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ABSTRACT

Peer orientation has been found to explain as much as 27.4% of the variance in achievement in graduate-level research methodology courses, with students who prefer to learn in cooperative groups tending to attain lower levels of performance in individual learning settings than do their counterparts. The purpose of the present study was to determine whether the relationship between peer orientation and achievement remained in research methodology courses when cooperative learning techniques were introduced. Participants were 159 students enrolled in 7 sections of a graduate-level research methodology course at a Southern university over a 2-semester period. These students were administered a learning style instrument were enrolled in sections in which cooperative learning groups were formed to undertake the major course requirements ($r=-0.16$, $p<0.05$). Findings reveal a small but statistically significant relationship between peer orientation and achievement. Although this relationship represents a small effect size, the fact that the relationship may still be nontrivial warrants further research. (Contains 42 references.) (Author/SLD)

Running head: COOPERATIVE LEARNING

The Relationship Between Peer Orientation and Achievement in Cooperative-Learning Based Research Methodology Courses

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Abstract

Peer orientation has been found to explain as much as 27.4% of the variance in achievement in graduate-level research methodology courses, with students who prefer to learn in cooperative groups tending to attain lower levels of performance in individual learning settings than do their counterparts. Thus, the purpose of the present study was to determine whether the relationship between peer orientation and achievement remained in research methodology courses when cooperative learning techniques were introduced. Participants comprised 159 students enrolled in seven sections of a graduate-level research methodology course at a southern university over a two-semester period. These students, who were administered a learning style instrument, were enrolled in sections in which cooperative learning groups were formed to undertake the major course requirements. Findings revealed a small but statistically significant relationship between peer orientation and achievement ($r = -.16$, $p < .05$). Although this relationship represented a small effect size, the fact that the relationship may still be non-trivial warrants further research.

The Relationship Between Peer Orientation and Achievement in Cooperative-Learning Based Research Methodology Courses

Research suggests that learning styles play an important role in research methodology classes (Onwuegbuzie & Daley, 1997a). In particular, evidence exists that graduate students who tend to prefer to learn in cooperative learning groups tend to obtain lower levels of performance in research methodology courses in which all assignments are undertaken and graded individually than do their counterparts who have more individualistic orientations (Onwuegbuzie & Daley, 1997b). Indeed, Onwuegbuzie and Daley (1997b) found that peer orientation explains as much as 27.4% of the variance in achievement among graduate students.

Thus, the purpose of the present study was to determine whether the relationship between peer orientation and achievement remained in research methodology courses in which cooperative learning groups were formed to undertake the major course requirements. Indeed, a paucity of studies have been undertaken in the area of cooperative learning at the graduate level. Even less formal investigations have been conducted in this field specifically with respect to educational research courses, despite the fact that (1) the overwhelmingly majority of graduate students in colleges of education are required to enroll in at least one research methodology course as a necessary component of their degree programs (Onwuegbuzie, 1998), (2) the majority of students find these courses the most difficult in their programs of study (Onwuegbuzie, 1997), and (3) in recent years, there has been an increase in the number of research methodology instructors who utilize cooperative learning techniques in their classes (Onwuegbuzie & DaRos, in press). It was hypothesized that the relationship between cooperative learning orientation and performance in educational research courses found previously (i.e., Onwuegbuzie & Daley, 1997b) would disappear when

cooperative learning techniques were implemented.

Review of the Related Literature

Cooperative learning is the instructional use of small groups in which students work together to maximize their own learning, as well as those of their group members (Johnson, Johnson, & Smith, 1991a). Although Slavin (1990) proposed a two-element theory of cooperative learning comprising positive interdependence and individual accountability, it is the five-component theory of D.W. Johnson, R.T. Johnson, and their colleagues (Johnson, Johnson, & Holubec, 1991; Johnson et al., 1991a; Johnson, Johnson, & Smith, 1991b) that currently appears to be the most utilized. According to this theory, the following five elements are essential for maximizing the success of the cooperative learning endeavor: (1) positive interdependence, (2) face-to-face promotive interaction, (3) individual accountability, (4) social skills, and (5) group processing.

