Group Investigation: Theory and Practice

Daniel Zingaro, Ontario Institute for Studies in Education, Toronto, Ontario

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1   Introduction

Cooperative learning (CL) is more than having students work in groups: it is a fundamental shift from teacher as information provider and sole source of truth, to teacher as facilitator [2]. It involves the use of tasks whose completion requires the combined efforts and skills of the individual group members. Group investigation (GI) is one form of CL, and the focus of this paper. The following sections consider the technique in general, origins of the model, key decisions teachers must make, effects on learners, and implementation concerns and gaps in the research base.

2   What is Group Investigation?

In GI, students form interest groups within which to plan and implement an investigation, and synthesize the findings into a group presentation for the class [2]. The teacher's general role is to make the students aware of resources that may be helpful while carrying out the investigation. GI includes four important components ("the four I's"): investigation, interaction, interpretation and intrinsic motivation. Investigation refers to the fact that groups focus on the process of inquiring about a chosen topic. Interaction is a hallmark of all cooperative learning methods, required for students to explore ideas and help one another learn. Interpretation occurs when the group synthesizes and elaborates on the findings of each member in order to enhance understanding and clarity of ideas. Finally, intrinsic motivation is kindled in students by granting them autonomy in the investigative process.

Implementation of GI proceeds in six steps [2, 8, 5]. First, the teacher presents a multi-faceted problem to the class, and students choose an interest group. The problem posed here is particularly important, as a variety of reactions from students is necessary for appropriate group formation. Teachers

should avoid giving their own ideas or rejecting ideas from students. Second, groups plan their investigation — the procedures, tasks and goals consistent with the chosen subtopic. Third, groups carry out the investigation as planned in the above step. The teacher's role at this step is to follow the investigative process, offering help when required: suggesting resources, ensuring a variety of skills is being used, etc. Fourth, groups plan their presentation. They evaluate what they have learned, and synthesize it into a form that can be understood by the class. Fifth, groups conduct the presentation. Finally, the teacher and students evaluate the investigation and resulting presentations. Throughout the process, group representatives often make reports to the class, helping group members appreciate that they are part of a larger social unit.

As is generally found with CL techniques, research consistently finds higher levels of achievement from GI activities as compared with whole-class instruction, particularly on matters of higher-level cognition. It has also been found that GI improves positive inter-ethnic relations and enhances intrinsic motivation. Compared to other CL methods, GI has strong roots in giving students control over their learning [8].

3   Origins of the Model

According to [2], GI has at least four theoretical origins.

3.1   Dewey's Educational Philosophy

For Dewey, the goal of education is to develop socially responsible citizens who understand how to work together to solve problems and construct knowledge. Thus, educational environments should mirror real-world democracies in that the students have the opportunity to make choices and discuss ideas and thoughts. These criteria were present in Dewey's classrooms of the early 20th century and continue on in today's GI: students get to choose the subtopic of study, then are free to explore their own ideas and the ideas of their group mates in order to arrive at consensus. This is to be contrasted with traditional teaching in which this horizontal flow of information is replaced by a vertical command-and-control philosophy that runs against the core of what Dewey believed. For example, as part of his pedagogic creed, Dewey stated "The teacher is not in the school to impose certain ideas or to form certain habits in the child, but is there as a member of the community to select the influences which shall affect the child and to assist him in properly responding to these influences" [1].

3.2   Group Dynamics

Group dynamics encompasses the study and solution of problems that occur when people work in groups [2]. It makes a distinction between people simply working in the same place, and actual groups — the latter characterized by goal interdependence and sharing of resources. It is important for teachers to understand how groups work so they can facilitate interaction among the students. For example, seminal work by Tuckman [9] identified four important stages in the development of both social and task behaviors. In the social realm, the stages are testing-dependence, conflict, cohesion, and functional roles. In the task realm, the stages are orientation, emotionality, relevant opinion exchange and emergence of solutions. Evidently, debate and argument in the second stage of group development is simply indicative of natural group processing.

3.3   Constructivist Psychology of Cognition

According to [2], "the constructivist perspective asserts that knowledge is acquired through a person's interactions with the social and material environment". As already noted, interaction is a key component of all CL techniques, including GI. Students guide their own learning as they investigate a topic of interest to them. This can be contrasted with direct teacher instruction, where there is very little interaction; instead, knowledge is transferred directly from the teacher to the student.

3.4   Motivation Theory

It has been argued that standard classroom instruction depends largely on extrinsic motivation [2]: the students learn material not because they want to, but because it leads to attainment of grades and other awards. By contrast, the goal of GI is to have students learn because they are genuinely interested in the material.

