

## The Role of Cooperative Learning in Research Methodology Courses: A Mixed-Methods Analysis

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*This study investigated the effectiveness of cooperative learning (CL) in a graduate-level research methodology course. Participants comprised 193 graduate students enrolled in several sections of this course. Eighty-one students were in sections wherein CL groups were formed to undertake the major course requirements; 112 were in sections wherein all assignments were undertaken individually (IL). Students' conceptual knowledge of research concepts, methodologies, and applications was measured individually in both groups via midterm and final examinations. A split-plot analysis of variance revealed a group by examination time interaction, whereby CL students had statistically significantly lower performance levels on the midterm examination than did IL students (effect size = 0.48). However, no statistically significant difference in achievement was found with respect to the final examination. Analysis of reflexive journals indicated that most students (70.4%) tended to have positive overall attitudes towards their cooperative learning experiences. Implications are discussed.*

### *Overview of Cooperative Learning*

To date, cooperative learning is one of the most thoroughly researched of all instructional methods (Slavin, 1992). Over the last several years more than 1,000 studies have been conducted at the precollegiate level (Cooper & Muech, 1992). The work of David and Roger Johnson at the University of Minnesota, Robert Slavin at Johns Hopkins University, and Elizabeth Cohen at Stanford University emerges most frequently. They are considered the pioneers in cooperative learning, having devoted years of detailed research and analysis to clarify the conditions under which cooperative, competitive, and individualized goal structures influence student achievement, self-esteem, and social skills (Smith & MacGregor, 1992).

Numerous benefits emerged from the flurry of cooperative learning research and the associated publication of three major works (Johnson & Johnson, 1989; Sharan, 1990; Slavin, 1990). These publications expanded the findings of earlier reviews and provided further evidence that cooperation improved self-esteem, increased effort to achieve, enhanced psychological well-being and caring

relationships, and fostered the ability to take the perspective of another individual (Davidson & Kroll, 1991).

Cooperative learning is defined as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (Johnson, Johnson, & Smith, 1991a, p. III). This instructional strategy is based on the social interdependence theories of Morton Deutsch and Kurt Lewin (Deutsch, 1949; Lewin, 1935). These theories and related research suggest that social interdependence positively influences individual interaction with a given situation, which subsequently affects the outcomes of that interaction (Johnson & Johnson, 1989).

Johnson et al. (1991a) assert that grouping students to work on a common assignment does not guarantee that cooperative learning will occur. Apparently, this learning method requires more structured small group learning around specifically defined tasks or problems. And although there are a variety of ways to implement cooperative learning in any discipline, researchers (Johnson, Johnson, & Holubec, 1991; Johnson et al., 1991a; Johnson, Johnson, & Smith, 1991b) have identified five essential elements: positive interdependence, face-to-face promotive interaction, individual accountability, social skills, and group processing.

The first requirement for a successful cooperative activity is positive interdependence among group members. That is, each group member's efforts are indispensable and necessary for the groups' success, and each member has a distinctive contribution to make to the

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group effort. In tandem with positive interdependence is face-to-face promotive interaction among group members. The structuring of tasks enables each others' strengths and weaknesses to be used in a complimentary manner to reach the group's goals. Efficiently and effectively helping one another and exchanging needed resources are important strategies used to reach these goals (Johnson, Johnson, & Holubec, 1991).

Individual accountability places the responsibility on the student to master the assigned work. In so doing, *coat-tailing* (i.e., disproportionately benefitting from another's work) is less likely to occur. Cooperative learning groups provide a forum to use social skills such as effective communication, building and maintaining trust, and constructively resolving conflicts. In fact, Johnson and his colleagues (Johnson, 1993; Johnson & Johnson, 1991; Johnson et al., 1991a, 1991b) contend that the success of a group's work is contingent on healthy interaction between students. Lastly, groups must assess how well they are working towards achieving their goals. Johnson and Johnson (1991) postulate that the aforementioned five elements help to insure a successful cooperative learning experience for students. Notably, these elements are an amalgam of interpersonal skills and learning outcomes.

Smith, Johnson, and Johnson (1992) theorized that there are a variety of cooperative learning activities which can be classified into the following three group types: informal learning groups, formal cooperative learning groups, and cooperative base groups. According to this conceptualization, informal learning groups are less structured and short-term, requiring students to complete a task often associated with a lecture. Formal cooperative learning groups are longer in duration, comprise small (2-4 member) groups, and are established by the instructor to create a final product such as a course project. Cooperative base groups are stable, long-term, peer support groups composed of 3-5 individuals. According to Smith et al. (1992), base groups enhance students' learning and increase attendance in larger lecture classes. Learning becomes a melding of task-oriented processes and interpersonal experiences that enhance valuable teaming skills.

#### *Summary of Cooperative Learning Efficacy*

The efficacy of cooperative learning has been studied at all age levels for many subject areas, in all types of school settings, and with students of different ethnic groups (Johnson et al., 1991a; Slavin, 1991a). Slavin (1990) identified more than 70 high-quality studies that compared learning and traditional methods in elementary and secondary schools. Of the 70 studies, 67 measured effects on student achievement, with 41 (61%) reporting significantly higher achievement levels in cooperative than in control classes. Twenty-five (37 percent) found

no differences, and in only one study did the control group outperform the experimental group.

#### *Meta-analytic Studies of Cooperative Learning Research*

Johnson and colleagues (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981) conducted a meta-analysis of 122 achievement studies. The majority of these studies measured several outcomes in addition to achievement. Their findings supported the effectiveness of cooperative learning in a variety of forms. Not only did achievement levels increase; so did levels of self-esteem, attitudes towards school, time-on-task, and attendance rate. It is thus not surprising that cooperative learning as an instructional method was recommended by the National Council of Teachers of Mathematics (1989, 1991) and the National Research Council (1989).

Johnson and Johnson (1989) later conducted a more extensive meta-analysis of over 575 experimental and 100 correlational studies (see Johnson & Johnson, 1989 for a complete listing of these studies). These studies spanned 90 years with different age subjects, in different subject areas, and in a variety of settings. A subgroup of 375 studies was reviewed to answer the question of how successful competitive, individualistic, and cooperative efforts were in promoting productivity and achievement. The achievement effects found were as follows:

When all of the studies were included in the analysis, the average student cooperating performed at about two-thirds a standard deviation above the average student learning within a competitive (effect size= 0.67) or individualistic (effect size = 0.64) situation. When only high-quality studies were included in the analysis the effect sizes were 0.88 and 0.61 respectively (Johnson et al., 1991a, p. 38).