The first component, positive interdependence, requires that *all* group members believe that they and all other members of their team are essential for the success of the group. Moreover, this element promotes a situation in which students not only perceive that their work benefits their group members, but also that the efforts of their group members assist them. As such, under optimal conditions, positive interdependence necessitates the sharing of resources, the provision of mutual support and encouragement, and the acknowledgment and celebration of joint successes, however small (Johnson et al., 1991a).

Johnson et al. (1991a) noted that positive interdependence can be structured in a number of ways. First, *positive goal interdependence* can be incorporated in which the instructor promotes one or more mutual goals for each group such as ensuring that every member of the group learns the assigned material. Second, *positive reward/celebration interdependence* can be implemented, whereby the

teacher provides joint rewards, such as bonus points to every member of the group if every member satisfies some specified criterion (e.g., obtain the passing score on a test). Third, *positive resource interdependence* can be enforced in which the educator provides limited resources to students which must be shared, or presents each student a part of the required resources that the group must fit together (termed the *jigsaw method*). Fourth, *positive role interdependence* can be promoted by assigning each group member complimentary roles (e.g., reader, notetaker, motivator, and checker of understanding of material). A myriad of studies (e.g., Johnson, Johnson, Stanne, & Garibaldi, 1990; Mesch, Johnson, & Johnson, 1988; Mesch, Lew, Johnson, & Johnson, 1986) have documented that positive interdependence provides the impetus for many of the other four elements, and that goal interdependence combined with reward interdependence or resource interdependence is effective in increasing achievement.

The second component of cooperative learning, face-to-face promotive interaction, takes place when individuals encourage and facilitate each group member's efforts to achieve the group goals. Examples of promotive interaction include students within a group providing each other with feedback to improve their future performance and influencing each other's efforts to achieve the group's goals (Johnson et al., 1991a). Individual accountability, the third element, occurs when the performance of each student is evaluated, feedback is given both to the individual and to the group, and the student is held responsible by other group members for not *coat-tailing* or *social loafing* (i.e., disproportionately benefiting from the work of other group members). According to Johnson et al. (1991a), individual accountability can be promoted by (1) keeping the size of the group small, (2) giving an individual test to each student, (3) calling on students in the class randomly and asking students to present the work

of the group to the entire class, (4) observing how members of each group interact with other members, (5) assigning one member of each group to ask other group members to explain new material to the rest of the group (i.e., checker), and (6) requiring that each student teaches what he/she learned to a fellow group member or to someone else from another group.

Social skills is the fourth key component of cooperative learning. This element involves the appropriate use of small group and interpersonal skills. In order to facilitate social skills, it is imperative that students have mutual knowledge and trust, communicate effectively with one another, and solve conflicts (Johnson, 1990, 1991; Johnson & F. Johnson, 1991). According to Johnson and F. Johnson (1991), instructors should not assume that every student has the necessary social skills to work effectively with other group members. Rather, educators should teach their students social skills and reward the appropriate use of these skills (Mesch et al., 1988; Mesch et al., 1986). Group processing, the final component of the five-element theory of cooperative learning, involves reflecting on a group session to describe what actions of the members were effective and ineffective and deciding upon which actions to continue, which to modify, and which to discard. The goal of group processing is to fine tune the effectiveness of the group. Johnson et al. (1991a) recommend that instructors systematically monitor groups to evaluate group processing.

According to Johnson and Johnson (1991), the five elements presented above help to promote a successful cooperative learning experience for students. Apparently, all five components must be present for active learning to occur on the part of *every* student. As noted by Onwuegbuzie and DaRos (in press), these elements are a combination of interpersonal skills and learning outcomes.

Smith, Johnson, and Johnson (1992) contend that the five elements of

cooperative learning must be structured within one of three types of cooperative learning groups, namely, informal learning groups, formal cooperative learning groups, and cooperative base groups. According to these theorists, informal learning groups are less structured and short-term, requiring students to undertake 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 undertake an extensive project such as a term project. Finally, cooperative base groups are stable, long-term, peer support groups consisting of between 3 and 5 students. As such, base groups are the most comprehensive and intense forms of cooperative learning. Interestingly, base groups have been found to enhance students' learning and to increase attendance in larger lecture classes (Smith et al., 1992).

