Cooperative Learning Groups in Online Courses
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Use of group learning may be traced back to Greek and Roman times in the writings of Aristotle, Plato, Marcus Aurelius, and Thomas Aquinas (Hooper, 1992; Joyce & Weil, 2000). In the development of American schools, Horace Mann and Henry Barnard called for cooperative schools.

Cooperative learning also fits in well with constructivist and social learning theories. Constructivists theorize that learners create their own knowledge based upon their prior experiences (Gredler, 1997; Schrunk, 1996). In cooperative learning models, students share learning and the group energy (synergy) produces a knowledge and experience greater than the sum of each individual. Students encounter new ideas, perspectives, and experiences with their peers. The group process is reflective of Vygotsky’s (1930/1978, as cited in Gredler, 1997) zone of proximal development that is defined as the difference between the developmental level of an individual versus the level achieved with the guidance of an adult or in cooperation with peers.

Social theorists believe the “central role of education is to prepare citizens to generate integrative democratic behavior, both to enhance personal and social life and to ensure a productive democratic social order. They believe that cooperative enterprise inherently enhances our quality of life, bringing joy and a sense of verve and bonhomie to us and reducing alienation and unproductive social conflict” (Joyce & Weil, 2000, pp. 29). Dewey (1916) proposed that schools should be set up in the form of a democracy and students should have the opportunity to practice the skills needed to live in a democratic society. Thelen (1960) suggested that classroom activities should incorporate the democratic process.
Cooperative learning may be defined as a compliment of methods and techniques that require students to work together and support each other toward a common goal and discouraging competition (Johnson & Johnson, 1985, as cited in Singhanayak & Hooper, 1998; Johnson & Johnson, 1993; Johnson & Johnson, 1999; Slavin, 1996, as cited in Locatis, 2000; Johnson & Johnson, 1992, as cited in Locatis, 2000). Johnson and Johnson (1993, 1999) listed five elements required for effective cooperative learning:

1. Positive interdependence – Positive interdependence is a feeling or perception that everybody’s work is linked together and dependent upon each other. Positive interdependence is established through mutual learning goals and strengthened by joint rewards, divided resources, and complementary roles.

2. Individual accountability – The purpose of cooperative learning is to make individuals stronger by making them accountable for doing their share of the work. Common ways to structure individual accountability are (a) test each student, (b) randomly select one student to respond for the group, or (c) have one student summarize for another student.

3. Promotive interaction – Members promote success by helping, assisting, supporting, encouraging, and praising each other. Helping each other learn also promotes interpersonal dynamics and cognitive processes through explaining problems, discussing concepts, teaching each other, and connecting existing knowledge with new knowledge.

4. Social skills – Students need interpersonal and small group skills to succeed in cooperative learning. It may be necessary to teach leadership, decision-making, trust-building, communication and conflict-management skills.
5. Group processing – Students need to discuss actions that help or hinder the group and how to continue or change.

Locatis identified four representative models for cooperative learning (Slavin, 1995, as cited in Locatis, 2000; King, 1993; Millis, 1990, as cited in Locatis, 2000):

**Student team-achievement divisions (STAD).** Students are assigned to four-member teams that are mixed on the basis of gender, ethnicity, and performance level. Lessons are presented in a traditional manner, but students work together to ensure that all team members master the materials. Students are tested individually and each individual student’s score is compared to his or her past average. Team points are awarded based on the degree to which members exceed their earlier performance.

**Teams-games-tournaments (TGT).** TGT approach is identical to STAD, except students compete with those in other teams who are at the same performance level. Low and high achievers from each team compete with their counterparts, and the top scorers in these “tiered” tournaments win points for their teams.

**Jigsaw II.** The Jigsaw approach is like STAD except that each student is assigned expository material and each team member is randomly assigned to become expert in some aspect of the assignment. If the topic is a country, for example, one member might specialize in history, another in geography, another in economics, and so on. Students interact with members of other teams who have the same specialization and then return to impart the content that they have gathered to their teammates.
Team accelerated instruction (TAI). Students study individually but are assigned to teams whose members check and help each other. Students are tested individually, but team rewards are given based on the number of individual assignments and tests that members complete. The method is useful in highly structured subjects where success depends on mastering pre-requisites.

Advantages and Disadvantages

Researchers have identified instructional and affective benefits of cooperative learning groups.

Instructional Benefits

Academic Achievement. Studies of cooperative learning techniques have repeatedly shown increased academic performance (Chang & Mao, 1999; Duren & Cherrington, 1992; Hertz-Lazarowitz, Sharan, & Steinberg, 1980; Hudgins, 1960; Madden & Slavin, 1983; McClintock & Sonquist, 1976; Okebukola & Ogunniyi, 1984; Potthast, 1999; Sharan, Hertz-Lazarowitz, & Ackerman, 1979-80; Sherman & Thomas, 1986; Slavin & Karweit, 1984); these results carried across subject areas and grade levels.

