be inferred that the interaction with the lower achieving EXG I students did not negatively affect the higher achieving EXG II students in this study.

According to the t test results there is a significant difference in the DIAL-R gain scores of the higher achieving groups (EXG II, CG) and the lower achieving group (EXG I). Because there was a significant difference in the gain scores of the higher achieving (EXG II, CG) and lower achieving groups (EXG I), the null hypothesis must be rejected. It can be inferred that the lower achieving students may have benefited by interacting with the higher achieving students. It can not be assumed that the interaction is the only factor in the significant gain of the lower achieving students' test scores. In order to find that the interaction between the higher and lower achieving students is the

single cause for the high gain scores for the lower achieving students there must be a control group of lower achieving students that do not interact with high achieving students.

Although it is difficult to measure isolated factors in educational research, numerous studies referenced in the review of related literature agree that both low achievers and high achievers have much to gain from the interaction with their peers. These factors include cognitive skills, attitudes, social skills, and motor skills. Furthermore, both groups of achievers also benefit from a heterogeneous cooperative learning environment. In collaborating with each other, the high achievers as well as the lower achievers, may develop leadership, communication, decision making, and conflict management skills. Cooperative learning provides an excellent tool for bridging the gaps between student learning outcomes in a heterogeneous classroom.

APPENDIX

Description of Learning Centers

Art

Purpose: to encourage the children to express their feelings, to develop their imaginations and creativity, and to practice fine motor skills

Materials: scissors, glue, crayons, colored pencils, markers, paper, playdough, cookie cutters, magazines, yarn, paint, easel, and scraps of various materials

Blocks

Purpose: To allow the children to exercise cooperation, observation, balance, discrimination, large motor and small motor skills

Materials: cardboard blocks, train and tracks, Dacta Lego blocks, small wooden blocks, and Lincoln Logs

Housekeeping

Purpose: To allow the children to practice self expression, and language communication skills

Materials: child size refrigerator, stove, table, chairs, plastic dishes, discarded food

containers, dolls, stuffed animals, clothes for dress-up, puppets, and puppet stage

Listening Library

Purpose: To give children opportunities to enjoy and become familiar with literature

Materials: books, story cassettes, cassette player, headphones

Manipulatives

Purpose: To help build fine motor skills and to practice cooperation and problem solving

Materials: puzzles, peg boards, Fisher Price toys, lacing cards, and matching games

Math

Purpose: To give children opportunities in counting, patterning, matching, classifying, measuring, and problem solving

Materials: number concept games, items for counting and patterning (coins, unifix blocks, animal counters, etc.), and pattern blocks

Sand/Water/Beans

Purpose: To entice children to experiment with measuring

and the properties of water, sand, and beans

Materials: sand, water, dried beans (various kinds), measuring cups and spoons, baster, water toys, dish liquid, wash clothes, and towels

Science

Purpose: To encourage exploration

Materials: magnifying glass, nature items (shells, leaves, nuts, gourds, flowers, seeds, and pets), and books

Writing

Purpose: To allow the children to experiment and practice scribbling, pretend writing, and writing words and names

Materials: pencils, pens, paper, alphabet rubber stamps, stamp pads, envelops, note pads, chalk, chalkboard, eraser

REFERENCES

Adams, D.N. (1990). Involving students in cooperative learning. Teaching Pre-K, 20 (7), 51-52.

Atkinson, A.H. & Green, V.P. (1990). Cooperative learning: The teacher's role. Childhood Education, 67 (1), 8-11.

Augustin, D.K., Gruber, K.D. & Hanson, L.A. (1990). Cooperation works. Educational Leadership, 47 (4), 4-7.

Bailey, D.B., Jr. & Wolery, M. (1984). Teaching Infants and Preschoolers with Handicaps. Columbus, OH: Charles E. Merrill Publishing Company.

Bredekamp, S. (Ed.). (1987). Developmentally appropriate practice in early childhood programs serving children from birth through age 8. (pp. 62-87). Washington, D.C.: National Association for the Education of Young Children.

Carroll, J.A. & Seaton, M. (1992). Cooperative Learning Throughout the Year. Carthage, IL: Good Apple.

Conoley, J.C. & Kramer, J.J. (Eds.). (1989). The Tenth Mental Measurements Yearbook. (pp. 244-248). Lincoln, NE: The University of Nebraska Press.

Johnson, D.W., Johnson, R.T., Holubec, E. (1988). Cooperation in the Classroom. Edina, Minn.: Interaction Book Company.

Manning, M.L. & Lucking, R. (1990). Ability grouping: Realities and alternatives. Childhood Education, 66, 254-258.

Miller, K.A. (1989). Enhancing early childhood mainstreaming through cooperative learning: A brief literature review. Child Study Journal, 19, 285-291.

Morgan, B.M. (1989). Cooperative learning: Teacher use, classroom life, social integration, and student achievement. Dissertation Abstracts International, 48,3043-A.

Odom, S.L. & Karnes, M.B. (1988). Early Intervention for Infants and Children with Handicaps. Baltimore, MD: Paul H. Brookes.

Peterson, C., Peterson, J. & Scriven, G. (1077). Peer imitation by nonhandicapped and handicapped preschoolers. Exceptional Children, 43, 223-224.

Ross, H.W. (1992). Integrating infants with disabilities? Can "ordinary" caregivers do it? Young Children, 47 (3), 65-71.

Safford, P.L. (1989). Integrated Teaching in Early Childhood: Starting in the Mainstream. White Plains, NY: Longman Inc.

Snyder, L., Apolloni, T., Cooke, T.P. (1977). Integrated settings at the early childhood level: The role of nonretarted peers. Exceptional Children, 43, 262-266.

Tateyama-Sniezek, K.M. (1990). Cooperative learning: Does it improve the academic achievement of students with handicaps? Exceptional Children, 56, 426-437.

Tudge, J. & Caruso, D. (1988). Cooperative problem solving in the classroom: Enhancing young children's cognitive development. Young Children, 43 (1), 46-52.

Watson, D.L. & Rangel, L. (1989). Don't forget the slow learner. The Clearing House, 62, 266-268.