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Group Investigation as a Cooperative Learning Strategy: An Integrated Analysis of the Literature

The cooperative learning strategy of group investigation has been used extensively in elementary and high school classrooms. Whereas this learning strategy seems to benefit low- and middle-achieving students, the performance of high-achieving students seems to change little. This article examines the literature on group investigation as a cooperative learning strategy and offers suggestions for areas of future investigation and research.

La stratégie d'apprentissage coopératif qu'est l'enquête collective a été largement utilisée dans les classes à l'élémentaire et au secondaire. Alors que cette stratégie semble porter fruits auprès des élèves dont le rendement est médiocre ou moyen, elle ne semble pas influencer le rendement des élèves très performants. Nous nous penchons sur la littérature portant sur l'enquête collective comme stratégie d'apprentissage coopératif, et offrons des suggestions de domaines pour la recherche à l'avenir.

Since learning is something that the pupil has to do himself and for himself, the initiative lies with the learner. The teacher is a guide and director; he steers the boat but the energy that propels it must come from those who are learning. (Dewey in Simpson, Jackson, & Aycock, 2005, p. 59)

Group investigation is a successful and extensively researched cooperative learning strategy that involves task specialization (Slavin, 1995). Working in

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small cooperative groups, students investigate a specific topic. They decide how to study the topic and divide the work among themselves. The information collected is then compiled into a whole and presented to the entire class (Sharan & Sharan, 1990). To comprehend fully the complexities of group investigation, "it is imperative to examine the intellectual, pedagogical, and psychological foundations upon which this method is based" (Sharan & Sharan, 1992, p. 1). This learning method has many advantages that are made clear below.

Group investigation allows students to be directly involved in how they obtain knowledge; they are not mere recipients. It is a democratic approach in a classroom setting. This approach can be traced back to Ancient Greece. In their writings, Plato and Aristotle espoused the notion of an "ideal" society involving a democratic educational system. Since that time, educators such as Augustine, Sir Thomas More, and John Locke have produced educational models with a democratic theme; however, it has been difficult until now to implement democratic methods in school settings (Joyce & Weil, 1996).

Dewey has been credited by educational researchers for the foundational work in this area. He pointed out that meaningful learning occurs when students experience how knowledge is generated (Simpson et al., 2005). "Dewey's view of teaching and learning [takes] into consideration the organizational, social interactive, motivational, and cognitive aspects of the process of schooling" (Sharan & Sharan, 1992, p. 2). This method is applicable to most branches of human knowledge. Dewey stated that students should work collaboratively to create knowledge and develop critical thinking skills that would be useful to them as adults in democratic societies.

The school of *group dynamics* agrees with many of Dewey's precepts. Lewin (1936), a pioneering theoretician and researcher in the field of social psychology, postulated that behavior is not only dependent on one's personality and response to stimuli, but also on one's interaction with one's environment.

The cognitive features of investigation as articulated by Dewey are consistent with the work of other theorists such as Piaget, Bruner, and Vygotsky. These scholars helped to formulate a new approach to cognition called constructivism. Group investigation proponents believe that the learner constructs knowledge; the teacher is a guide who assists in the management of learning tasks. In support of this approach, Gardner has identified *Interpersonal Intelligence* as "the most powerful predictor of whether or not an individual will be successful in life." These theorists point out that a synergistic effect occurs when the group investigation method is used.

Cooperative learning strategies can be layered with activities to aid in the above-mentioned integration. Students learn more information at higher levels when they learn in cooperative groups rather than in competitive, individualistic environments (Leicester, Modgil, & Modgil, 2000). Cooperative learning produces an effect size of 1.25 standard deviations related to higher-order thinking when compared with more traditional teaching techniques (Bennett & Rolheiser, 2001). Thus group investigation is a more effective teaching method than other more traditional teaching techniques. Collaboration offered through cooperative learning techniques such as group investigation encourages "insights and solutions to arise synergistically" (Driscoll, 2005, p. 396). Sylwester (2000) suggests that social feedback causes changes in serotonin levels that in

turn relate to self-esteem. Serotonin fluctuations are thus adaptations that cause movement up or down negotiated social hierarchies.

Using one teaching approach to enhance another is perhaps the most effective method of learning. Since 1943, studies have refuted the notion that students in social environments would be outperformed by students in competitive environments (Joyce & Weil, 1996). In the classroom, group investigation offers teachers the opportunity to encourage students to reach high levels of learning.

Teachers' Decisions and Role

Sharan (1995) has demonstrated that students from grade 2 through senior high school have experienced social and academic benefits when participating in a group investigation. Some teachers are more comfortable than others in transitioning from a traditional teaching role to that of a facilitator. As part of the investigative process, "the teacher acts as a resource person, guide, consultant, and classroom manager" (Pedersen & Digby, 1995, p. 254). By preparing students to work in groups in the group investigation framework, formulating an interesting question or issue to investigate, and choosing appropriate monitoring and assessment procedures, the teacher implements the process (Table 1).

What to Study?