In a meta-analysis conducted by Johnson, Maruyama, Johnson, Nelson and Skon (1981), 122 studies compared for the effectiveness of cooperation versus individualistic or competitive learning situations. The definition of the three learning situations is taken from Deutsch's work (1949, 1962 as cited in Johnson, Maruyama, et al., 1981, p. 47) on social situations and goals structures.

Deutsch defined a cooperative social situation as one in which the goals of the separate individuals are so linked together that there is a positive correlation
among their goal attainment. An individual can attain his or her goal if and only if the other participants can attain their goals. Thus a person seeks an outcome that is beneficial to all those with whom he or she is cooperatively linked. A competitive social situation is one in which the goals of the separate participants are so linked that there is a negative correlation among their goal attainments. An individual can attain his or her goal if and only if the other participants cannot attain their goals. Thus a person seeks an outcome that is personally beneficial but is detrimental to the others with whom he or she is competitively linked. Finally, in an individualistic situation, there is no correlation among the goal attainments of the participants. Whether an individual accomplishes his or her goals has no influence on whether other individuals achieve their goals. Thus a person seeks an outcome that is personally beneficial, ignoring as irrelevant the goal achievement efforts of other participants in the situation.

The meta-analysis showed cooperative learning situations were superior to both competitive and individualistic. "All three meta-analyses indicated that cooperation promotes higher achievement and productivity than individualistic efforts. The results hold for all subject areas and age groups” (Johnson, Maruyama, et al., p. 57). The comparison with competition showed "cooperation is superior . . . in promoting achievement and productivity" (Johnson, Maruyama, et al., p. 56).

In 1960, Hudgins found that fifth grade students working in groups made higher scores on math tests than students who worked individually. Whicker, Bol and Nunnery studied secondary precalculus classes and concluded “cooperative learning promotes mathematics achievement” (1997, p. 48). In undergraduate college statistics classes,
groups using cooperative learning techniques scored higher on tests (Potthast, 1999). McClintock and Sonquist (1976) studied undergraduate college sociology students and found students participating in cooperative groups received higher than average grades on term papers than working individually. They also concluded, "group performance was often better than what could have been expected of the best student in the group" (1976, p. 595). Lazarowitz, Hertz-Lazarowitz, and Baird reported “significantly higher gains in both normative and criterion measures of academic testing” for students in cooperative learning groups (1994, p. 1128). In other studies, cooperative-learning strategies were found to improve student performance (Chang and Mao, 1999) and cognitive achievement (Okebukola & Ogunniyi, 1984) in science classes. Augustine, Gruber, and Hanson (1989-90) report higher achievement resulting from cooperative groups in a wide variety of subject areas including spelling, social studies, health, and language.

Studies also reported students in cooperative learning groups were able to master and retain information better than students in individual or competitive situations (Humphreys, Johnson, & Johnson, 1992). Duren and Cherrington (1992) observed significant improvements in long-term retention of problem-solving strategies of students participating in cooperative learning groups. They reported students in cooperative groups were more willing to tackle a problem longer, made qualitative verbalization of problem solving strategies, justified solutions, were more open to alternative strategies and corrective feedback, and attempted to use learned strategies 7% more often than independent practice classes.

Johnson, Maruyama, et. al. (1981) hypothesized that the effects of cooperation would increase the more students worked together, encouraged and tutored each other,
and rehearsed materials being learned. Whicker et al. (1997) came to a similar conclusion but felt it might take some time for the benefits of cooperative learning to become apparent. They reported, "although there were increasing group differences on the second chapter test administered after four weeks, the groups did not significantly differ until the scores on the third chapter test were compared, 6 weeks after the cooperative learning technique was initiated" (1997, p. 48).

Studies have also shown cooperative techniques are more effective with higher levels of learning on Bloom's taxonomy (Good, Reys, Grouws, & Mulryan, 1989-90; Johnson, Maruyama, et al., 1981; Mevarech, 1999; Sharan et al., 1979-80). According to Sharan et al., the "fundamental goals of cooperative learning . . . are to promote processes of learning which are intellectually more complex and richer than the presentation-recitation model" (1979-80, p. 129). Their study showed little difference between traditional classroom and small-group learning for lower levels of Bloom's taxonomy. However, the small groups "were able to build more high level concepts on the basis of low level information . . . than were peers in the classrooms" (p. 129). Mevarech (1999) showed more pronounced differences in performance at higher cognitive levels while Chang and Mao (1999) found that cooperative learning was more effective at enhancing the higher-level cognitive domain. Mevarech (1999) also found that heterogeneous groups of students could solve complex cognitive tasks without lowering the progress of high-achieving students. Augustine et al. (1989-90) reported heterogeneous groups generally improved performance for both low-achieving and high-achieving students and groups promoted critical thinking.
Although the reasons for improved cognitive abilities resulting from cooperative learning are not totally understood, Hooper (1992) proposed the following: individuals received more attention from group members than a teacher can provide; process of generating explanations required deeper processing of information (Webb, 1988, as cited in Hooper, 1992); and group discussions helped students construct new knowledge (Vygotsky, 1978 as cited in Hooper, 1992).

