

*EFFECTS OF COOPERATIVE LEARNING GROUPS DURING
SOCIAL STUDIES FOR STUDENTS WITH AUTISM AND
FOURTH-GRADE PEERS*

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We investigated the use of cooperative learning groups as an instructional strategy for integrating 2 students with autism into a fourth-grade social studies class. Baseline consisted of 40 min of teacher-led sessions including lecture, questions and discussion with students, and the use of maps. The intervention condition consisted of 10 min of teacher introduction of new material, followed by cooperative learning groups that included tutoring on key words and facts, a team activity, and a whole class wrap-up and review. An ABAB design showed increases for target students and peers for the number of items gained on weekly pretests and posttests, the percentage of academic engagement during sessions, and durations of student interaction during the intervention.

DESCRIPTORS: autism, cooperative learning, inclusion

The inclusion of students with disabilities into regular classroom activities continues to be a high priority among practitioners, administrators, policymakers, and families (Gaylord-Ross, 1989; Sailor et al., 1989; S. Stainback, Stainback, & Forest, 1989). Consequently, there is a need to demonstrate effective strategies that will improve the learning of such heterogeneous groups as well as foster social and interpersonal skills.

A number of researchers advocate the use of peer-mediated learning strategies to meet these goals in integrated settings (Cosden & Haring, 1992; Greenwood, Carta, Kamps, & Arreaga-

Mayer, 1990; D. Johnson & Johnson, 1986). Peer-mediated instructional arrangements (e.g., tutoring and cooperative learning) are recommended as an additional or alternative method to traditional instruction (i.e., lecture, teacher-student discussion, small group instruction) to increase students' opportunity to respond, practice time for targeted skill areas, and cooperation and social skills use among peers (Greenwood et al., 1990).

Cooperative learning is one such strategy, and is defined as "small groups of learners working together as a team to solve a problem, complete a task, or accomplish a common goal" (Artz & Newman, 1990, p. 448). Characteristics have included both cooperative incentives or rewards, cooperative task structures (e.g., interdependent tasks, group projects, group reports or worksheets, etc.), and small groups of student participants working together toward a common goal. Several formats have been used to foster cooperative groups (e.g., Olympia, Sheridan, Jensen, & Andrews, 1994).

Teams-games-tournaments (TGT) includes

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teacher presentation of instructional material with teams of students engaged in peer tutoring to prepare for tournaments. Student teams and academic divisions (STAD) are similar to TGT, with students taking written quizzes with individual improvement scores contributing to a team score (see Slavin, 1990, for a review). Teams-assisted individualization (TAI) applications combine small groups and individualized programming to teach mathematics to mainstreamed students with mild disabilities (Slavin, Madden, & Leavey, 1984b). Cooperative integrated reading and composition (CIRC) is a method in which students work in pairs within groups using story packets to practice reading skills (Jenkins, Jewell, Leicester, Jenkins, & Troutner, 1991; Madden, Slavin, & Stevens, 1986). Classwide student tutoring teams (CSTT) are an arrangement in which elements of two programs are combined: classwide peer tutoring (Delquadri, Greenwood, Stretton, & Hall, 1983) and teams-games-tournaments (DeVries & Slavin, 1978). This method utilizes the small-group format and the roles of tutor and tutee in combination with a team point system and individual monitoring of learning and mastery. The CSST procedures have been demonstrated to increase the academic performance of secondary mainstreamed students (Maheady, Sacca, & Harper, 1987).

Other cooperative methods actively promote group interaction. For example, the jigsaw method is an arrangement in which tasks include elements of interdependence (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978). Procedures include "team building," in which task completion is contingent upon cooperation (e.g., each student has a part of the task), and students are instructed in group processes. Similarly, the group-investigation model emphasizes collaboration and social interaction (Sharan, 1980). Students decide on a subtopic of the material being covered and divide the material into individual tasks that are then assigned to each member. Similarly, "learning together" (D. Johnson & Johnson, 1975), more recently

called "circles of learning" (D. Johnson, Johnson, Holubec, & Roy, 1984), includes students working together with assigned roles (e.g., reader, recorder, encourager, prober) to complete a single assignment or worksheet with group feedback on the task and group dynamics, eliminating an emphasis on competition among groups.

