This study investigated the effects of computer-assisted cooperative learning in mathematics instruction within integrated classrooms for students with and without disabilities. A total of 118, 3rd grade elementary students, 25 of whom had learning disabilities, participated in the study. These students were grouped into a cooperative or whole-class learning environment to learn mathematics supported by computer technology. Six regular teachers were randomly assigned either to cooperative or whole-class learning groups to conduct mathematics instruction following the school’s curriculum. Three special education teachers, with their participating students, were integrated within the regular classes. Three commercial computer software packages were used for students to learn mathematics skills, including concepts, computation, application, and problem solving. The mathematics achievement was examined by pre- and posttests to the participating students. Results showed that students in the cooperative learning group had statistically higher achievement scores than those in the whole-class learning group. However, there were no significant differences between the groups of regular students on the social outcome measure. In addition, interviews of special education students indicated that they liked to be included in regular classrooms only when they were accepted and supported.
Placing students with disabilities in regular classrooms, regarded as mainstreaming, integration, or inclusion, has been advocated by educators and parents (Putnam, 1993, Haring & McCormick, 1996). As inclusion occurs, teachers are confronted with the challenge of developing appropriate approaches to meet the instructional needs of diverse students. Physically including students with disabilities into classroom with regular peers will not ensure the accomplishment of their academic goals. In integrated learning environments, all children need to benefit from and be enriched through opportunities to learn from each other (Sapon-Shevin, 1992; Stainback, Stainback, & Jackson, 1992). According to Davidson (1994), cooperative learning approach will possibly provide this opportunity for promoting integration of students with and without disabilities through team collaboration and positive peer interaction.

Over the past decade, many studies have been related to the advantages of using the cooperative learning strategy (e.g., Slavin, 1990, Johnson & Johnson, 1989, 1994). Results of these studies indicate that when students have an opportunity to study together and are rewarded based on the learning that occurs across the entire group, they learn significantly more than those who study individually. Among the cooperative learning approaches, Team-assisted Individualization (TAI) has been used in mathematics instruction at the elementary school level. Using TAI, allows students to be placed in teams of four or five with a range from higher-, medium-, to lower-abilities. In this format students first work independently, and then meet in teams where they exchange papers, check the accuracy of each other’s work, help each other, then take a quiz individually. Teams receive recognition based on the average number of problems correctly completed by all team members. The TAI approach has been regarded as an appropriate method for grouping students across different academic levels during elementary mathematics instruction to students in grades three to six (Slavin, 1990). According to Slavin (1990), cooperative learning is one approach to successfully including different students to work together. These students are engaged in shared instructional activities and develop friendships. Students with disabilities are rejected less often by peers and have fewer behavioral problems than when they were placed in self-contained special education classrooms (Johnson & Johnson, 1994).

Computer-assisted instruction (CAI), has been identified as a promising way to adapt instruction to individual differences (Corno & Snow, 1986). CAI provides (a) individualized instruction permitting learners to monitor their speed on a moment-by-moment basis, (b) immediate feedback through which learners can monitor their response accuracy on each question on the
screen, and (c) immediate reinforcement to motivate continuing on-task behavior. Further, CAI allows for individual differences in abilities and rate of learning. Often, the presentation of problems is tailored according to the learner’s answers and immediate feedback for each response is supplied on the screen. These features have been seen as having potential to meet individual needs of students, as well as enhancing on-task social interactions of a heterogeneous group of students (e.g. Johnson & Johnson, 1986, Hooper, 1990). Also, CAI joined with cooperative learning instruction shows that pairs or small groups of students working together often results in improved learning outcomes in regular classroom environments (Light & Blaye, 1990). Both high and low achievers could benefit from a cooperative social context to enhance their individual accountability and attentiveness (Mevarech, 1993). However, research was conducted only in regular classrooms with regular students.

As computer-assisted instruction increases, it is possible to combine with cooperative learning strategy in instruction. To date, little research has been conducted to examine the effectiveness of combining or integrating these two strategies in mathematics instruction for students with and without disabilities in integrated classes. The purpose of the current research was to examine the impact of computer-assisted cooperative learning on student achievement in integrated educational settings.

METHOD

Participating Students

A total of 118, 3rd grade students participated in the study. Of those, 25 were classified as learning disabled with their IEP (Individualized Education Plan) objectives in mathematics. (Note: In psycho-educational evaluation, these students had met the State Board of Education (1993) criteria for having learning disabilities. The classification as learning disabled was determined by respective school districts.)