In general, cooperative learning has been found to promote higher achievement than do other learning situations for several subject areas and at many age levels (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981). Slavin (1983), in his review of 46 experimental studies, found that cooperative groups had significantly higher achievement levels than did control groups in 29 (63%) classrooms and no differences in 15 (32.6%) classrooms. In fact, in only two investigations did the control groups have higher achievement levels than did the cooperative learning classrooms. Slavin (1990), who reviewed 60 published research articles in this area, noted that 72% of comparisons favored the cooperative learning groups. Cooperative learning also has been found to affect positively other educational outcomes such as levels of productivity, time on task, self-esteem, attitudes towards school, motivation, self-efficacy, social cohesion, and attendance rate (Ames, 1984; Crooks, 1988; Johnson, Johnson, & Maryuma, 1983; Webb, 1985, 1988).

Despite the fact that more than 600 formal inquiries have been conducted during the past 90 years in which the effectiveness of cooperative, competitive, and individualistic initiatives have been compared (Johnson et al., 1991a), most of these investigations have focused on grades three through nine (Purdom & Kromey, 1992). Relatively few studies have been undertaken at the secondary school level. However, much of their research support the use of cooperative learning methods (Slavin, 1992).

Even fewer studies have been conducted at the collegiate level (Slavin, 1989, 1991). Nevertheless, Slavin (1992) contended that cooperative learning positively affects achievement in college settings. More specifically, 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. However, it is clear that more research is needed at the college level (Slavin (1989).

An extensive review of the literature revealed only two studies examining the effects of cooperative learning in graduate-level research methodology courses. However, findings from these investigations were inconclusive. Specifically, Wilson (1998) found that the following strategies, when used in combination, were helpful in reducing levels of anxiety among graduate students enrolled in educational research courses: addressing the anxiety, using humor, applying statistics to real-world situations, reducing fear of evaluation, and encouraging students to work in cooperative groups. Unfortunately, the cooperative techniques were not isolated from the other methods. Thus, it was beyond the scope of the investigation to determine the individual effect of cooperative learning on statistics anxiety.

Onwuegbuzie and DaRos (in press) utilized a mixed-methodological research

design to investigate the effects of cooperative learning on levels of achievement and attitudes in research methodology courses. These researchers found that students enrolled in classes in which cooperative base groups were formed had statistically significantly lower performance levels at the midpoint of the course (effect size = 0.48), as measured by the midterm examination, than did students who were enrolled in sections in which all assignments were undertaken and graded individually. Interestingly, although students in the cooperative learning groups still had lower levels of performance than did their counterparts with respect to the final examination, this difference was not statistically significant. No overall difference in course average was found between these two groups. Furthermore, analysis of reflexive journals indicated that 70.2% of the subjects tended to have positive overall attitudes towards their cooperative learning experiences, 19.2% of the students tended to have negative overall attitudes, and 10.6% tended to be ambivalent.

Even if future studies provide more substantial evidence about the efficacy of cooperative learning techniques in graduate-level research methodology courses, it cannot be assumed that this instructional method is effective for all students. Indeed, even proponents of cooperative learning (e.g., Johnson & Johnson, 1989) concede that some learners are more predisposed than others to engage in this form of learning. For example, several researchers have found that social orientation may influence how students perform in cooperative groups. At the elementary school level, Widaman and Kagan (1987) noted that students with a peer orientation attained higher performance levels when placed in cooperative learning groups, whereas competitively-oriented students performed better in competitive learning structures. At the high school level, Chan (1980-81) observed that, after being exposed to both cooperative and individual techniques, students with a need for

affiliation reported more positive attitudes towards cooperative learning than did those with a low need for affiliation.