Despite procedural descriptions and demonstrations of cooperative learning techniques to teach a variety of content areas (e.g., reading, mathematics, biology, science, and history) questions remain regarding implementation issues and documentation of effects (see Slavin, 1990, and Tateyama-Sniezek, 1990, for reviews). The existing literature on the use of cooperative learning groups is limited in the areas of measurement of social and academic outcomes, replication of findings, and applications within integrated classrooms (i.e., those studies including students with disabilities). In a recent review, Tateyama-Sniezek (1990) found only 12 studies that met the criteria of cooperative learning as the independent variable, academic achievement as the dependent measure, and students with disabilities as part of the sample. Of the 12 studies, nine compared cooperative learning to individual learning; of these, seven included students with mild disabilities, one included students with hearing impairments, and one included students with severe disabilities. In the review, several studies reported increased achievement for students with learning disabilities (e.g., D. Johnson & Johnson, 1982, 1984; Smith, Johnson, & Johnson, 1982).

Less favorable results or cautions were also reported in the review (Tateyama-Sniezek, 1990), particularly when separating results for subsamples of students with disabilities compared to full samples. Several reports indicated no differences or mixed findings for individual and cooperative learning group procedures for the students with disabilities (Cosden, Pearl, & Bryan, 1985; Madden & Slavin, 1983; Slavin, Madden, & Leavey, 1984a). Tateyama-Sniezek (1990) found that only half of the studies re-

ported that students performed better under the cooperative learning condition, yet most authors continued to recommend use of the procedure for social reasons, including (a) positive group interactions, (b) positive feelings about peers and school, (c) cooperation, and (d) improved self-esteem (D. Johnson & Johnson, 1986).

Although an element of controversy exists, most agree that more research is needed to determine the merits of cooperative learning groups (Cosden et al., 1985; Lloyd, Crowley, Kohler, & Strain, 1988; Tateyama-Sniezek, 1990). Authors have noted that the research for many interventions (i.e., cooperative learning, prereferral intervention, teacher consultation, other peer-mediated strategies) is suggestive rather than conclusive in the remediation of academic deficits and/or inclusion into mainstreamed activities (Lloyd et al., 1988). The authors call for continued, careful, systematic research in these areas, including specification of implementation procedures, accommodations for students with disabilities, and monitoring of students' academic and social benefits.

The purpose of the present study was to address these concerns and thus to contribute to the research in the area of instructional procedures to facilitate academic and social integration of students with disabilities. The study further addresses the need within the cooperative learning research to demonstrate successful academic achievement outcomes and social interaction for students with and without disabilities within an integrated setting. Specifically, the investigation measured the effects of using cooperative learning groups as an instructional format for including 2 students with autism into a fourth-grade general education classroom for social studies. The following research questions were addressed: (a) Can students with autism participate in the cooperative learning groups activities? (b) What kinds of academic learning and engagement occur for the students with autism and their fourth-grade peers during traditional instruction versus cooperative learning

groups? (c) What levels of interaction occur among the students during the two instructional arrangements?

METHOD

Participants and Setting

Participants were 2 students with autism and 16 fourth-grade regular classroom peers in an inner-city elementary school. The first target student, Ann, a 10-year-old, was considered by her teachers to be functioning at a moderate level. She was able to complete assignments in second- to third-grade material; however, weaknesses were noted in the areas of comprehension and abstract concepts. Ann communicated well in expressing needs and responding to verbal requests with phrases and sentences; however, she was also echolalic, and reversed pronouns. Her language was somewhat rote, atonal, and arrhythmic. She scored 41 on the Autism Behavior Checklist (Krug, Arick, & Almond, 1980) with problem areas including "lacking in friendships, imitation, and play skills," "does not attend to social or environmental stimuli," "ritualistic," and "strong reactions to changes in routines."

Matt was 9 years old and described by teachers as a high-functioning student with autism. He was successfully learning the second- and third-grade curriculum, but he exhibited problems in comprehension and abstract reasoning. For example, he comprehended general information from reading materials and constructed descriptive written sentences, but information was typically literal or rote in nature and was lacking in interpretation and generalization to other events and persons. Language was appropriate in terms of grammar, syntax, and contextual relevance but often mimicked previously heard or read phrases. Matt was a very withdrawn, shy student who generally appeared to be anxious, rarely initiated to peers, and preferred adult attention and contact. Few autistic behaviors (e.g., stereotypy, lack of environmental awareness) were in evidence, except for a

strong dependence on rituals, schedules, and time. His school behavior was generally very appropriate, although parents described occasional serious tantrums and disruptive behavior at home. Only two items were noted on the Autism Behavior Checklist as completed by the teacher (i.e., “lack of friendships” and “often frightened and anxious”).

Fourth-grade peers. Six male and 10 female fourth-grade peers also participated in the cooperative learning activities. The teacher rated the 16 participants for their knowledge and typical performance in social studies activities; 5 students were rated high, 8 average, and 3 low.