All students were enrolled in three elementary schools located in both suburban and urban areas in a northeast state of the United States (see Figure 1). Forty percent were African American, 35% Caucasian, and 25% Hispanic or other. The students with learning disabilities had been receiving mathematics instruction in self-contained special education classrooms due to their academic difficulties. For this study, these students were included in the third grade regular classes. Their average mathematics level was at the second grade according to their district tests.
All the participating students were randomly assigned to cooperative learning and whole-class learning groups. To assess equivalence between the two groups, the mathematics subtest of Primary level 3 (Form J) of the Stanford Achievement Test (SAT) (Gardner, Rudman, Karlson & Merwin, 1991) were administered to the entire study population. The test scores attained by students in each of the groups were evaluated using an analysis of variance (ANOVA) to determine if they were significantly different at the pretest. The analysis indicated no significant difference between the two groups ($p > .05$).

### Participating Teachers

Two regular teachers and one special education teacher from three schools participated in the study. In each school, one regular teacher was randomly assigned to teach students in the whole-class learning group,
while the other taught the cooperative learning group. These teachers shifted teaching assignments monthly in order to reduce the impact of teacher effects (e.g. teaching experience, personal characteristics). The one special education teacher in each school supported both regular teachers throughout the study.

**Research Design**

The study employed a pre- and posttest control group design. The instruction was conducted over an entire semester in the regular classrooms and the computer labs during regularly scheduled instructional sessions in mathematics.

**Instructional Materials**

The third grade mathematics curriculum for the three schools allowed for use of the following instructional materials:

**Computer software.** Three commercially produced computer software packages were used. Those packages covered mathematics computational and problem solving skills appropriate for the third grade level. Software A, Mathkeys (MECC, 1994), designed to be integrated with the Houghton Mifflin Mathematics textbook (1989), was used as a major program to teach addition, multiplication facts, subtraction, and division computation skills. Software B, Fraction and Decimal Maze (Great Wave, Inc. 1995) was used as a supplemental material for understanding decimal and fraction concepts and values. Software C, Mathshop Jr. (Scholastic Inc., 1994) was used as a supplemental material for practicing problem solving and computation skills (see Figure 2). These software programs had animated graphics, sound, manipulatives, and immediate feedback of correction and incorrectness as motivators. Each computer lab of the participating schools was equipped with 20 computers, plus one with a demonstration board or a TV monitor located in front of the other computers. This computer was used by the teacher to demonstrate programs, model the instructional steps, and teach mathematics skills.
Topics: Basic fact families including addition, subtraction, multiplication, and division; coin recognition, place value, concepts, number patterns.

There are 3 basic programs:

1. Base Ten Bolcks: using trading process to understand the concepts of addition, subtraction, multiplication and division, and study place value by manipulating unit (ones), rod (tens), flat (hundreds) and cube (thousands).

2. Hundred Chart: using numeric and visual patterns to practice number sequences, and addition and multiplication facts.

3. Counters: using electronic version of math manipulatives and unlimited time for students to solve the problems demonstrated by the program, and making their own problems by writing on the screen, or changing some information.

Software B: Fraction and Decimal Maze

Topics: Fraction and decimal concepts, values, comparison, addition, and subtraction.

Instruction game format with animated graphics and digitized speech based on standard math textbooks from 3rd to 8th grade. Only 3rd grade level was selected for the study.

Software C: Mathshop Jr.

Instructional game format played by students against computer using animated graphics with unlimited time for responses.

Figure 2. Software A: Mathkeys

Instructional sheets. An instructional sheet was given to each student during instruction. Those sheets explained in units the skills to be mastered, steps to be followed when using the computer, and general procedures related to problem solving (see Figure 3).

Worksheets. Each worksheet included 10 mathematics problems that resembled the problems included in each computer practice session and in the textbook. The worksheets were used by students during daily practice sessions (see Figure 4).

Quizzes. Each quiz contained 10 questions about students being able to learn during each week. This quiz was completed by both groups weekly.
1. Place the arrow on 100's chart (click).
2. This screen will appear:

3. Place the arrow on Rule A (click)
4. Place the arrow on 'Choose my own numbers' (click).
5. Decide which "x" table you need to practice with (For example: 7 x table)
6. Move arrow to 100's chart and as you say the x table to yourself move the arrow to the correct answer and click. (example: 7 x 1 =7), place the arrow on 7 (click) A black box will appear on the number.
7. Go through the entire 7 x table clicking each correct answer.