At the college level, Hall et al. (1988) reported that dyads of college students with moderate to high levels of social orientation tended to outperform dyads of students with low levels of social orientation. Similarly, Klein and Pridemore (1992) noted that college students with a high need for affiliation who worked alone attained lower levels of achievement than did students in all other conditions. Additionally, Sutter and Reid (1969) demonstrated that college students with high levels of sociability performed relatively better than did introverted students with respect to cooperative computer-assisted instruction, whereas introverted students performed relatively better on individual-based computer-assisted instruction. To date, no study at the graduate level appears to exist which investigates whether cooperative learning techniques are more effective for peer-oriented students than for their counterparts. This was the focus of the present investigation.

Methods

Participants

Participants comprised 159 students from a number of disciplines (e.g., early childhood education, elementary education, middle grades, secondary education, speech language pathology, and psychology) who were enrolled in seven sections of a graduate-level research methodology course at a southern university over a two-semester period. Participation was voluntary. In order to participate, students were required to give their consent by signing an informed consent document. Subjects received extra course credit. All surveys were coded using student identification numbers in order to maximize confidentiality.

The ages of the participants ranged from 22 to 55 (mean = 32.4, *SD* = 8.5),

with a mean grade point average (based on graduate courses) of 3.67 (*SD* = 0.39). The majority of the sample was female (89.9%). With respect to ethnicity, the group comprised Caucasian-American (98.1%), with the remainder (1.9%) being African-American.

Setting

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 semester, which lasted for 16 weeks, 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 throughly to be able to write proposals for dissertations and for seeking external funding. As such, the research proposals provided authentic assessment.

The second major course requirement that was undertaken by cooperative learning groups 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 students from procrastinating, 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. The article critiques provided performance assessment.

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 3-5 students. Students were encouraged to choose group members based on major, profession, and proximity to each other's homes. 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 (1) completing the groups assignments successfully and (2) preparing students for the in-class individual 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).

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 typically is the case in traditional settings, 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

Students were administered the Productivity Environmental Preference Survey (PEPS) on the first day of class. The PEPS, designed by Dunn, Dunn, and Price (1991), is an instrument which surveys individuals' preferences in each of 20 different modalities. The PEPS was developed through factor analysis using orthogonal (varimax) rotations. It is a comprehensive approach to the identification of how adults prefer to function, to learn, to concentrate, and to perform during educational or work activities in the following areas: (a) environment (i.e., sound, temperature, light, and design); (b) emotionality (e.g., motivation, responsibility, persistence, and the need for either structure or flexibility); (c) sociological preferences (i.e., peer orientation, authority orientation); and (d) physical needs (e.g., perceptual preferences(s), time of day, intake, and mobility). Specifically, the PEPS measures preferences

pertaining to the following 20 modalities: noise, light, temperature, design, motivation, persistence, responsibility, structure, peer orientation, authority orientation, multiple perceptual preferences, auditory, visual, tactile, kinesthetic, intake, evening/morning, late morning, afternoon, and mobility. Each subscale represents a learning modality. Performance on each of the 20 subscales is expressed in standard score units, which range from 20 to 80, with a mean of 50 and a standard deviation of 10. According to the instrument developers, individuals having a standard score of 40 or less or 60 or more find that modality important when they study or work. Individuals scoring between 40 and 60 typically differ from others with respect to how much that variable is important to them.

Unfortunately, the reliabilities of the subscales used for the present study were not available since the PEPS was scored by its owners. Scores on the PEPS were analyzed as continuous variables, instead of partitioning them (e.g., dichomotizing the scores into preference vs. neutral vs. non-preference), since to categorize a continuous variable is "to reduce its variance and thus its possible correlation with other variables" (Kerlinger, 1986, p. 558). Indeed, Pedhazur (1982, pp. 452-453) asserted that "categorization leads to a loss of information, and consequently to a less sensitive analysis."

Scores from the peer-orientation subscale were correlated with the final examination. This assessment, which was administered individually in all classes, measured conceptual knowledge, including students' knowledge of research concepts, methodologies, and applications.