All cooperative learning groups took place in the regular classroom with the classroom teacher monitoring the sessions and the special education paraprofessional assisting with monitoring and administering pretests and posttests. One or two experimenters were present and provided occasional directions but primarily served as monitors to ensure program fidelity and as data collectors.

Materials

The curriculum materials used for the cooperative learning groups were the social studies text, *States and Regions*, corresponding worksheets, and flashcards containing facts, key terms, and definitions. Topics from the text included the Northeast, the Southeast, the Great Lakes states, the Plains states, the Southwest, and the Mountain states. Each group received a tub of materials to use during cooperative groups consisting of fact/word cards, sentence/definition paper, activity sheets, job tags, help cards, and bonus point (sticker) sheets (see Procedure section for a description of the activities and structure).

Experimental Design and Procedure

A reversal design was used to assess the effectiveness of cooperative learning groups on academic performance, academic engagement, peer interactions, and social and behavioral skills for students with autism and their peers.

Baseline. A 2-week initial baseline was conducted during 40-min teacher lecture on social studies material given four times per week. This traditional teacher-led format was one that the teacher was currently using for social studies as well as for other content areas. Sixteen students and the 2 students with autism were seated in assigned groups of 3 or 4 in the classroom. The presentation covered topics arranged as units in the text *States and Regions*, including the Northeast and the Southeast. The teacher’s lecture and discussion format included introducing key words and facts, posing questions to individuals, and using maps. The students were expected to use texts and take notes.

Cooperative learning groups. Following baseline, a 3-week cooperative learning groups program was implemented. Cooperative learning groups occurred for 40 min four times per week during social studies. Students were again seated in assigned groups of 4 at desks arranged in a table format. Each group contained an academically high-functioning peer, 2 peers functioning at a moderate level, and 1 peer functioning at a low level. In two of the groups, the low-functioning student was a target student with autism.

The intervention sessions consisted of an initial 10-min whole-class lecture to present or review new social studies materials and information (e.g., show the location of the Northwest on the map, indicate the states that are included in the Northwest region), followed by implementation of the cooperative learning groups. Group activities consisted of (a) distribution of materials tubs, (b) key-word peer tutoring for 10 min, (c) fact card peer tutoring for 8 min, (d) a 5-min team activity utilizing either a worksheet (e.g., multiple choice questions or fill in the blank) or a research activity (e.g., find five facts about Johnny Appleseed), and (e) a 5-min whole-class wrap-up activity.

In addition to lesson-related activities, a second component of the program was to encourage teamwork by the use of appropriate social skills and task behaviors. In this component,

each student was assigned to a team role: materials manager, recorder, checker, or organizer. The materials manager's job was to identify all materials to the group, pass out materials to group members as necessary, and return materials to the tubs as sessions were completed. The recorder's job was to write down all information on a worksheet, read questions to the group, and fill in the group's best answer. The organizer's role was to make sure everyone did his or her specific job and finished all activities, and to check to see that all information on the activity sheet was correct. The checker was to fill out a group checklist noting their performance, with input from all group members at the end of sessions. All students were responsible for answering group-directed questions from the teacher (e.g., "Group 3, tell me four states in the Southwest region") during the wrap-up activity.

The groups received initial training (during the first week of intervention) on cooperative learning procedures, the use of the corresponding group social skills, and ongoing monitoring and reinforcement for implementing those procedures. Group social skills were selected from programs developed to enhance cooperative learning groups (Vernon, Schumaker, & Deschler, 1993) and included (a) share ideas, (b) correct other's work, (c) offer praise, (d) react calmly, and (e) encourage and help others (SCORE). Games were used for training and practice to help to teach group social skills and cooperation for 1 week prior to introducing social studies materials.

Reinforcement for the use of group social skills during cooperative learning groups was provided by using a sticker chart for each group. The teacher and paraprofessional rotated among the groups to monitor the use of the five social skills. When groups demonstrated the appropriate social skills, stickers were placed on the group chart under the specific skill column. For example, the paraprofessional placed a sticker in the "E" column after hearing a team member encourage another team member.

The teacher's roles during this condition were (a) to introduce new materials and information; (b) to monitor designated group roles; (c) to monitor implementation of specified activities (e.g., peer tutoring in words, facts, team activity, etc.); (d) to provide feedback to the groups as appropriate; (e) to give bonus points and stickers for group social skills; (f) to provide academic assistance when requested; and (g) to conduct the wrap-up activity with the whole class. The special education paraprofessional's role was identical to that of the teacher except that she did not introduce new material or conduct the wrap-up activity.

The first intervention phase lasted for 3 weeks and covered topics regarding the Great Lakes states.

Baseline 2. A 2-week return to baseline followed the initial intervention condition. Procedures during this condition were the same as for the initial baseline condition. The social studies units covered topics related to the Plains states.