Figure 3. Instructional sheet
Using the Ten Blocks of the Mathkeys program to solve the following problems:

\[
\begin{array}{cccccc}
57 & 48 & 256 & 940 & 738 \\
+35 & +76 & -197 & -184 & +126 \\
\end{array}
\]

Write the standard form and show the value in the Ten Blocks:

- Five thousand three hundred
- Two hundred twenty-one
- 7 hundreds 9 tens
- 3 thousands 4 tens 9 ones
- 9 tens 0 ones

Figure 4. Worksheet example

Computer Skills Training

Prior to the study, the participating teachers received training on computer skills including utilizing a keyboard, mouse, and menu bars in each school setting. Subsequent training was provided to practice on each software package and read the instructional menu until the teachers were knowledgeable and comfortable with the computer and the programs. In addition, the teachers were trained by the researcher to implement the instructional procedures of the study. All the participating students were having a computer class once a week required by the school’s curriculum during the school year. They had learned basic computer skills, such as using a keyboard, mouse, and menu bar.

PROCEDURES

Instruction in mathematics occurred in the regular classrooms during daily scheduled 30-minute period. This was followed by a 20-minute session in the computer laboratory four days a week. The weekly quiz was completed on the fifth day of each week.
Cooperative Learning

The computer-assisted cooperative learning was implemented following four stages.

Stage 1: Introducing cooperative learning. Teachers introduced students to working together in teams. Students then were grouped into teams of four. Each team consisted of students with varying levels of achievement including a mix of genders. Students in each team were paired by twos that were reformed weekly. Teams were re-grouped monthly as that indicated in Slavin’s model (1990). Within each team one student was selected to be team leader, and within each pair, one student was selected as team manager. Team members were seated together so that they could work at a computer in pairs to complete class assignments. After introducing the cooperative arrangement, each team was assigned to play a game in order to enable students to work together effectively. The teacher then introduced the students to the mathematics skills to be addressed, problem solving procedures, and the computer program that was related to the skills to be developed.

Stage 2: Working at computers with a partner. After the teacher’s instruction, the class went to the computer laboratory. In the laboratory, each pair of students was assigned to one computer. The teacher demonstrated one section of the software package relating to the skills learned in class. Then students were required to imitate following the teacher’s steps. Subsequently, two students worked at one computer to complete the section of the computer program by reading the instructional sheet and discussing the instruction with the partner. Each student was required to solve five problems of the worksheet in the computer section. The partner checked the answers. If the answer was correct, the student would record it in the worksheet. If the answer was wrong, the student tried to solve the problem again with the partner’s help. Subsequently, the previous partner continued to solve the next problem, and the first student served as a partner. Students took turns working at the computer to complete their worksheet. When a student within a pair got five of the problems correct, his/her partner would sign the sheet to indicate that he/she was certified by the team to complete that day’s work.

Stage 3: Working in a team. When the pairs within a team completed the worksheet, the team leader would get the members together to check the answers. If the members had a different answer to a problem, the team would work together at the computer or discuss the procedures to determine
the correct answer. If someone was having difficulty, other members would offer help. If questions remained, the team would ask for the teacher’s help. Then, the team leader collected all the members’ worksheets to keep in the team’s folder for the teacher.

**Stage 4: Competing with other teams.** After completing the session, students took a quiz. Special education students took a quiz at their appropriate level. The team leader scored the quiz using an answer sheet produced by the teacher. The teacher checked the scores and computed a team’s scores based on the average score of the quiz gained by each team member. At the end of the week, teams were selected as “Super Team,” “Great Team,” or “Good Team” based on their scores, and received a team certificate. These certificates were posted on the class bulletin board to show each team’s performance.

In the following week, the teacher would provide 10 minutes of instruction daily with small groups of students who were at about the same level of math and check students’ understanding of the main concepts and procedures to solve problems in the specific session. Students would continue to work at computers within their pairs and teams. During the pair and team working period, both regular and special education teachers served as facilitators to provide assistance with questions about the session when students needed help. The same cycle of teaching, working in pairs at computer, discussing in teams, taking an individual quiz was conducted during the entire semester.