Although many studies in the area of cooperative learning have been conducted with students in Grades 3-9 (Purdum & Kromey, 1992), relatively few studies have examined the effects of this method of instruction in Grades 10-12 (Newman & Thompson, 1987). In fact, reflecting this trend, the only full-scale review that focused solely on secondary schools (i.e., middle, junior, and high schools) was conducted by Newman and Thompson (cited in Slavin, 1992). Their review on cooperative learning located 27 reports of what they deemed to be high-quality studies, including 37 comparisons of cooperative versus control methods. However, consistent with studies in earlier grades, a statistically significant proportion of these studies (68%) supported the use of cooperative learning methods.

*Overview of Cooperative Learning in Higher Education*

Even fewer studies have been conducted at the collegiate level (Slavin, 1989, 1991b). Unfortunately, of those that have, many suffer from a variety of methodological problems (Cooper & Muech, 1992). Nevertheless, Slavin (1992) posited that, despite flawed research at this level, there is evidence of positive achievement effects of this learning strategy in college settings (see, for example, Fraser, Beaman, Diener, & Kelem, 1977). A subgroup of the earlier noted 1989 meta-analysis was conducted by Johnson and Johnson (1989). This subgroup of 137 experimental studies compared cooperative, competitive, and individualistic efforts at the college and adult levels, revealing that cooperative learning promotes higher achievement than do competitive or individualistic learning (effect sizes = 0.59 and 0.62, respectively) (Johnson et al., 1991a). Qin, Johnson, and Johnson (1995), in a review of 46 studies at the post-secondary level, found positive effects on problem solving associated with the cooperative learning model in 55 of the 63 outcomes. Given this caveat, there are still many questions to be answered; notably why and how cooperative learning yields its various effects at the college level. To this end, Slavin (1989) recommended that research continue to add to the knowledge base in higher education.

Although the research on cooperative learning indicates that it is a powerful method for influencing student achievement and attitudes, this technique has not been implemented systematically in many college classrooms (Cooper & Muech, 1992). Advocating for this instructional method, Garfield (1993) provides an in-depth rationale for the use of cooperative learning in college statistics classes. Indeed, results of studies are beginning to emerge on the use of cooperative learning activities in statistics courses (Borresen, 1990; Giraud 1997; Jones, 1991; Keeler & Steinhorst, 1995; Shaughnessy, 1977). In particular, instructors of undergraduate introductory and applied statistics classes have examined the effects on achievement of lecture versus cooperative teaching methods (Borresen, 1990; Giraud, 1997; Keeler & Steinhorst, 1995). Teacher-researchers in these studies acknowledged that many students have negative attitudes towards statistics; therefore, in addition to performance outcomes, the question of whether or not cooperative learning techniques can change negative attitudes was addressed. The length of these studies ranged from two sections in the same semester (Giraud, 1997) to three years comprising six introductory classes (Borresen, 1990).

Borresen (1990) postulated that students in voluntary cooperative learning groups would outperform students in assigned cooperative learning groups, and that both groups would perform better than students working individually. Findings revealed that more than twice as many

"A's" were earned by the assigned and volunteer groups than by students working on their assignments individually. Interestingly, no achievement difference was found between the voluntary and assigned groups. Of equal concern to the researcher was students' attitudes towards statistics. Based on formal and informal evaluations, approximately half of the students in the voluntary and assigned groups indicated a positive change in their attitudes and enthusiasm.

Giraud (1997) examined the comparative effects of cooperative versus lecture methods of instruction in two sections of an undergraduate statistics course. Giraud randomly assigned students of various abilities to create opportunities for supportive scaffolding (Vygotsky, 1978). The scaffolding process occurs when less skillful students actively collaborate with more competent peers, thereby enabling students to develop more complex levels of understanding and skill. The size of the cooperative groups ranged from three to five students and remained relatively consistent throughout the semester. A 30-item Statistics Readiness Test was administered during the first week of class to test students' knowledge of basic algebra and mathematical reasoning. According to Giraud, this instrument measured statistical readiness and was used to assist in determining whether there was an interaction between students' basic algebra and mathematics skill level and the instructional method. The major question posed was whether or not cooperative learning benefitted less skilled students. Post hoc comparisons revealed that students who scored the lowest on the algebra and mathematics reasoning pretest and were in the cooperative learning group, scored higher than did their counterparts in the lecture class (Giraud, 1997). The study suggested that cooperative learning induces higher achievement in statistics courses than do lecture methods of instruction for all students. Most importantly, students who were least prepared for statistics benefited the most from cooperative learning.

Over the course of several semesters, Keeler and Steinhorst (1995) changed from delivering course content using traditional lecturing to using a cooperative learning approach. The purpose of their study was to examine the relationship between grade achievement and retention as related to cooperatively and traditionally structured courses. Researchers cited the following three reasons for experimenting with cooperative learning: (a) to increase completion rates, (b) to improve students' performance on papers and tests, and (c) to improve students' attitudes towards the course and subject. Data comprised final grade distributions, student retention in class, and a questionnaire that queried students' attitudes towards group activities. Keeler and Steinhorst found that a greater number of students successfully completed the courses using the cooperative learning model, and students achieved higher

final scores in the two experimental sections than in the comparison course section. Moreover, students' attitudes towards the cooperative group learning experience were positive. Interestingly, better scores on the first two exams by the traditional semester students were offset by a comprehensive final exam that was 20 points lower than the first two exams. Consequently, the class mean cumulative score in the traditional section was half a letter grade lower than in the cooperative learning classes.

### *Purpose of the Present Study*

In summation, cooperative learning activities appear to benefit students ranging from elementary to baccalaureate educational levels. Johnson et al. (1991a) suggest that the benefits are the result of bi-directional relations among achievement, quality of interpersonal relationships, and psychological health--with each impacting the others. Unfortunately, scant research exists at the graduate level (Slavin, 1991b). Because research methodology courses are taken by the vast majority of the graduate students, and because many students perform at lower levels in these courses than in any other course in their programs of study (Onwuegbuzie, 1997), the purpose of this study was to investigate the effects of cooperative learning on levels of achievement in these classes. An extensive review of literature revealed no study comparing the effects of cooperative learning and traditional structured teaching techniques in research methodology classes. The aforementioned findings that cooperative learning tends to increase levels of achievement in statistics classes, coupled with the fact that research methodology classes typically contain elements of statistics (Mundfrom, Shaw, Thomas, Young, & Moore, 1998), led to the hypothesis that students assigned to cooperative learning groups in research methodology courses have higher levels of achievement than do their counterparts who are not assigned to groups.