**Affective Benefits**

Cooperative learning also produced a number of affective skills such as positive feelings toward other students, increased self-esteem, ability to work together, and improved social skills. According to Joyce (1999), the goal of cooperative learning is not only to increase academic performance, but also to develop the student's group processing and social skills.

Good et al. reported "enhanced motivation and enthusiasm, positive peer interaction, and advanced mathematical thinking" (1989-90, p. 56) as potential benefits of cooperative learning groups. Participation in groups also required students to develop the ability to work together, capitalize on strengths, and become more sensitive to each other.

A study by Blaney, Stephan, Rosenfield, Aronson, and Sikes showed "strong, positive pattern of behavior and feelings which can be attributed to the . . . groups" (1977, p 127). Students in cooperative groups felt they could learn from each other, increased self-esteem, and liking for groupmates carried over to the other students in the class. Another study also showed increased self-esteem and number of friends for students in cooperative groups (Lazarowitz et al., 1994). Johnson, Johnson, Johnson and Anderson reported, "students felt more accepted and supported by their teachers and peers" (1976,
p. 450). In addition, they found evidence that cooperative learning strategies promoted an intrinsic motivation to learn.

In a study of students from third to seventh grade, Hertz-Lazarowitz et al. observed students in "cooperative small groups were more cooperative" (1980, p. 104) than students in the standard presentation-recitation classrooms. In one group experiment, students in a cooperative group created more words, announced them to the group, helped each other, accepted new ideas, and generally enhanced productivity as compared to their non-group counterparts. In addition, Johnson et al. (1976) found students interacting in cooperative groups displayed more altruistic behavior.

The findings of Johnson and Johnson provided "behavioral evidence that the cross-ethnic relationships created in cooperative learning groups do generalize to free-time, free-choice situations" (1981, p. 448). The attitudinal measures indicated "students perceived the interaction to be supportive and encouraging of both academic work and friendships" (1981, p. 448). The results of the study indicated student interaction in cooperative learning was characterized by a perception of receiving more help (between minority and majority students), stronger beliefs that students encourage and support each other, feelings of getting to know each other and creating new friendships, thinking through rationale for answers, applying skills and knowledge in new situations, and greater cooperation with each other. Madden and Slavin (1983) obtained similar results by placing handicapped students in cooperative learning groups with normal-progress peers. The normal-progress peers showed a decrease in rejection of students with mild academic handicaps.
Students also liked working in cooperative groups. McClintock and Sonquist (1976) reported that group members were satisfied with their groups, regardless of their own or the group's performance, and preferred to work in groups on subsequent tasks. Whicker et al. (1997) surveyed student attitudes toward groups. Overwhelmingly, they found students liked receiving help from each other. Other student comments were (1) it is easier to work on complex or difficult problems together, (2) liked the opportunity to discuss and share ideas, (3) learned more in cooperative groups, and (4) needed suggestions and advice on how to work out problems. However, students consistently recommended rotation of group membership.

**Problem Areas**

Most of the problem areas identified with cooperative learning dealt with individual participation in the group. Good et al. (1989-90) reported that some groups required a lot of time to bond, which impedes initial progress. Also, there were subsets of students who remained passive and allowed others to do the work. Joyce (1999) studied the problem of group members who do not participate, the free-rider effect. Joyce allowed group members to penalize participants for failing to contribute by rotating them to a different group. Olson (1965; as cited in Hooper, 1992) determined that making individual effort more noticeable could eliminate the free-rider effect.

King (1993) reported a similar problem where high achievers tended to dominate the group and low achievers remained passive. In another study, Hudgins (1960) observed two types of group interactions that tended to negate group process. In the first type of interaction, there was a tendency for one student to determine the answer to math problems. If the student had high social status, the answer was accepted without
question. However, students with lower social status had to prove the correctness of their answer. In the second type of group interaction, students independently solved the problems and then compared answers. If answers did not match, one person tended to assume initiative and demonstrate a solution.

Another problem reported by Good et al. (1989-90) was inadequate curriculum materials for small groups forcing teachers to adapt materials designed for the individual work. As a result, there was a loss of continuity in content (within a class and between grades), tasks that were not group dependent, and inadequate pacing (not enough time for group process or too much time). Steiner, Stromwall, Brzuzy and Gerdes (1999) reported that poor implementation, poorly planned activities, unmonitored progress, and ineffective group incentives inhibit cooperative learning strategies. Another challenge was cooperative learning strategies often take more time and require a reduction in the amount of content covered.