**Whole-Class Learning**

The teacher provided whole-class instruction on major concepts and procedures to solve problems in the specific unit of math class, then delivered the instruction sheet and worksheet to the students. In the lab, the teacher demonstrated the computer program to the whole class and assigned students to work at computer individually. Students were required to complete the worksheet daily and a quiz weekly. The teacher scored the sheets and quizzes and responded to students’ questions. Except for the different procedures, the time allotment of the class, and the curriculum materials used in class were the same as those used with the cooperative learning group.
MEASUREMENT

Mathematics Achievement

Students’ math achievement was measured by the Stanford Achievement Test (SAT): Mathematics Subtest (1991). This test includes concepts, computation, and application and was administered in group as a pre- and posttest.

Social acceptance. The Acceptance Scale (Voeltz, 1980) was used to assess regular students’ attitudes toward children with disabilities. This scale consists of 27 sentences that present varied positive and negative statements about individual differences and about children with disabilities. Three choices for responses (agree, disagree, and undecided) are provided. According to Voeltz (1980), four factors: (a) social contact willingness, (b) actual contact with disabled children, (c) mild deviance consequation, and (d) avoidance are represented. Factors a and b have positive scores indicating acceptance, while Factors c and d contain negative items, so that low scores indicate acceptance while high scores are opposite. The reliability of the scale has been determined in both test-retest (resulting in a stability coefficient of .68) and a split-half (coefficient of .82) procedure (Voeltz, 1982). The scale was administrated to regular students in both groups as a pre- and posttest.

Attitudes of special education students. At the end of the instruction each special education student was interviewed. The questions included in the interview are indicated in Figure 5. The questioning was structured in order to elicit a full-range of responses related to students’ attitudes about integrating into regular classrooms with nondisabled peers, and to assure that each student had an opportunity to present his/her point of view. The interviews were orally taped.
RELIABILITY

To ensure that the equal time was allotted for instruction of each group, two graduate students and three parents were trained by the researcher to observe each class using a designed checklist (See Figure 6). The results of these observations were used for weekly discussion with teachers. Thus, each group in the participating schools had same amount of instruction time with same instructional procedures. In addition to observations, the graduate students graded the achievement tests. Their scoring reached an inter-rater reliability of 100%. Meanwhile, two graduate students listened to the recorded tape and filled in each student’s responses to the interview questions. Ninety-five percent agreement between the two was reached.
RESULTS

Mathematics achievement. Pre- and postmathematics achievement test scores were compared using a 2x2 analysis of variance with condition (Cooperative vs. whole-class), serving as a between subject factor and testing time (pre and post) serving as a within subject factor. Descriptive data for the two groups are presented in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop.</td>
<td>46</td>
<td>53.43(24.2)</td>
<td>77.76</td>
<td>26.3</td>
<td>13</td>
</tr>
<tr>
<td>Whole</td>
<td>47</td>
<td>57.42(25.6)</td>
<td>66.62</td>
<td>24.1</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.25(13.1)</td>
<td>47</td>
<td>26.5</td>
<td></td>
</tr>
</tbody>
</table>
The analysis of variance yielded a significant main effect from pretest to posttest scores, and a significant interaction between time of testing and condition of instruction \((F = 4.14, p=.043, (p< .05))\). This analysis is included in Table 2.

A post hoc one way ANOVA analysis of the posttest scores yielded a significant difference in favor of the cooperative learning group \((F(1,116) = 4.23, p = .042 (p < .05))\).

**Social acceptance.** The pre- and posttest scores of the social acceptance scale are presented in Table 3. There were no significant differences between the two groups, though the scores of the cooperative group on social contact willingness are higher, and scores on mild deviance and avoidance are lower than those obtained from the whole-class group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Willingness</th>
<th>Pre Mean</th>
<th>SD</th>
<th>Post Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop</td>
<td>48</td>
<td>Willingness</td>
<td>13.10</td>
<td>4.25</td>
<td>17.20</td>
<td>5.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Actual contact</td>
<td>4.76</td>
<td>2.95</td>
<td>6.11</td>
<td>3.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mild deviance</td>
<td>4.57</td>
<td>1.90</td>
<td>4.09</td>
<td>2.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avoidance</td>
<td>9.38</td>
<td>2.96</td>
<td>7.98</td>
<td>3.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Willingness</th>
<th>Pre Mean</th>
<th>SD</th>
<th>Post Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole</td>
<td>45</td>
<td>Willingness</td>
<td>13.91</td>
<td>4.49</td>
<td>17.20</td>
<td>4.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Actual contact</td>
<td>4.91</td>
<td>3.07</td>
<td>6.13</td>
<td>3.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mild deviance</td>
<td>3.49</td>
<td>2.26</td>
<td>4.27</td>
<td>2.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avoidance</td>
<td>9.38</td>
<td>2.91</td>
<td>9.16</td>
<td>3.21</td>
</tr>
</tbody>
</table>