A secondary purpose was to determine the effects of cooperative learning on students' attitudes towards group activities and overall learning in research methodology courses. It was expected that the majority of students assigned to cooperative learning groups would find this instructional method more helpful than obtaining information solely via a lecture format. In particular, it was hypothesized that the majority of students in the cooperative learning groups would report positive attitudes towards this method of instruction. It was hoped that the results of this study would assist in finding optimal ways to enhance student learning in research methodology courses.

## Method

### *Participants*

*Demographics.* Participants comprised 193 students, enrolled in graduate-level educational research metho-

dology courses within a three-year period at a mid-southern university. Eighty-one students were enrolled in sections in which cooperative learning groups were formed to undertake the major course requirements (i.e., written critical evaluation of published research reports and preparation of research proposals). The remainder ( $n = 112$ ) were enrolled in sections in which all assignments were undertaken and graded on an individual basis. The same instructor taught all sections.

With respect to the cooperative learning groups, the majority of participants was female (79.8%), ranging in age from 22 to 55 ( $M = 32.4$ ,  $SD = 8.5$ ), with a mean grade point average of 3.67 ( $SD = 0.39$ ). The racial composition was 84.0% Caucasian-American and 16.0% African-American. With regard to the control group sample, most of the participants were female (82.5%) and Caucasian-American (87.5%), ranging in age from 23 to 60 ( $M = 31.1$ ,  $SD = 8.6$ ), with a mean grade point average of 3.63 ( $SD = 0.39$ ). No significance difference ( $t = 1.28$ ,  $p > .05$ , effect size = 0.10) in mean grade point average was found between students in the cooperative learning classes and those in the individualized classes.

### *Procedure*

*Course requirements.* According to the university graduate handbook, the course involved the "application of scientific method to educational research, including nature of research problems in education, theory of research, experimental design, techniques in data gathering, the interpretation of results, research reporting, and bibliographical techniques." For each 16-week semester, classes were held for three hours, once per week. The main requirement of the course was the completion of a research proposal. The objective of the proposal was to prepare students thoroughly to be able to write proposals for dissertations and for seeking external funding. As such, the research proposals provided authentic assessment. Specifically, the research proposal, which could represent either quantitative or qualitative research on a topic of their choice, had to comprise a title, introduction section, review of the related literature, methodology section, analysis section, bibliography, and appendix section including a biography of proposal writer, time-table, budget, consent form(s), and author-designed instrument(s). Research proposals had to be unique and realistic, have educational significance, and extend the knowledge base. Students were expected to type their proposals, following guidelines specified by the American Psychological Association (1994). Students' writing style (e.g., grammar, punctuation, clarity, and application of the American Psychological Association (1994) criteria) also was assessed. All proposals had to include an in-depth review of the literature, and thus extensive library usage was required. Indeed, although many research methodology

instructors appear to require what could be conceptualized as a *mini-proposal*, the research proposal in this course was required to be extremely comprehensive. Historically, over the years, research proposals in this course typically ranged from 25 to 40 pages, with the literature review section usually ranging from 5 to 15 pages. Students in both treatment conditions were encouraged to immerse themselves with their research proposals from the first class meeting. Moreover, students/groups were required to formulate their research questions by the second class meeting and to start obtaining literature sources by the third class meeting.

The second major course requirement involved a written critical evaluation of a published research report (article critique). The major goal of the article critique was to allow students to practice evaluating published research articles utilizing principles of the scientific method. In order to prevent student procrastination, students were required to select several potential articles to critique and to bring them to the second class meeting for advice from the instructor as to their appropriateness. Furthermore, students were required to make their final selection as to which article to critique by the third week of the semester.

Because students in both treatment groups typically had various levels of experience using the library, a one-hour library orientation always was provided for them at the second class meeting. In this orientation, the library coordinator demonstrated how to conduct extensive library searches, showing them how to use several electronic databases (e.g., ERIC, PsycLIT, MEDLINE, CINAHL), as well as familiarizing students with the location of various sources (e.g., periodicals) and interfaces. In short, this orientation involved course-integrated instruction, live interactive demonstrations, and hands-on practice exercises. Student feedback indicated that most students found this orientation to be extremely useful (Onwuegbuzie, 1997).

Due to the comprehensiveness of the article critique and the research proposal, the instructor attempted to make himself as available as possible to all students outside class time and office hours, encouraging them to contact him at his home between 10 a.m. and 10 p.m., on any day of the week (including weekends and holidays), if they had any questions about the assignments. Many students in both experimental conditions took advantage of this opportunity.

*Individualized learning group.* The first part of each class period typically consisted of a review of the material presented in the previous period. Problems which were assigned were discussed and questions answered. The middle portion of each class lesson generally involved presenting new material. The instructor's style was pri-

marily lecture interspersed with students' questions. He used a didactic approach which precluded opportunities to engage in cooperative learning within the lecture period. Visual aids used primarily were overhead projectors and a chalk board. The last part of the class period tended to contain an overview of the reading, a presentation of the follow-up tasks assigned for the next period, and a brief overview of the material to be covered in future sessions. All students were provided with a complete set of the instructor's lecture notes at the beginning of the course. These notes comprised a summary of the textbook and a synthesis of other relevant sources.

*Cooperative learning group.* On the first day of class, students, in turn, were asked to introduce themselves to the whole class, disclosing their major, educational aspirations, profession, and interests. Following these introductions students were asked to form groups comprising 3-4 students. Students were encouraged to choose group members based on major, profession, and proximity to each other's homes. A few groups involved pairs. These pairs were formed when the class size represented a prime number. The cooperative learning group that was utilized involved the use of base groups (Smith et al., 1992). The aim of these base groups was to promote stable membership whose foremost responsibility was to provide each student the support, encouragement, and assistance needed to understand the material presented by the instructor and in the readings, with a view to (a) completing the group assignments successfully and (b) preparing students for the in-class examinations. Students were encouraged to stay together during the entire course. Although they were allowed to change groups if any conflicts or unresolvable problems arose among group members, no student requested such a change. Students were asked to exchange telephone numbers and e-mail addresses and information about their schedules so that they could meet outside class. Each base group undertook one research proposal and one article critique.