Cooperative Learning Groups 2. The final condition consisted of the reintroduction of cooperative learning groups, which included teacher presentation of new material, assigned groups of 4 students, peer tutoring on key words and facts, team activity, teacher monitoring and feedback, and group reinforcement for use of social skills. Social studies units covered the Southwest and the Mountain states.

Dependent Measures

Data were collected on (a) weekly pretests and posttests on social studies curriculum, (b) academic engagement during two 10-min samples during the 40-min social studies period, and (c) target and peer interactions during social studies sessions (5-min probes). Observations were randomly conducted for engagement and social interaction and for the target students and peers.

Pretests and posttests. Weekly quizzes were given before and after study of each unit. Tests for fourth-grade peers consisted of 15 items devel-

oped by the classroom teacher and experimenter from the social studies text. One unit per week was covered by the teacher, with corresponding questions on the quizzes. Items on these tests differed for the students with autism and focused solely on sight word vocabulary and comprehension (i.e., formulating sentences). These modifications were based on students' functioning levels, advice of the special education teacher, and both students' related goals and objectives (i.e., sight word identification, use of three- to four-word sentences). Thus, tests for the students with autism consisted of 30 items, the first part being the identification of 15 key vocabulary terms related to the week's lessons, similar to items on the peers' quizzes. The second part consisted of asking the students to use the term in a sentence.

Each student responded to a written quiz, with all questions read orally by the adult. Quizzes were administered to the target students initially by the experimenter and then by the special education teacher, using a one-to-one verbal request and oral response procedure (e.g., "What is this word?"). Quizzes were corrected by the fourth-grade and special education teachers. The definition for a correct response for the use of a key term in a sentence required that the sentence (a) be grammatically correct (e.g., noun-verb sequence), (b) incorporate the requested term, and (c) contain a correct referent to the term (e.g., *Adobe* is used to make *bricks*). This same definition applied to questions on the peers' tests that required a complete sentence as an answer.

Academic engagement probes. Academic engagement probes were conducted using a version of the Code for Instructional Structure (CISSAR) observation system as described by Greenwood and Carta (1988). The experimenters observed on a 10-s momentary time-sampling basis and recorded student behaviors and the instructional format that was in place. Student behaviors consisted of seven codes denoting active academic engagement (i.e., write, task participation, read aloud, read silently, talk

academic, answer question, ask question). Non-engagement behaviors were also recorded. The coding of "attend" denoted the student as making eye contact with the teacher or material (i.e., passive attention to task without active responses as defined above). "Other" was coded when the student was neither actively or passively responding to the teacher or materials (e.g., self-stimulation, looking around, playing with items in desk, etc.). Instructional codes included readers, workbooks, worksheets, paper and pencil, listen to lecture, other media (overhead projector, response cards, flashcards), teacher-student discussion, and fetch or put away.

Engagement probes were conducted for 1 pair of students (i.e., 1 target student and 1 peer) simultaneously for 10 min during the social studies sessions. Data were then collected for a second pair, again including the second target student and a peer. Corresponding peers were chosen for observation based on their group assignment (i.e., in a group with a student with autism). Groups were rotated weekly. A minimum of one probe per week was conducted during each condition.

Student interaction. Observations of the time spent engaged in appropriate interactions (student to peer or peer to peer) were conducted using the Social Interaction Code (SIC) developed by Niemeier and McEvoy (1989). The code is a computerized system to record initiations, responses, and length of interactions among students. *Initiations* were defined as motor or vocal behavior (assisting, sharing materials, conversing), clearly directed to a peer, that attempted to evoke a response. *Responses* were defined as motor or vocal behavior given in reply to the initiation within 3 s. Interactions were thus defined as reciprocal behaviors that occurred as a result of an initiation-response sequence; no qualitative information was coded. Observations were conducted using NEC 8300 laptop computers, which included an inner timing device as part of the SIC program to record frequency, length of interactions, and total du-

ration time for peer interactions during social studies sessions. This coding system has been updated and is commercially available (Tapp, Wehby, & Ellis, 1992). Five-minute probes of interactions were systematically conducted for target students and their corresponding peers a minimum of once per week across experimental conditions. This peer interaction measure served as documentation of the students' ability to cooperate with each other in the group activities.

Consumer satisfaction surveys. Teachers completed consumer satisfaction surveys at the end of the study. Surveys listed 13 items regarding implementation (e.g., groups were easily implemented, easily managed, materials were appropriate, amount of feedback), activities (e.g., the peer tutoring component, research activity), and results (e.g., academic and social benefits for students with autism and fourth graders). Items were rated from 1 (*strongly disagree*) to 5 (*strongly agree*).