Opinions of disabled students
**Cooperative learning group.** Ninety percent of the students indicated a preference for being included in regular classrooms with their nondisabled peers. Examples of their positive responses include “...like the class;” “...like to be in the class.” Two students also indicated that they also liked their special education class, their special education teacher and teacher aide. They responded, for example, “enjoy going back and forth,” “...like both.” When asked to indicate the difference between the math class and their previous special education class, all the students responded: “we have more kids, we have more activities,” “...make more friends,” “... have harder work,” “...have more tests.” “I learned 2nd grade math in Mrs.xx’s (special education) class, but I have to learn 3rd grade math here. It’s hard.” In response to the question whether they like to work in teams with their partners, all the students commented positively. Examples of these responses include: “...like to work in the team;” “...help me when I am stuck on a problem;” “...I learned more in groups;” “...group members help me work out problems;” “...without teams I am bored;” “...we work together, do things together in different ways.” When asked, “Who is your friend in the class?” each student mentioned at least one regular student’s name in addition to a friend enrolled in their previous special education classroom.

**Whole-class group.** No students wished to remain in the integrated class, although three students indicated that they liked learning math using the computer, and they were expected to learn more in the regular class than they did in their special education class. Their comments were, “...too many kids, lots of noise;” “...work is too hard;” “...math is difficult.” One student mentioned that he would rather remain in the special education class all day. When asked why he did not like to be in the regular class, he indicated that the worksheets were too hard and he did not get as much help as when he was in the special education class. Another student mentioned that when he could not figure out a problem he would be called “stupid.” One more student said, “Ms. Xx’s kids are smart, but being in there with them sometimes I’m not so happy.” In response to the question “Who is your friend in the class?” Seventy-five percent of the students mentioned their former classmates from the special education class. Three students mentioned their regular classmates who were sitting next to them when working in the computer lab.

**DISCUSSION**
The results of this study demonstrated that students with and without disabilities in cooperative learning groups statistically outperformed students with and without disabilities in whole-class instruction group. Although students in both cooperative and whole-class groups increased their math skills learning using computer-assisted instruction, a significant difference was obtained on the posttest between the two groups. Moreover, a significant interaction between time of test (pre vs. post) and instructional group (cooperative vs. whole-class) showed that computer-assisted cooperative learning had a great effect on math skills learning when students with and without disabilities were integrated in regular classrooms. This result supported the results of earlier studies by King (1989), Johnson, Johnson, and Stanne (1985), Light and Blaye, (1990), and Mevarech, (1993). That is, cooperative learning experiences can enhance mathematics skills performance in a technology-assisted instructional environment.

Although the scores of Social Acceptance obtained by the regular students were not significantly different between the cooperative learning group and whole-class group, each disabled student involved in cooperative learning mentioned at least one nondisabled peer as his/her friend while few were mentioned by the disabled students in the whole-class group. This may indicate that there were better peer relationships in cooperative learning situations, a finding that supports the previous research (e.g. Johnson & Johnson, 1989, Slavin, 1990). Perhaps, this is likely due to the cooperative learning process in which diverse students work together to achieve their common goals. The results of the data collected during the interviews indicated that most of the disabled students that experienced cooperative learning with their nondisabled peers preferred to be in the regular class. In contrast, the responses of disabled students in whole-class group were negative toward their inclusion in the regular classrooms. This negative reaction was indicated by the fact that no disabled student wanted to stay in the regular class even though several students mentioned that they liked learning math using a computer. This finding may imply that special education students would rather stay in the self-contained class if they are included in a regular class without support and help from their peers.

Cooperative learning appears to be a useful strategy for effecting the integration of students with disabilities in regular education classrooms. It provides an integrated situation for diverse students to work together (Sapon-Shevin, 1991). The computer serves as a teacher’s aide—an instructional tool, one that is always met with great excitement by students. In an integrated classroom, computer-assisted cooperative learning may create a way to facilitate the inclusion of diverse students and assist teachers to
meet the needs of students at different levels. The results of the current research may add valuable information to previous studies on computer-assisted instruction and cooperative learning. The findings indicate that a structured cooperative learning strategy within a computer-assisted environment may affect performance of students with and without disabilities. When learning situations are structured cooperatively, regular and special education students can work together in pairs or teams. Students support and help each other to encourage themselves to accomplish their learning tasks. They learn to accept different views from their team members, understand, and learn from each other. They also learn to play a role of an active collaborator within teams. This learning experience may motivate students with and without disabilities in their academic achievement and social skill attainment in schools.