The instructor informed students of the following basic group skills: every group member should participate as equally as possible, or at least according to their strengths, students should respect the opinions of all group members, no students should dominate group discussions, and every student should be aware of all tasks undertaken by group members and be prepared to provide constructive criticism. Students were not assigned specific group roles; however, they were presented with different models for the division of labor (e.g., each student writing a section of the research proposal and article critique; each student individually undertaking all sections of these assignments and then comparing their work with all other group members with a view to merging).

As in the individualized groups, the first part of each class period typically consisted of a review of the material presented in the previous session and the middle portion of each class lesson generally involved the presentation of new material. All students were provided with a complete set of the instructors' lecture notes at the beginning of the course. However, instead of a lecture-based review of the material, as in the individualized groups, in the cooperative treatment condition, each base group reviewed the material that was presented earlier by the instructor. During this phase, students rearranged desk-chairs into groups within the classroom. While students worked in groups, the instructor observed, answered questions posed by students, and informed the class of any insights gained from circulating among the groups. As time permitted, students in the cooperative groups also were given class time towards the end of the period to discuss their research proposals and/or their article critiques.

### Instruments

A scoring rubric was used to evaluate proposals and article critiques, with detailed feedback provided. Students in the control group received individual scores, on a 100-point scale, for their research proposals and article critiques. Students in the cooperative learning groups were given group scores for these assignments. Conceptual knowledge, which involved students' knowledge of research concepts, methodologies, and applications, was measured individually in both sets of classes via comprehensive written midterm and final examinations. The examination form consisted of open-ended questions, involving items which required knowledge of the research process. All of the items pertained to content from the first half of the course and were chosen from the instructor's item bank to ensure that the examination was typical of past examinations given by this instructor. The final examination also was constructed by the course instructor and paralleled the format of the midterm examination, yet covered the complete course content. Both the midterm and the final examination were administered under untimed conditions and were scored on a 100-point scale by the instructor, using a key that specified the number of points awarded for both correct and partial-credit answers. Finally, students in the cooperative learning were asked to keep reflexive journals. Journal entries were recorded by students on a regular basis.

## Results

### *Analysis of Achievement Data*

A *split-plot* analysis of variance (ANOVA) was undertaken using treatment group as the between-subjects factor and examination time as the within-subjects factor (Maxwell & Delaney, 1990). The Shapiro-Wilk test

(Shapiro & Wilk, 1965; Shapiro, Wilk, & Chen, 1968) did not indicate that the distribution of the midterm examination ( $W = .97, p > .05$ ) or the final examination ( $W = .97, p > .05$ ) scores was non-normal. Also, because there were only two levels of the within-subjects factor (i.e., the midterm and final examination), the sphericity assumption (i.e., the homogeneity of treatment-difference variances assumption) was met by default (Maxwell & Delaney, 1990). (It should be noted that a multivariate analysis could have been undertaken to analyze the data rather than the univariate split-plot ANOVA. However, when there are only two levels of the within-subjects factor, as is the case here, the two approaches are identical. See for example, Maxwell & Delaney (1990).)

The split-plot ANOVA revealed a treatment group  $\times$  examination time interaction ( $F_{1, 191} = 5.80, p = 0.017; \omega^2 = .05$ ). Both main effects also were statistically significant, namely, treatment group ( $F_{1, 191} = 4.74, p < 0.031; \omega^2 = .02$ ) and examination time ( $F_{1, 191} = 18.79, p < 0.001; \omega^2 = .08$ ). Follow-up tests of simple effects indicated that students enrolled in cooperative learning sections of the course had statistically significantly ( $t = 3.01, p < .01$ ) lower levels of performance ( $M = 76.7\%, SD = 12.0$ ) than did their counterparts ( $M = 82.1\%, SD = 10.7$ ) at the midpoint of the course, as measured by the midterm examination. The effect size (ES) corresponding to this difference (i.e., mean differences divided by the pooled standard deviation, which is known as Cohen's  $d$ ) was .48, which, using Cohen's (1988) criteria, suggests a moderate effect. Although students in the cooperative learning groups still had lower levels of performance ( $M = 82.2\%, SD = 9.7$ ) with respect to the final examination than did students in individualized learning sections ( $M = 84.9\%, SD = 11.7$ ), this difference was not statistically significantly different ( $t = 1.68, p > .05$ ). However, the corresponding effect size (i.e., 0.25), suggests that this difference may be non-trivial. The simple effects indicated that an ordinal interaction was apparent, with individualized learning groups obtaining higher scores on both in-class examinations, with the difference between the two groups being statistically significantly higher only at the midterm stage. Finally, no overall difference ( $t = -1.21, p > .05, ES = 0.16$ ) in course average was found between the cooperative learning groups ( $M = 83.8\%, SD = 6.7$ ) and the individualized learning groups ( $M = 82.4\%, SD = 9.8$ ).

Interestingly, although scores obtained for the research proposals did not discriminate the cooperative learning ( $M = 82.5, SD = 15.3$ ) and the individualized learning ( $M = 81.8, SD = 11.3$ ) groups ( $t = 0.3, p > .05, ES = 0.04$ ), the article critiques completed by students in the cooperative learning groups ( $M = 85.3, SD = 8.4$ ) obtained statistically significantly higher scores ( $t = 2.3, p < .05, ES = 0.32$ ) than did those undertaken individually ( $M = 81.5, SD = 14.5$ ), with a moderate effect size.