The student surveys by Whicker et al. (1997) identified some problems as well. Uncooperative group members were seen as a disadvantage and some students felt left behind. Also, some students resisted cooperative learning strategies due to prior negative experiences or fear of trying something new (Steiner et al., 1999).

**Cooperative Learning and Technology**

Technology comes in a variety of forms from overhead slides to complex computer simulations. Computer-assisted instruction has been incorporated with cooperative learning techniques by grouping two or more students with one computer or having students use computers while they collaborate.
Research conducted on the integration of computer-assisted instruction and cooperative-learning techniques has followed the same methods and procedures as research on cooperative learning groups. Brush (1997) reported that both computer-assisted learning and cooperative learning could be successfully integrated, that student achievement increased, students stayed on task longer, and attitudes toward learning and each other improved. Dalton, Hannafin, and Hooper (1989) reported that the conversations among group members increased the amount of content learned. As a result of having to pace their work with each other, students mastered the content better and stayed on task. Also, the researchers noted that both high-achievers and low-achievers benefited from cooperative learning groups.

In a much earlier experiment, Amaria, Biran, and Leith (1968) paired cooperative learning techniques with programmed instruction and showed higher academic results than individualistic learning situations. In addition, the researchers reported that heterogeneous groups, on the average, worked better than homogeneous groups. They hypothesized that intelligent children frequently made intuitive leaps to solutions. However, in later learning, intelligent children frequently had to clarify the principles skipped in earlier leaps. Less bright children, on the other hand, needed help with conceptual structures. It appeared that forcing bright students to organize their concepts in order to explain them to the less bright students benefited both parties.

Cooperative Learning in Online Courses

Through the use of synchronous and asynchronous computer-mediated communication tools, the use of cooperative learning strategies is now possible in online
courses. Little research has been done to date in regard to online courses and cooperative learning.

According to Locatis (2000, pp. 7), “online learning environments may have more direct impact on the way interaction is structured, including the kinds of information accessed, the amount of learner control, the mode of interaction, and the immediacy of interaction. The online utilities available, the ones teachers choose to employ, and the ways teachers choose to employ them can directly affect the structure of interaction and consequently, learning outcomes.”

Undoubtedly, new dynamics will come into play with the movement of cooperative learning techniques to an online environment. Some issues to consider are:

1. Technical difficulties are inevitable. Berge (1995) recommended adequate infrastructure to support online courses and high-quality technical support for faculty and students. Also training may be required for both students and faculty members. Based on personal experience in online courses, Stone (1996) said that technology was initially an issue. However, she soon found herself immersed in the class.

2. Communication in an online environment also changes. Locatis (2000, p. 7) believes “computer mediated online environment acts to constrain and structure interaction . . . and may have an effect on the enjoyment and benefit learners derive from interacting.” Communication moves from verbal to written and visual clues are no longer available. “On the other hand, … technologies may encourage more equal levels of participation (Scardamalia, et al., 1994, as cited in Locatis, 2000, p. 7) and more critical
thinking” (Newman et al., 1997, as cited in Locatis, 2000, p. 7). McGarth (1997-98, p. 293) found “talk is a familiar tool for teaching . . . but in the traditional class, . . . often only one answer is heard, and the same students tend to volunteer.” In computer-mediated communication, she said “many answers to any one question may be offered . . . and considered, (and) weighted by all.” For McGarth, “conference has all the advantages of small group student-centered activity, plus the added advantage that the number of peers each student is interacting with is enlarged.” Stone (1996) found webchats were useful for real time communication to discuss the course and get acquainted but limited for purposes of discussion. She also found that communication online required “being concise and clear.” Due to the absence of non-verbal clues, misunderstandings were more likely and required suspension of judgment and requests for clarification. Stone also recommended alternative ways to express emotion such as emoticons.

3. Motivation may be another problem for students online. Stone (1996) found that interaction with other participants was necessary for her motivation. “I have learned a great deal . . . from the postings of others, and their replies to my postings have often forced me to critically examine my own assumptions” (p. 5). Another aspect of motivation is not to overwhelm students with information overload. Too much information may result in social loaﬁng and sucker effect. In both instances, students stopped participating because they perceived it was no longer required either because of the size of the group or because others are not participating (Hooper, 1992). In both instances, the
size of the group must be closely monitored to insure involvement of all members.

Computer-mediated communication has the potential to expand cooperative learning techniques to distance education and also expand communication options in traditional classes. However, the dynamics of these new technologies must be researched to determine the best procedures to enhance cooperative learning.
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