Reliability

Interobserver agreement was assessed for weekly quizzes for peers, the sentence component of weekly quizzes for students with autism, student interaction data, and academic engagement. Reliability observers were research assistants not directly involved in the study's implementation who had been trained using both direct observation and video recordings to a criterion of three sessions at 80% or higher. Reliability observers were not naive to the purpose of the study. Interobserver agreement for peer quizzes was assessed for pretests and posttests for 3 weeks of the study during baseline and intervention. Percentage agreement ranged from 92% to 99% (item-by-item agreement for individuals was first computed, then averaged across all quizzes). Percentage agreement for target students for stating sentences using vocabulary words ranged from 73% to 100%, with a mean of 93% for 3 weeks' quizzes. Percentage agreement was also computed for correct responses on quizzes, with a mean of 87% for

peers and 63% for target students. (Note that low agreements for target students were due to low scores in using sentences relevant to social studies content; i.e., 0 to 2 correct for Ann and 0 to 8 correct for Matt. Disagreements were also attributed to the fact that the formulation of sentences allowed for some variance in what was a correct sentence, as opposed to asking for a factual answer.)

Reliability for student interaction data was completed for 46% of the 5-min samples for Ann and the peers in her group and for 39% of samples for Matt and his peers. Percentage agreement was computed for frequency and total duration of student interactions by dividing the smaller number by the higher number and multiplying by 100%. Reliability for frequency of student interactions was 100% for Ann, 95% for Matt (range, 60% to 100%), and 92% for peers (range, 50% to 100%). Reliability for duration was 96% for Ann (range, 83% to 100%), 90% for Matt (range, 50% to 100%), and 91% for peers (range, 52% to 100%). Although overall reliability was acceptable, a few sessions with lower interaction time showed lower percentages of reliability. All but one instance of agreement below 80% for duration of interaction time occurred during baseline conditions, which were characterized by minimal interaction.

Reliability was computed for 34% of the engagement probes. Percentage agreements for academic engagement averaged 79% for Matt, 96% for Ann, and 92% for peers. Agreements for attention averaged 68% for Matt, 83% for Ann, and 75% for peers; agreements for other behaviors averaged 87%, 88%, and 78%, respectively. As with social interaction, low rates of agreement were noted during sessions with low occurrence of the behavior.

RESULTS

Weekly Quizzes

Figure 1 depicts the scoring gains (i.e., posttest minus pretest scores) on weekly quizzes for

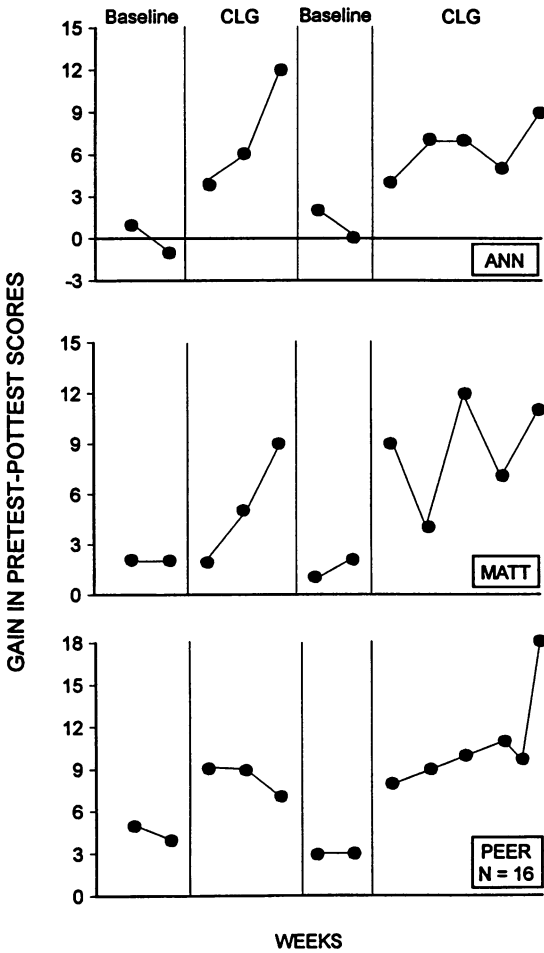


Figure 1. Pretest and posttest scores for target students and peer averages.

the students with autism and the average for the peers by conditions. Students with autism gained more items during intervention ($M = 5$ to 8.6) compared to baseline ($M = 0$ to 2 items gained). Peers in general also scored higher during cooperative learning conditions ($M = 9.5$ and 10.5) than during baseline ($M = 4.7$ and 3.2) with a few exceptions on individual tests.