*Analysis of Qualitative Data*

A phenomenological mode of inquiry (*inductive, generative, and constructive*) was used to analyze the reflexive journals (Goetz & Lecompte, 1984, p. 54). In order to determine the percentage of students who responded positively to their cooperative learning experience, these data were *unitized*, that is, units of information served as the basis for defining a significant statement (Glaser & Strauss, 1967). Each unit corresponded to a significant statement in each journal, which provided evidence of student attitudes towards their cooperative learning groups (Lincoln & Guba, 1985). Each significant statement was categorized either as positive or negative. Accordingly, a journal was characterized as being indicative of a positive overall attitude towards cooperative learning if at least two-thirds of the significant statements were positive. Similarly, a journal was characterized as being indicative of a negative overall attitude towards cooperative learning if at least two-thirds of the significant statements were negative. Finally, a journal was characterized as being indicative of an ambivalent overall attitude towards cooperative learning if between one-third and two-thirds of the significant statements were negative/positive. Based on these classifications, 70.4% ( $n = 57$ ) of the participants were determined to have positive overall attitudes towards their cooperative learning experience, 19.8% ( $n = 16$ ) of the participants were determined to have negative overall attitudes, and 9.9% ( $n = 8$ ) were regarded as being ambivalent.

The *method of constant comparison* (Glaser & Strauss, 1967, p. 105) was utilized in order to categorize units which appeared similar in content. Each category represented a distinct theme. This method of analysis revealed a number of themes relating to students' attitudes towards their cooperative learning experience. Each emergent theme was indicative of either a positive or negative cooperative learning experience. Each of these themes will now be discussed with examples from the database used as illustrations. As needed, pseudonyms are used to maintain confidentiality.

*Positive Themes*

The most consistent positive response was that the use of cooperative learning groups allowed students to interact with other group members and to share ideas. Examples of this positive interdependence include:

I thought cooperative learning was an excellent experience. I liked getting to know others in my field and working with them. Even though we were at different levels of understanding of the assignments and writing abilities, modifications had to be made to part of the critique to bring it

up to standard. I would not hesitate to do this again--this is how things work in real life--collaboration with other professionals.

I liked proofing each other's work to produce a quality product and will do this again with other papers. I liked utilizing each other's strengths and learning from each other. Two heads are better than one.

One student declared: "I have really enjoyed working in the cooperative group in this class. I feel it has given me someone to work with as well as share ideas . . . ." Another student noted that the cooperative learning groups "help everyone understand the different areas of the critique by having someone to talk to about it." Evidence also was provided that the cooperative learning groups prevented some of the weaker students from losing focus: "Being in the group helped me to see other viewpoints and also helped stay focused on the right track because sometimes I went 'blind'."

Some students believed that being in a group that was homogeneous with respect to area of study was advantageous: One group member stated: "It helped that each were majoring in the same area." Similarly, another student reported that "Since we all had a common interest (early intervention special education) we worked well together." The ability to provide or to receive peer-tutoring (i.e., scaffolding) was another positive outcome cited by some participants in the cooperative learning groups. The following statement exemplified scaffolding: "Cooperative learning allows students to learn from their peers. This may be helpful when the teacher is unable to explain something well enough for everyone in the class to understand." Another student observed that: "Everyone has a different learning style and this [cooperative learning] would give people that need help a chance to work with someone who could help them." Additionally, one group member concluded: "I learned more from my classmates than by doing it [the research projects] all by myself."

A few students found that cooperative learning helped to increase their levels of self-esteem and self-efficacy. For example, one student revealed the following:

I am not an outgoing person. I do not always feel confident in myself to do some assignments. I feel the assignments would have been hard for me to do myself. I have low self-esteem. I feel that working in cooperative learning groups helps to build up your self-esteem.

The dimension of personal responsibility was evidenced when one student disclosed: "I feel that I put more effort

into the paper than I would have if it had been just for myself because I knew that other people's grades were going to be affected also." Even students who tended to procrastinate appeared to benefit from cooperative learning, as illustrated by the following journal entry:

I am a procrastinator and having a group to help me get my part done on time made it easier to finish with less stress and worry. I like to put things off until the last minute, and then rush through. I found it helpful to get things done ahead for a change.

Many participants believed that cooperative learning helped to reduce their levels of anxiety. Compelling accounts of how cooperative learning reduced anxiety levels are reported below:

I enjoyed working with my co-workers. We got to know each other better by working together--that made the class more 'comfortable.' It seemed like when one was anxious, the others were encouraging. We supported each other.

Another student admitted that "I really enjoyed working on this as a cooperative learning group. It helped to reduce my level of anxiety." Yet another student reasoned that "By working in groups, the stress and anxiety was shared and therefore somewhat lessened."

Some of the groups provided ample evidence of positive interdependence and face-to-face promotive interaction. The following description provides an example in which these features appeared to be maximized:

At the very beginning we were all concerned that our varied educational backgrounds would cause difficulty. This was not a problem. We each brought different strengths into the group so we were made stronger as a whole.

I feel the members of our group got along together wonderfully. We worked on everything together and everyone seemed willing to cooperate. I can't think of any instances when we had a problem.

Notably, social cohesiveness enhanced the quality of interpersonal relationships among students, with some group members stating that this method of instruction helped to improve the classroom climate by increasing the incidence of positive, cooperative interactions both within and outside the classroom. Indeed, many students reported enjoying sitting close to their group members in the classroom. Perhaps even more compelling was the fact that cooperative learning appeared to have the potential to

create permanent bonds among some of the students: "With this style of work, we have made new friends in the process."

With respect to problem solving, cooperative learning appeared to be effective for some groups. In many cases, when students worked on a problem, such as arriving at a final draft of the research proposal, the problem was solved redundantly, which enabled students to check each other's problem-solving procedures and mistakes during the process. As noted by one student: "It was nice having other people to check my work. They caught some mistakes that I had missed. It was a great learning experience!" Another student declared: "I liked proofing each others' work to produce a quality product and will do this again with other papers [in other classes]." Yet another student revealed: "Although we each were assigned a section of the projects, we got together after completing the sections and re-worked them as a group." A few individuals recognized that the groups' attempt to maximize the quality of their projects increased the length of time spent on solving tasks, as evidenced by the following:

I believe that our group effort probably took longer to write the critique than if we had written it individually. However, I feel that we probably discussed the information in greater detail as we critiqued the article.

An important finding was that the groups who appeared to be the most functional with respect to the distribution and completion of tasks also appeared to have the most metacognitive awareness of the cooperative learning process and to exhibit more self-regulatory behaviors than did members of less functional groups. In addition, functional groups tended to assign roles to each group member and to distribute the workload as equally as possible. For example, a member of an extremely functional group noted the following:

We promoted each other's learning by helping, sharing and encouraging. We could explain, discuss, what we knew to each other. We talked through each aspect of the assignments. In cooperative learning groups you need a leader, decision maker, trust builder, communicator and working relationships among members. Our group had all of these. Sarah and I contributed in the projects being an encourager, praiser, to reinforce members' contributions. Terri and Jacquie were the recorders to write down the groups' decisions and edit the group's reports. Laura volunteered to be the typist for the group. Our group stayed on task and maintained a good working relationship.