Results and Discussion

Findings revealed a small but statistically significant relationship between peer orientation and achievement ($r = -.16$, $p < .05$). That is, peer orientation explained 2.6% of the variance. Although this relationship was statistically

lower ($p < .05$) than the corresponding relationship reported by Onwuegbuzie and Daley (1997b), the fact that the relationship may still be non-trivial warrants further research.

Interestingly, using the Bonferroni adjustment in order to maintain a 5% Type I error rate, peer orientation was related statistically significantly ($p < .05$) to the following learning modalities: motivation ($r = -.27$), responsibility ($r = -.36$), authority orientation ($r = .39$), multiple perception orientation ($r = -.62$), and mobility ($r = -.32$). Specifically, students who were more peer oriented tended to report lower levels of motivation, to be less responsible, to have less positive attitudes towards the presence of authority figures in the classroom, to be less inclined to have multiple perception preferences, and to require mobility in learning environments. Using Cohen's (1988) criteria, these correlations represented moderate to large effects.

Thus, it is likely that peer-oriented students who underachieve in research methodology courses do so, not only because they are unsuited to traditional, individual methods of instruction, but also because they possess learning styles that do not maximize their learning in these classes. Findings from the present investigation suggest that peer-oriented learners possess potentially debilitative learning styles that appear to include (1) low motivation, (2) less responsibility, (3) less positive attitudes towards the presence of authority figures, (4) less inclination to learn via the use of multiple resources, and (5) a need for mobility in learning environments.

The relatively low motivation levels reported by peer-oriented learners obviously is a major cause for concern for research methodology instructors, because motivation has been found consistently to be related to achievement (e.g., Bailey, Onwuegbuzie, & Daley, in press). This finding seems to support the

observation of Onwuegbuzie and DaRos (1999) that a notable proportion of peer-oriented students, particularly the weaker ones, appear to like cooperative learning for reasons which are not compatible with the instructional objectives of this approach. Indeed, Onwuegbuzie and DaRos asserted that some peer-oriented students assume the role of coat-tailers in their cooperative groups. Apparently, these individuals like cooperative learning because they realized that they do not need to put forth as much effort in order to obtain a passing grade in research methodology courses. Onwuegbuzie and DaRos (1999) further theorize that these coat-tailers

> ....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,...reduce 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....It is also possible that some of the weaker students, especially in heterogeneous groups, [a]re 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...prevent weaker students from taking an active role in the whole research process, thus debilitating their performance levels. (pp. 33-34)

Thus, future research should investigate the role of motivation in research methodology courses among peer-oriented learners.

The fact that students who prefer cooperative learning techniques tend to be less responsible with respect to their learning probably reflects the fact that, in order to understand the research process to a competent level, much of the learning must be undertaken outside the classroom. Indeed, responsible

students are more likely to complete homework assignments and to prepare for class (Bailey et al., in press). Being assigned to a cooperative base group likely gives peer-oriented students the false impression that they do not have to be as responsible for their own learning.

The finding that peer-oriented learners tend to have less positive attitudes towards the presence of authority figures and not to prefer to learn via the use of multiple resources might explain Onwuegbuzie and Daley's (1997b) finding that students with these attributes tend to be less adept at writing research proposals and demonstrate the least knowledge of research concepts, methodologies, and applications. Finally, students with a need for mobility in learning environments may prefer cooperative learning techniques because it allows them to become more mobile in class. In any case, future research should investigate further the relationships reported in the present study. Indeed such investigations should utilize simultaneously both quantitative and qualitative techniques, since mixed methodological research designs have been found to be extremely informative in the area of cooperative learning--allowing triangulation of data to occur (see for example, Onwuegbuzie & DaRos , 1999, in press).

A few limitations of the present inquiry are worthy of mention. First, the fact that the results were obtained from a relatively small, non-random, geographically-limited sample of students seeking graduate degrees poses a threat to external validity. That is, it is not clear the extent to which the results are generalizable to other graduate students enrolled in research methodology courses. Second, the lack of qualitative information in the current investigation limited the ability to explain the relationships found. In any case, because findings stem from a correlational research design, it is beyond the scope of the study to determine whether any of the above relationships represent causal ones. This

should be a goal of future research.

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