In this study, three software packages employed have animated graphics, sound, and manipulative. The effects of graphics may reduce achievement differences between students of different ability levels, and help form mental images as students are learning the skills (Joseph & Dwyer, 1982). This visual imagery technique may result in motivated learning, and provide a chance for students at diverse learning levels to discuss and explore skills together. In the computer-assisted cooperative learning environment, students discussed the problems appearing on the screen with their partners, assisted in recalling the appropriate procedures, and examined errors before pressing the Enter key or clicking at the OK button to input the response or to record in the worksheet. This interactive learning environment may foster students’ attention, motivation, and collaboration. The results of the study seem to indicate that computer-assisted cooperative learning approach can help teachers structure the integration among all students as they work toward their academic attainment and interpersonal goals in the classroom. Further research may be needed to clarify the present findings on effects of computer-assisted cooperative learning using a wider range of disabled children in different regions. Computer-assisted instruction has considerable potential to facilitate learning in integrated classrooms for students with and without disabilities.

References

Corno, L., & Snow, R.E. (1986). Adapting teaching to individual difference among learners. In M.G. Wittrock (Ed.)
within computer-assisted cooperative learning groups. 


can *Journal of mental deficiency*, 86, 380-390.

Table 1
Means and Standard Deviations of Math Achievement Pre- and Posttest

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Ed</td>
<td>46</td>
<td>53.43(24.2)</td>
<td>24.2</td>
<td>77.76(26.3)</td>
<td>26.3</td>
<td>13</td>
</tr>
<tr>
<td>Special Ed</td>
<td>47</td>
<td>57.42(25.6)</td>
<td>25.6</td>
<td>66.62(24.1)</td>
<td>24.1</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 2
Analysis of Variance on Math Achievement Pre- and Posttest

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Effects</td>
<td>17641.83</td>
<td>2</td>
<td>8820.92</td>
<td>13.41</td>
<td>.00</td>
</tr>
<tr>
<td>Group</td>
<td>624.81</td>
<td>1</td>
<td>624.81</td>
<td>.95</td>
<td>.331</td>
</tr>
<tr>
<td>Time</td>
<td>17017.02</td>
<td>1</td>
<td>17017.02</td>
<td>25.86</td>
<td>.00</td>
</tr>
</tbody>
</table>

2-way Interaction
| Group Time | 2725.44 | 1  | 2725.44 | 4.14 | .043|

Table 3:
Mean and standard Deviations of Social Acceptance Scale Pre and Post Test
<table>
<thead>
<tr>
<th>Group Number</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Coop</td>
<td>48</td>
<td>18.10</td>
</tr>
<tr>
<td>Actual contact</td>
<td>4.76</td>
<td>2.95</td>
</tr>
<tr>
<td>Mild deviance</td>
<td>4.57</td>
<td>1.90</td>
</tr>
<tr>
<td>Avoidance</td>
<td>9.38</td>
<td>2.96</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Whole</th>
<th>45</th>
<th>Willingness</th>
<th>16.91</th>
<th>4.49</th>
<th>17.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual contact</td>
<td>4.91</td>
<td>3.07</td>
<td>6.13</td>
<td>3.81</td>
<td></td>
</tr>
<tr>
<td>Mild deviance</td>
<td>3.49</td>
<td>2.26</td>
<td>4.27</td>
<td>2.58</td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>9.38</td>
<td>2.91</td>
<td>9.16</td>
<td>3.21</td>
<td></td>
</tr>
</tbody>
</table>

Support for this paper was provided by a research grant (#H023N40027) from the U. S. Department of Education, Office of Special Education Programs. The opinions expressed herein do not necessarily reflect the position or policy of the funding agency and no official endorsement should be inferred.

The author wishes to thank Dr. Frank Sutman for his input at various stages of the report.

School 1: Suburban area

Regular Ed| Special Ed| Group | Boys | Girls | Boys | Girls | Co-learning | Whole-class | Total | 21562

School 2: Urban area