Many of the inservice teachers related their cooperative learning experience to their own classrooms. For example, one teacher admitted: "I have gained new insights into cooperative learning and team work that I can take back and use in my classroom (i.e., the necessity of good communication and conflict management)." Another compelling statement posited by a teacher was:

I also think that it is a good experience for adults (mainly teachers) to get another experience with cooperative learning. It gives us a chance to see what our kids go through again since most [teachers] use cooperative learning in their classes. But haven't had a practical experience with it in a while.

### *Negative Themes*

Although the negative themes which emerged were less frequent in occurrence than the aforementioned positive themes, many of them were, nevertheless, noteworthy. By far the most cited criticism of their cooperative learning experience centered around the time constraints. Many students noted how difficult it was for them to meet group members outside the classroom--especially students who lived the furthest from their group members. One student noted that "the only negative experience we had was finding a convenient time for all to meet." Another student stated: "The only drawback I have is the time factor. It required some schedule balancing to find time to get together and work outside the class." One student declared that her inability to meet regularly with her group members would disrupt the group:

I don't think it [cooperative learning] worked well because our group had a hard time finding a time to meet--we all have jobs, schedules, families--it was very difficult. I, especially, felt like I had abandoned the group because of things going on in my personal life. It would have been more convenient to work alone.

Closely related to the issue of time was the issue of location. One student declared: "I don't like cooperative learning. It was difficult to meet in groups because of location." Another student wrote: "Our main disadvantage was having to travel in order to work together." This was again echoed by the following attitude: "I do not like cooperative learning groups because . . . when your group *all* live in a different location, it is very hard to *all* get together to work on the project." In an attempt to resolve some of the scheduling and logistical difficulties, two group members recommended that "more class time be devoted to working in groups." Additionally, two indi-

viduals suggested that reducing the group size to two students would alleviate some of the time and location constraints. One of these students wrote the following:

I am not sure this setting is very effective for cooperative learning. Too many different occupations and professions involved. As for me personally, I would have rather just, let us get in pairs--probably could have gotten better working conditions--due to time frame--professions, etc.

The other student revealed:

I usually have no problem working in groups, however, this time it was difficult. With everyone in my group working and going to school, it was hard to find time to get together. Also, all three of us lived in three different cities. I think for smaller projects, group work is terrific, but writing papers of this length should be assigned to one person, or two at the most.

One student complained that her group often arranged to meet at inconvenient times for her: "At the time my group members wished to meet to work on their critique, I should have been and needed to study for my mid-term." However, not all students were negative about having to schedule meetings outside the class sessions. In particular, one student revealed: "I admit, I was skeptical at first. However, as time went on, I saw that we could accommodate everyone's schedules to find time to meet."

Although, as evidenced earlier, many students experienced increases in their motivation levels in an effort to help maximize their group's grade, some students appeared to their group members to remain unmotivated. One student thought that she "was put in a group that wasn't motivated." Apparently, this group took a long time to start their assignments. Thus, an unfortunate outcome of cooperative learning enterprise was that a few students used the opportunity to coat-tail. One individual made the following observation:

I believe that cooperative learning in research methodology courses is really an effective way for instruction. However, I realize that even in graduate school there are those who will not take the responsibility of "sharing the load." When this happens it tends to bring down work quality of the entire group.

A student who attained one of the highest overall averages in the course noted that "It was hard for everyone to have an equal share since some people were reluctant to con-

tribute to the group's discussions." Similarly, another high-achieving student complained that "two group members gave no feedback or assistance in the proof-reading and correcting of errors on the finished paper." Unfortunately, these students did not disclose which group members they regarded as coat-tailers. However, one low-achieving student admitted to coat-tailing:

I have to be honest about the work this semester. I probably did not do but 40% of the work but the circumstances did not allow me or my partner to change that fact. He did not mind and he knew that if the shoe had been on the other foot I would not have minded either. When you are partners you can't always split the work 50/50 but you can put forth your best effort and do what is required. I appreciate the chance for the opportunity to work with a group, thank you.

Although, as documented above, many students reported that their cooperative group experience helped to *reduce* their levels of anxiety, one student disclosed that cooperative learning *increased* their anxiety levels: "Our groups worked extremely well together. We were all concerned that our work would negatively affect the others' grades. That fact increased my anxiety level." Trying to reach a consensus also was a source of anxiety:

While our group was small (only two), we had some difficulties agreeing on what we wanted to say. I think larger groups would experience this problem even more. My partner and I have similar learning styles and work habits so that was not a problem, but several people would be difficult to work with.

One student astutely noted that "cooperative groups work well if people respect individual's ideas." Unfortunately, it was clear that some of the high-achieving students did not respect their lower-achieving group members. For example, one student declared: "I was disappointed with one peer's work and making her redo it didn't seem to help [its quality], so we had to redo it [for her]." Another high-achieving student revealed the following:

In general, I dislike cooperative learning intensely. I don't like to be involved in group work because I am very independent and picky about work quality. . . . The difficulties I had were because I found it somewhat difficult to clarify other people's thoughts when they didn't seem straightforward, and I was displeased with the literature review section but did not have

time to redo it since I got it "late." I don't like to "share" grades.

This account suggests an intolerance for what they regarded to be sub-standard work. This intolerance, coupled with a lack of trust of some group members' ability to contribute effectively to the assignment, led to some high-achieving students undertaking a disproportionate amount of the workload. For example, one high achiever stated: "I do not like cooperative learning. I ended up doing a larger share of the work because I wanted the highest quality of work. In my case cooperative learning is more work than completing a project on my own." Another high performing student admitted: "I may have appeared overbearing to the group because I wanted to have everything checked and re-checked. The group was gracious about this." Yet another high-achieving student revealed:

I was responsible for the summary, the majority of the introduction, and for putting it all together and checking APA style. I do feel like I did most of the work in the group, but also I feel like I took on that role myself because that is what I needed to do before I put my name on the paper. I'm too paranoid to turn something like this over to others, so I accept that as one of my hang-ups in regard to cooperative learning.