Group investigation can be used to study a wide range of subject areas, as long as the question or issue being investigated lends itself to broad inquiry. In order to motivate the class to participate and ensure student learning, teachers must design the problem around curricular expectations and students' interest. It is critical that the teacher have a firm grasp of the subject matter being investigated. It is not the teacher's responsibility to answer every question; however, the teacher should appreciate the students' questions and be able to assist them in finding an answer (Sharan & Sharan, 1992). After introducing the topic, teachers must allow students time to discuss and formulate their own questions. Students can then take ownership of the issues raised and eventually researched.

Preparing Students for Group Investigation

Because group investigation is dependent on student interaction, Sharan and Sharan (1992) suggest that teachers take time to promote interactive and productive discussion; framing appropriate questions and allowing students time will encourage this process to occur. A suggested starting point would be to use the think-pair-share strategy.

Table 1
The Stages of Implementation of Group Investigation

Stage 1: Class determines sub topics and organizes into research groups
Stage 2: Groups plan their investigations
Stage 3: Groups carry out the investigation
Stage 4: Groups plan their presentations
Stage 5: Groups make their presentations
Stage 6: Teachers and students evaluate their projects

Group investigation is successful when teachers appeal to students' interests and intrinsic motivation. Students can then choose their own groups (4-5 members) based on their personal interests. This reinforces the "Deweyian principles of learners as active participants and decision makers" (Mitchell, Reilly, Bramwell, Solosky, & Lilly, 2004, p. 2). If a particular topic is popular, teachers may allow two groups to study it. The scope of the topic should allow for acceptable differences in the subtopics that are generated.

Group investigation as a learning strategy is not always appropriate, however. In situations where time is limited, when students may be too young or not have the skills to collect a variety of resources independently, the teacher may wish to provide appropriate resources for each group. Interestingly, students who participated in group investigation in a secondary chemistry class reported that although they recognized the benefits, the teacher had not chosen the right time of the year to implement it. Because the group investigation occurred just before a national exam, a decline in the students' motivation scores was reported (Shachar & Fischer, 2004).

Monitoring and Evaluation Procedures

It is important for teachers to monitor student groups closely. If a group member is not participating, the teacher may choose to meet with the student individually. At this time, the teacher can offer helpful and encouraging advice on how to deal with the particular situation. Teachers may also provide worksheets for students to record information such as group goals and progress. By asking students to record the group's plan, individual and group accountability will be ensured.

Encouraging students to capitalize on learning experiences outside the classroom such as visiting libraries, museums, workplaces, or parks enhances the group investigation learning process. In addition, if students experience difficulties locating resources, the teacher can provide assistance. Because the final presentations differ, teachers may also assist students with the appropriate materials and technology.

Group investigation lends itself to a wide variety of assessment and evaluative tools. Teachers may choose a variety of methods that consider both diagnostic (anecdotal observation records) and formative assessment (test). Sharan and Sharan (1992) suggest several methods of evaluation including collaborative, ongoing, and reflective processes, as well as assessments such as written tests, discussions, reports, and presentations.

Evidence of the Effect on Learners of Implementing the Model

When assessing the effect on learners of implementing the group investigation model of cooperative learning, researchers ask the same question as the Ancient Romans, *cui bono*, that is, who benefits? The evidence of the effect of group investigation on learners can be divided as follows: (a) what is the effect of group investigation on learners? and (b) what is the effect of group investigation on learners compared with other learning models?

Effect on Learners

Research on the effects of group investigation indicates that this method yields "superior student outcomes compared with those achieved by peers in classes conducted with the traditional whole-class method" (Shachar & Fischer, 2004,

p. 71). The scope, domain, and uniformity of the outcomes do vary; however, despite this variance, the generalization holds true that group investigation benefits learners.

In a study of the group investigation method to teach collaborative research activities reported by Agada (1998), it was found that learners realized gains in both social skills and cognitive knowledge. These two domains serve as a model for reporting the effect of group investigation.

Social Skills

Shy and reserved students, who would typically have difficulty working in group settings, admitted that the exercise pushed them to interact more than they would have done in more traditional class formats. Such interactions lead in some cases to the formation of social networks with peers outside the class project (Agada, 1998). Group investigation encourages the students to remain engaged with the group on various levels: cognitive, affective, and behavioral. Students in the Agada study reported that they had to become more reflective of their particular strengths and weaknesses within and across these levels, particularly in their social skills. The effect on social skills can influence cognitive skills through increased comfort levels in the group and the resultant increase in application to the inquiry question. Jongeling and Lock (1995) reinforce the social benefits of group investigation. They point out that group investigation provides opportunities for cooperative peer group interaction, while also creating the conditions necessitating conflict resolution.

Cognitive Skills

Several aspects of group investigation produce gains in cognitive knowledge. Agada (1998) found that the research and presentation exercises required students to be actively involved in and take responsibility for their learning. Furthermore, the multiple presentations by the group investigation groups not only enhanced [students'] study processes, but also reduced their anxiety. Consequently, this experience also improved the quality of their presentations. Similarly, the need to appraise others' ideas and sometimes confront them with opposing points of view brought about such dispositions as empathic understanding, critical thinking, and cognitive flexibility (Agada; Parkay, Oaks, & Peters, 2000).