Academic Engagement

The percentage of engagement was tabulated during baseline, cooperative groups, and the introductory lectures prior to cooperative learning groups. Figure 2 presents means for engagement, attention, and other student behavior by

condition for targets and peers. Academic engagement was higher for all students during cooperative learning groups than during baseline conditions. Engagement was not reported during the introduction of new material by the teacher immediately prior to the cooperative learning groups, which was typically a teacher-led lecture format similar to baseline. Engagement (active responses such as writing, task participation, reading) ranged from 2% to 25% in baselines, 1% to 17% during lectures prior to groups, and 72% to 90% during cooperative learning groups. Attention (i.e., listening, watching but not active responding) was higher during baselines ($M = 19\%$ to 59%) and lower during intervention groups ($M = 0\%$ to 10%). Other nonacademic behaviors (e.g., locating materials, looking, inappropriate talking) occurred more frequently during baseline conditions ($M = 34\%$ to 67%) than during cooperative learning groups ($M = 9\%$ to 29%).

Student Interaction

All students showed substantial differences in the total duration of student interaction from baseline to intervention, providing support for cooperative learning groups as a setting event for peer interaction among students with and without disabilities. Figure 3 denotes total duration during 5-min probes for the 2 students with autism. Ann averaged 0 to 1.25 s (range, 0 to 5 s) of interaction time during baseline conditions, with increases to 191 s (range, 0 to 297 s) and 273 (range, 236 to 292 s), respectively, during the two cooperative groups conditions. Matt averaged 17 to 28 s (range, 0 to 105 s) of total interaction time during baseline, with increases during cooperative groups conditions to 219 s (range, 109 to 208 s) and 210 s (range, 163 to 297 s), respectively. Peers (reflecting data from 12 of the 16) showed similar differences across conditions, with baseline means of 12 s and 51 s and increases to means of 189 s and 202 s, respectively, during cooperative learning groups sessions.