Perhaps the most compelling finding that emerged from the phenomenological analysis centered around the group structures. In particular, the level of homogeneity appeared to play a role in determining how functional each group was. It appeared that groups which were too heterogeneous tended not to function as well as did homogeneous groups. Age was one factor which appeared to be a barrier in some cooperative learning groups. For example, one student noted that "because I am older and tend to be more set in my ways, I found it frustrating to agree on ideas."

By far the most important grouping factor was ability with respect to the research methods course. Interestingly, it appeared that the more homogeneous with respect to ability the group was, the more positive features they displayed. These features included positive interdependence, social cohesion, and a willingness to promote each other's learning and to hold each other personally and individually responsible for doing her/his fair share of the work. For example, the group which clearly was the most functional comprised members who all ended up with either average or below average overall achievement levels. This group did not complete the best projects, but they were the most positive about their cooperative learning experience--with all of them stating that they

expected to remain friends after the semester ended, even though they did not know each other prior to the course.

Conversely, the group containing students with the widest range of ability appeared to encounter the most problems. Whereas the weakest member of this 5-person group stated that she liked the cooperative experience, and the next weakest member expressed concern that the stronger members of the group dominated the projects, the highest-achieving member was extremely critical of the weaker members, as follows:

I have an overwhelming dislike of this method of teaching. First, let me explain that I am strongly motivated by my desire to maintain a 4.0 in my graduate studies. Also, I have a very difficult time allowing the work of someone else to determine the grade I obtain, therefore I tend to take over and do all the work myself. In this instance, I had another compatriot who also is driven by a desire to make A's and is also driven for excellence in her work. I am not sure whether it was our overbearing qualities that laid most of the work on our shoulders or our fear that if we didn't do it it wouldn't get done. The third member of our group tried extremely hard to participate in all of the assignments but she was relatively clueless about how to do it. We tried to explain as best we could, but under the time constraints I didn't know that we did a very good job. I know that I was disappointed in the lack of effort on the part of one member in particular who made no attempt to work on either project. She was not dependable, promised to do things then did not, made dates to be there but didn't show up . . . you get the picture.

This experience has forced me to reevaluate the use of group teaching in my classroom. I now have empathy for those motivated students whose desire to succeed means they will do ALL the work rather than fail, even if it means other students get to reap the A's they produce. Fortunately, my education is more important than my grade, and I know that when I leave this class, my ability to write, to present, and carry out quality research will be there. This is not true for one or two others in the class.

Although this student was obviously angry about the contributions or lack thereof of the "weakest" members of her group, she recognized that her workload, although high, would hold her in good stead in the future.

The purpose of this study was to investigate the effects of cooperative learning on levels of achievement and attitudes towards group activities and overall learning in research methodology courses. Findings revealed a statistically significant interaction between treatment group and examination time. More specifically, students in cooperative learning groups had significantly lower performance levels than did their counterparts at the midpoint of the course, as measured by the midterm examination. Indeed, the effect size pertaining to this difference was moderate. Moreover, using the pre-defined grading scale of the course instructor, the 5.4 point difference between the groups represents one-half of a letter-grade.

No statistically significant difference was found between the groups with respect to the final examination, although this difference may have been non-trivial, in favor of the individualized learning group. Because the two groups did not differ with respect to grade point average, it is unlikely that past academic achievement was a major factor in explaining these findings. Similarly, unlike most studies in the area of cooperative learning, it is unlikely that teacher variables played a major role, because the same instructor taught all groups in the study.

The fact that the cooperative learning groups had lower levels of achievement at the midpoint of the course, but that by the end of the course this differential decreased significantly (as indicated by the statistically significant interaction effect), suggests that cognitive outcomes improved over time. This, in turn, suggests that collaborative techniques may need time for their effects on achievement levels to be realized. Indeed, the result relating to the midterm deficits is consistent with the qualitative finding that some groups were slow in starting their projects. Moreover, the finding of no significant difference in the final examination scores is consistent with Courtney, Courtney, and Nicholson (1992), who found no differences in statistics achievement between graduate students who were taught using a cooperative learning method and those who were taught using a traditional method. Nevertheless, the fact that the gap in achievement levels between students in the two groups substantially narrowed by the end of course may be attributable to scaffolding, that is, to more able students helping the less-prepared students to understand the material presented.

Interestingly, no difference in overall course average was found between students in the two groups. This may be attributable to the fact that, although scores obtained for the research proposals did not discriminate the cooperative learning and the individualized learning groups, the article critiques completed by students in the

cooperative learning groups obtained statistically significantly higher scores than did those undertaken individually. Clearly, the article critique assignment and, to a smaller extent, the research proposal, helped to increase the course average of students in the cooperative learning groups relative to their counterparts, culminating in no overall difference in course grades between the two groups. Bearing in mind the comprehensiveness of the group projects, it is not surprising that the cooperative learning students performed at higher levels for at least one of them.

It is likely that the higher midterm examination scores obtained by students in the individualized learning group arose because they did, or at least were expected by the instructor to do, as much work on the two assignments (i.e., the article critique and research proposal) as were the entire group in the cooperative setting. That is, the additional effort required by the individualized group may have accounted for at least some of the higher achievement experienced by this group. Although it cannot be assumed that the extra effort per capita translates into a better product (indeed, this was not the case for research proposals), it is possible that working alone on the article critique and research proposal promoted their understanding of the research process to a greater extent than for those in the cooperative learning groups--particularly the coat-tailers.

In any case, the finding that the two groups did not differ in overall achievement in the research methods course supports Davidson's (1985) contention that conditions of cooperative learning groups such as group incentives which are required for success at the public school level may not be effective at the college level. Indeed, the similarity of overall performance levels found in the present study suggests that cooperative learning may not lead to grade inflation, provided that there is individual accountability. It appears that the in-class examinations in this course helped to ensure individual accountability.