In a study that employed a modified group investigation method on students' earth science achievement in secondary schools, results indicated that there was "no significant benefit found between the experimental groups and the control groups when overall achievement, knowledge-level, and comprehension-level test items were considered" (Chang & Mao, 1999, p. 374). However, Chang and Mao found that "students who worked cooperatively performed significantly better than students who worked alone on the application-level test items" (p. 384). A possible explanation for this tension in the literature is pointed out by Shachar and Fischer (2004), who reported "that the Group Investigation method affected students from different achievement levels differentially" (p. 85). The effect of the group investigation method on low and middle level achievers was significant, yet the effect on high-level achievers was negligible.

Other studies support the positive effect of group investigation. In a study of the effect of using group investigation for teaching chemistry at the secondary level, a learning process checklist revealed that there was "sharing of ideas, opinions and materials, helping of one another, planning, interpreting, and interacting purposefully in the instructional tasks" (Mun, Ngoh, & Lian, 2004, p. 1). Shachar and Fischer (2004) reported that "students expressed more positive attitudes toward the study of science, were more relaxed and less tense about studying science, and demonstrated superior laboratory skills than did students in traditional classrooms" (p. 86). Taking responsibility for their own learning, establishing tasks, and setting deadlines are all reported benefits to learners using the group investigation method (Jongeling & Lock, 1995).

Overcoming Challenges in Implementing the Group Investigation Model

It must be pointed out that in some instances group investigation has the potential to fail as a task specialization method. Experience and repeated practice with teamwork are necessary to make learning goals reachable. Cooperation, respect, and commitment are key values in this method. It is important for educators to be aware of the challenges of group investigation in order to overcome them.

Teamwork

Yoder-Wise (2003) points out that group work is not necessarily teamwork. For group investigation to work, teambuilding skills must be developed in the group. Parker (1990) views a team as a "group of people with a high degree of interdependence geared toward the achievement of a goal or a task" (p. 324). Group investigation lends itself to teamwork: groups must have defined objectives, ongoing positive relationships, and a supportive environment to accomplish a specific task (Sibbet & O'Hara-Devereaux, 1991). Groups work effectively when members listen, show respect, and are committed to completing the task. Ineffective groups have poor communication skills, lack respect, and are not committed to the task at hand (Jason, 2000). For it to succeed, group investigation among students must be done such as to facilitate team-building and teamwork.

Synergy occurs when people in a group work together to produce extraordinary results that could not have been accomplished by one person (Mears, 1997). Group investigation requires students to have synergy in order to be successful. A group lacking in this will often fail. To create synergy, teachers can assist groups by suggesting a few simple rules: develop a clear purpose for the investigation, listen actively to each participant, be compassionate to each other, tell the truth, be flexible, and be committed to the outcome of learning (Kohn, 2004).

A key aspect of group investigation is trust, that is, placing one's well-being in the hands of another. Members of the group must trust that each will do his or her share (Verderber & Verderber, 2001). When there is lack of trust among team members, the task is often poorly performed.

Cooperation

A key skill of group investigation is cooperation; learners actively proceed together toward the goal they seek. All group participants must feel that their knowledge, skills, and contributions are needed, valued, and respected. It is

vital that students using this method learn how to state openly what they are thinking and to be responsive to the views of other team members. Participants, therefore, must give and receive feedback that is constructive and facilitates learning.

Group investigation can only be implemented in an educational setting that supports interpersonal dialogue (Slavin, 1995). Participants in this method must be willing to cooperate with each other and with the teacher. Moreover, teachers cannot work with students who are not willing to participate cooperatively.

Task Segmentation

As a form of task specialization, group investigation has the potential to narrow one's learning to subtopics or subtasks. Slavin (1995) notes this danger and suggests ways to overcome it. Teachers need to ensure that time is given to students for sharing knowledge. If this time is not given, much of the work will not be communicated to classmates. Phelps and Damon (1989) found that task methods such as group investigation enhanced cognitive growth by allowing students the opportunity to communicate ideas and gain greater conceptual clarity.

Shachar and Fischer (2004) note the importance of group size in cooperative learning classrooms. They point out that "direct interaction among people is potentially most productive and meaningful in relatively small groups" (p. 71). Group investigation works better with small groups rather than large groups as it is easier to share knowledge and new ideas in smaller groups.

Conclusions

This review highlights future areas for investigation and research of cooperative learning as a learning/teaching method. These include: (a) more detailed research into which students benefit most from cooperative learning; (b) addressing the question as to whether cooperative learning could actually be disadvantageous to high-achieving students; (c) researching the characteristics of teachers who are drawn to this method of teaching; and (d) examining whether this teaching method can be taught.

Group investigation has the potential to be a powerful form of cooperative learning. Rooted in the ideals of Dewey and further developed by Lewin and Thelan, this method twins a democratic foundation with the dynamics of academic inquiry. Although it poses challenges for teachers in terms of structure and evaluation, group investigation nonetheless offers students the opportunity to take ownership of their own learning and to demonstrate their knowledge and understanding.

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