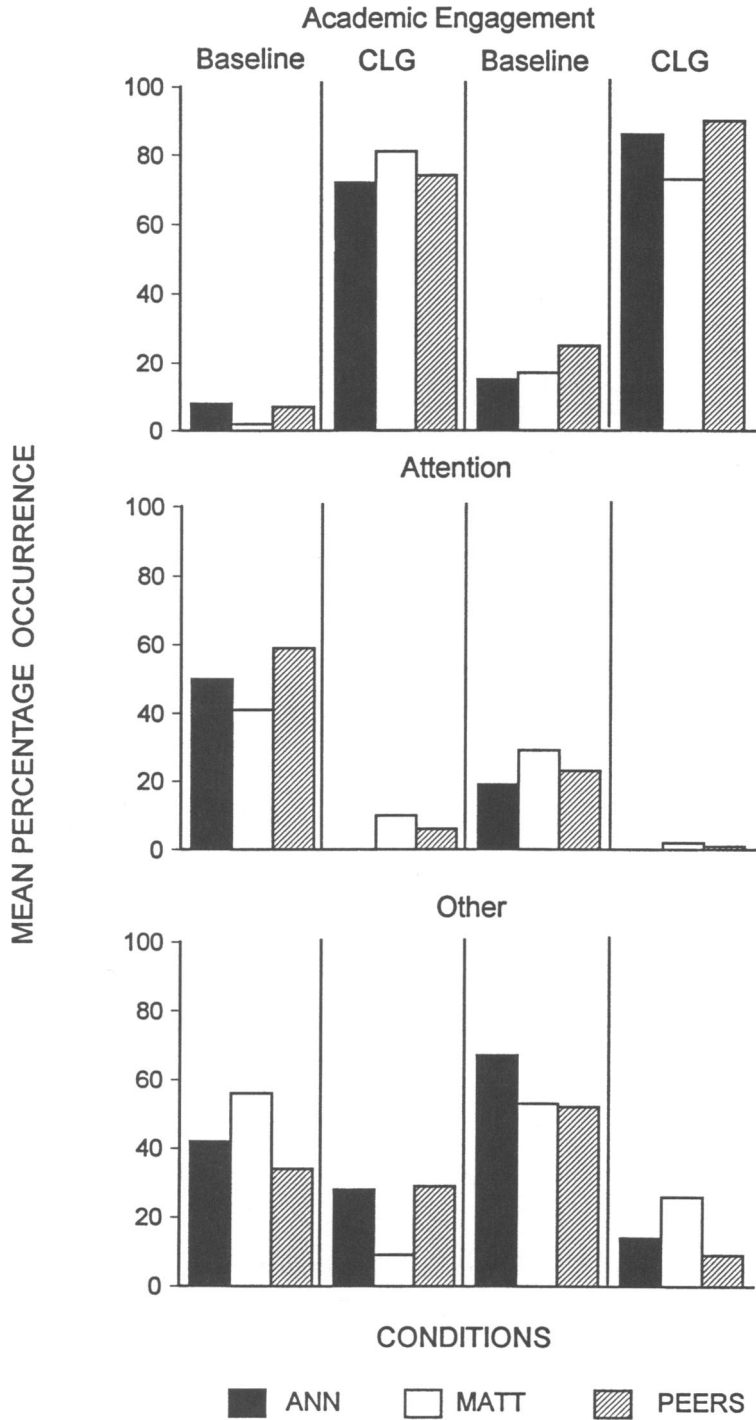


Figure 2. Mean percentage occurrence of academic engagement, attention, and other student behaviors across conditions.

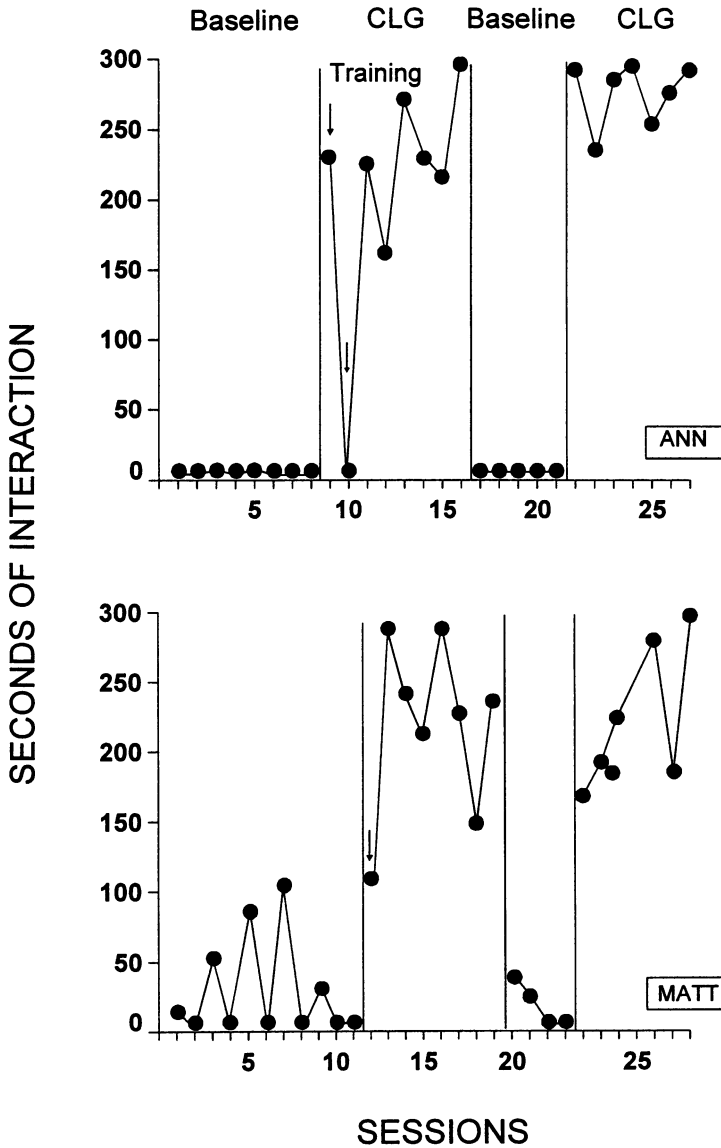


Figure 3. Peer interaction time for target students (total duration in seconds) during 5-min probes across conditions.

Consumer Satisfaction Surveys

The teacher and paraprofessional involved in the cooperative learning groups agreed (ratings of 4 and 5) that groups were easy to implement and manage, students benefited academically (one disagreement for the students with autism) and socially, tutoring and the research activities were effective components, materials were appropriate, and that feedback was satisfactory. Both strongly agreed that they benefited from

the experience, that they and the students enjoyed cooperative groups, and that they would use the groups in the future.

DISCUSSION

The results from this investigation indicated that the cooperative learning procedures were an effective instructional procedure for students with autism and their fourth-grade peers during

social studies sessions. Benefits were noted both for the target students and their peers for academic outcomes and social interactions. Thus, outcomes support previous literature reporting the components of successfully integrated classrooms to include (a) the systematic guidance and encouragement of interactions among students with and without disabilities, (b) teachers' adaptation of instruction for students with disabilities, (c) curricula that foster joint and complementary participation that benefits both groups of students, and (d) social skills training in the context of natural, integrated environments (Kamps et al., 1992; Madden & Slavin, 1983; Noonan & Hemphill, 1984; Shores et al., 1993; W. Stainback, Stainback, Raschle, & Anderson, 1981).