Although the hypothesis relating to achievement was not supported, the qualitative analyses indicated that the vast majority of students like cooperative learning. Indeed, the 70% of cooperative learning students who responded positively suggests a large effect size. In particular, the phenomenological analysis revealed that most students in the cooperative learning groups experienced the predicted shifts in motivation, persistence, self-esteem, self-efficacy, anxiety, social cohesion, problem solving adeptness, and metacognitive awareness. Because these variables represent positive outcomes of cooperative learning for many subject areas and at most age levels (Johnson et al., 1981), and because many of these variables have been found to be related to achievement in research methodology courses (Onwuegbuzie, 1997; Onwuegbuzie & Daley, 1996; Onwuegbuzie & Seaman,

1995; Onwuegbuzie, Slate, Paterson, Watson, & Schwartz, 2000), it is perhaps surprising that students in the cooperative learning group did not experience higher levels of achievement than did their counterparts. Thus, future research should investigate the reliability of the lack of difference in achievement levels found in the present study.

The fact that students appear to like cooperative learning techniques despite not experiencing increases in their levels of performance, may be related to the affective benefits of this form of learning. Numerous positive statements suggest that, for some students, the non-cognitive outcomes may be as important as subject matter achievement. This finding is congruent with earlier conclusions that cooperation promotes self-esteem, caring relationships, and psychological health (Johnson & Johnson, 1989; Sharan, 1990; Slavin, 1990).

Nevertheless, a few students, particularly the weaker ones, seemed to have liked cooperative learning for reasons which are not compatible with the instructional objectives of this method. That is, these coat-tailers appeared to like cooperative learning because they realized that they do not have to put forth as much effort in order to obtain a passing grade in these courses. These students may then rely on their more able group members to maximize their groups' project grades. The possible inflated project grades on the part of the weaker students may, in turn, have reduced the pressure on these less able students to achieve in the in-class examinations, culminating in reduced levels of motivation to study and, subsequently, lower actual performance levels--especially at the midterm stage. It is also possible that some of the weaker students, especially in heterogeneous groups, were not able to make a large contribution to their groups due to the domination of the workload by their more able counterparts. Such unequal distribution of the workload may have prevented weaker students from taking an active role in the whole research process, thus debilitating their performance levels. Indeed, Cohen (1994) and Slavin (1996) have noted the importance of fairness in work load.

An important limitation of the present investigation is that the results were obtained from a relatively small, non-random, geographically-limited sample of students seeking graduate degrees. Thus, the extent to which the findings generalize to other students enrolled in graduate programs is a question awaiting subsequent research using both quantitative and qualitative analysis techniques, as in the current study. Another threat to external validity stems from the fact that one of the researchers was the instructor of the course. Specifically, this threat, which is termed experimenter/researcher effect (Gay & Airasian, 2000), may have biased the findings of the study to some degree. However, it should be noted that the inter-rater reliability

between the two observers with respect to the identification of the emergent themes and the classification of significant statements to these themes was extremely high (i.e., 100%).

Reactive arrangements was another threat to external validity (Gay & Airasian, 2000). In particular, it is possible that the overwhelming positiveness of the journal entries may have been, in part, related to social desirability. Because the journals were turned in to the instructor who was responsible for assigning course grades, it cannot be ruled out that at least some of the students might have avoided making negative statements. However, it is possible that this threat was minimized for the following two reasons: (1) students were guaranteed maximum points for their journals, provided that entries were recorded on a regular basis, and (2) students were informed that their journals would not be read by the instructor until grades had been assigned and submitted to the registrar's office. Furthermore, the majority of students noted at least one negative statement about the cooperative learning process--many of whom cited the time and location constraints. If social desirability had played a large role in determining students' journal entries, it is likely that many more students would have recorded only positive responses.

A threat to internal validity was instrumentation. Due to the open-ended nature of both midterm and final examinations, assessment of internal consistency was not possible. However, it is likely that the use of detailed scoring rubrics helped to increase the reliability and validity of scores yielded by these measures.

A weakness of the research design was the fact that participants in the individualized group were not asked to complete journal entries. Such information could have led to comparisons of attitudes across each group. Interestingly, however, Onwuegbuzie (1997) analyzed journal entries of students who were enrolled in research methodology courses wherein the individualized method was utilized. This researcher noted the particular difficulties that many students had writing their research proposals, as well as the continual high levels of anxiety. A comparison of the journal entries of students in the cooperative learning group in the present investigation and the individualized learning students in Onwuegbuzie's (1997) study revealed that the cooperative learning students made less references to their anxiety levels than did the individualized learners. Indeed, in some instances, when anxiety levels were discussed by the cooperative learning participants, it was to note that the cooperative learning process helped to *reduce* their levels of anxiety.

Nevertheless, future research should compare comments made by both the individualized learning group and the cooperative learning group within the same study. In

order to facilitate such a comparison, "high specificity" journal entries would be needed. Such journals would involve more structure than the "low specificity" entries that were required for the present investigation. For example, a semi-structured journal format could be designed, whereby students are asked to respond to a few open-ended questions while recording their journal entries. Alternatively, a structured journal format could be incorporated in which students are requested to respond to specific questions in a definite order--some of which may be closed-ended.

Many researchers (Johnson et al., 1991a, 1991b) contend that (a) positive interdependence, (b) a willingness to promote each other's learning, (c) holding each other personally and individually accountable for her/his fair share of the work, (d) using appropriately the interpersonal and small-group skills needed to maximize group effectiveness, and (e) self-monitoring of how adequately members are working together, are essential for cooperative learning to be beneficial. Unfortunately, one or more of these five elements were not present in some of the groups--especially the most heterogeneous groups. This finding suggests that research methodology instructors who utilize cooperative learning techniques should emphasize to students the importance of maintaining these five elements, and should monitor each group for their presence on a continual basis.

In any case, the findings that high-achieving students in heterogeneous groups typically were the most critical of their group members suggests that an aptitude  $\times$  treatment interaction took place in this study. This possible interaction should be the subject of future investigations.

In summary, most graduate students in this study appear to regard cooperative learning as an effective instructional method in research methodology courses. However, their attitudes appear to be at odds with their test performance. As Johnson (1992) noted, there is an important difference between simply putting students in groups to learn and in structuring cooperation among students. Although the cooperative learning groups in this study were structured, comprising heterogeneous base groups, in which participants stayed together during the entire course, the findings suggest that even greater cooperative structure is needed in the course. The present authors currently are investigating the effects of increased cooperative structure on achievement and attitudes in research methodology courses, as well as the effects of the instructor monitoring group processing, modeling problem-solving skills, providing regular feedback regarding individual and group mastery, and evaluating group effectiveness on a regular basis. It is hoped that such studies will help to determine conditions under which the benefits of cooperative learning are maximized.

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