The findings of this investigation further contribute to the cooperative learning literature in several ways. First, the existing literature is limited and inconsistent in terms of student outcomes (Lloyd et al., 1988; Tateyama-Sniezek, 1990). This study clearly shows more learning using cooperative learning groups than the traditional lecture and teacher-student discussion format; students scored two to four times more correct items on weekly quizzes during the intervention, with the highest gains occurring during the final condition. Increased learning was demonstrated for the students with autism as well as their peers, supporting studies that have shown improved learning using cooperative learning groups (e.g., R. Johnson, Johnson, Scott, & Ramolae, 1985; Slavin, Leavay, & Madden, 1984). Learning for students with autism occurred primarily for social studies vocabulary recognition; even with the structure of cooperative learning groups, comprehension via sentence formulation remained a difficult task. This confirms previous reports regarding the difficulty with abstractions for persons with autism and the continued need for research in this area (Schreibman, 1988).

A second point is that students' active academic engagement levels were considerably higher during cooperative learning groups than

during baseline conditions. During teacher lecture and discussion periods (baseline and sessions just prior to cooperative learning groups), engagement was extremely low, whereas active responding (i.e., writing, academic talk, read aloud, read silent, and task participation) was evident for all students during cooperative learning groups. Although the teacher-initiated lecture and discussion procedures offered few opportunities for students to respond, the combination represents the traditional procedure that is used by this and many other regular classroom teachers. The influence of cooperative learning groups for all students in increasing student engagement is an established predictor of student academic achievement (e.g., Greenwood, 1991; Greenwood, Delquadri, & Hall, 1989) and a critical finding of the study.

A final important finding from this investigation was the high level of interaction among group members during cooperative learning groups. The use of teacher lecture and teacher-student discussion formats precludes student-to-student interaction, yet social and interpersonal skills are quite often cited as problem areas for students with disabilities and for many other children in the public schools (D. Johnson et al., 1984). The rapid and consistent increases in interaction time suggest that cooperative learning groups, given the structure outlined in the current study, can provide opportunities for appropriate interactions between students with autism and their typical peers. Consistent with other research, the training in group cooperation with monitoring and reinforcement of social skills appears (a) to provide an incentive to work together to learn and perform well on tests, (b) to confirm the importance of collateral peer supportive behaviors in maintaining peer-mediated instructional programs, and (c) to provide a model for curriculum modification that fosters joint and complementary participation for students with and without disabilities (e.g., Cosden & Haring, 1992; Gelb & Jacobson, 1988; Kohler &

Greenwood, 1990; Noonan & Hemphill, 1984).

The cooperative learning groups in this study appeared to be instrumental to the academic and social benefits for students with and without disabilities. Without a component analysis, the contribution of individual variables cannot be determined; however, several characteristics of the cooperative learning groups as an intervention package may be important to its success, including (a) structured tasks, worksheet activities, and research projects; (b) a relatively small class size, with adults providing continuous monitoring of the small groups; (c) heterogeneous groups; (d) frequent individual quizzes to check students' learning; and (e) reinforcement of social skills for each group throughout the program.

Despite the positive outcomes, results should be viewed with caution due to some low reliability results. Additional concerns exist regarding the use of regular classroom curricula for the students with autism. For example, even though the students learned some of the social studies content, would it have been more appropriate to include additional individualized and functional materials? Other concerns were noted anecdotally in the participation by students with autism. For example, the students were responsive to peers and were able to conduct peer-tutoring activities, but other group behaviors occurred less frequently (i.e., initiations by target students, initiations or responses to more than 1 peer during groups, praising group members, helping others when needed, etc.), indicating the need for additional training in specific skills or restructuring of the cooperative learning groups to provide more opportunities for these types of behaviors to be exhibited. In addition, teachers' implementation levels varied. For example, rates of implementation of essential procedures such as monitoring of cooperative learning group components, academic assistance to groups, and praise and encouragement of team progress were high; however, daily variances were noted within ses-

sions (e.g., no new material presented for the lesson, limited whole-group responding, no wrap-up activity).

Continued research is needed in several areas, including (a) specific interpersonal interaction patterns that may contribute to academic and social outcomes, (b) replications across different curriculum areas and with students with other disabilities, (c) longitudinal applications of procedures to measure long-term academic benefits, (d) a component analysis of the peer-tutoring versus "group sharing" components of cooperative learning groups, and (e) generalization and maintenance of social benefits for students with behavioral and social disabilities.

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