4   Decisions for the Teacher

The fact that intrinsic motivation is so central to GI highlights the importance of the task that the group is to work on. While each group does choose to work on their own subtask, the overarching teacher-chosen task does determine the extent to which students can work on something they find appealing. There is thus an important decision to be made here — choosing a topic that is broad enough to encompass all students' interests, but not so general as to

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fail as an initial motivator or guide. Examples include: what makes a poem a poem? How did explorers change the world? How does speaking more than one language affect us [7]? Additionally, teachers must choose topics that are relevant to students' lives, and that increase their understanding of the world.

Group formation is also important for GI, as it is for most CL methods. The steps of GI implementation essentially result in interest groups, since students with similar interests will choose the same subtopic. This is central to the idea of letting students guide their own learning. However, interest groups may end up being friendship groups in disguise. Since teacher-selected groups are generally recommended when implementing CL, it's interesting to think about alternate group formation strategies that maintain the remainder of GI unchanged. One idea would be to limit the number of subtasks available, so that each receives 8-10 students. Then, within the chosen subtask, teachers may "randomly" assign the students to two groups of four or five students. Done carefully, this may not hinder motivation, and gives some level of group formation control back to the teacher.

The size of groups must also be governed by the teacher. Group sizes from two to six have been recommended [5], but teachers must also decide what to do if students are not dispersed equally among the subtopics. Certainly, arbitrarily moving people between groups is to be discouraged. However, some students may have two equally appealing interests, and this is a choice the teacher can make based on group formation criteria. Further, groups should be ethnically and academically heterogeneous, but this may interact with the chosen topic or available subtopics. For example, if one subtopic is more challenging than others, perhaps an academically homogenous group will result. In this case, the teacher could try to deliver the message that all subtopics require varying skills in order for a group to successfully investigate the issue.

The group vs. individual grading question has also been raised about GI [5]. Group grades resonate with the key ideas of GI, where a component of evaluation is the process of interaction itself. However, in the absence of competition and within-group evaluation, a grade based in part on individual performance may increase individual accountability.

5   Effects on the Learner

Various positive effects of GI are reviewed in [5]. For example, students of GI classrooms have been found to perform better on high-level questions and those requiring elaboration of responses or the use of problem-solving.

Interestingly, GI does not have an adverse effect on low-level (information retrieval) questions, which might be surprising due to the lack of the "fast" one-way teacher delivery of information. In fact, sometimes GI has been found to be advantageous for this type of learning as well. Students from GI classrooms have also shown to be more cooperative and altruistic, even when interacting with students outside of their team or in situations outside of the classroom. When data of student perceptions was collected, themes raised about GI included being able to express themselves, greater independence and responsibility, and a sense of being accepted. In terms of the affective domain, GI has been found to promote interpersonal liking, trust, and more positive attitudes toward school and learning.

GI also produces gains in inter-ethnic relations. For example, one study in [5] used GI groups consisting of grade 7 and 8 white, black and Mexican students, and found that white children's attitudes improved toward the Mexican students. Unfortunately, white children did not change their attitude towards the blacks who, in turn, chose other blacks as friends. Interpersonal conflicts between members of different ethnic groups was also reduced in GI classrooms.

In Israel, junior high schools are very heterogeneous, including students of high- and low-socioeconomic status; teachers often point to this fact when explaining their teaching difficulties [4]. For example, with high- and low-achieving students in the same class, at what pace should direct instruction proceed? Of course, GI is directly suited to heterogeneous classrooms, so we might expect significant gains from its use here. GI promotes open verbal interaction and enables students to become resource persons for other students, highlighting the individual strengths of students from different ethnic groups. CL methods (including GI and STAD) have been found to improve the learning of English, including comprehension and knowledge of grammar rules. Most importantly, no interaction was found between ethnicity and achievement. Other studies have found similar effects in subjects such as history and geography, and GI has also been helpful in increasing cross-ethnic cooperation. In particular, one study [3] found that students in GI settings expressed themselves more frequently, and turn-taking among ethnic groups was symmetric. This is to be compared to direct instruction classes, where western students dominated the students of middle eastern background in terms of number of turns of speech. This is interesting especially in light of previous studies that concluded that middle eastern students' language abilities were not as advanced as their western counterparts. It appears that other studies cited here are more accurate: they claim that eastern students simply express themselves in nonstandard fashions that are not appreciated in schools. It may be that GI fosters this appreciation and enables eastern

students' perspectives to be fairly heard. GI also resulted in both ethnic groups expressing more positive statements toward middle eastern students. Finally, Student achievement scores were higher when GI was used.

GI can also have negative effects on some students, evident when student perceptions are obtained following a GI experience [2]. Categories of negative responses include not wanting to research information on their own, feeling that GI wastes more time than direct instruction, not learning about other areas of the overall topic, not possessing required research skills, and dissatisfaction with lack of cooperation.

6   Implementation Issues

As discussed in [2], teachers' training does not adequately prepare them for implementing GI, so substantial training is required. In preparation for the GI experiment of [2], teachers participated in GI training, which stressed the differences between GI and direct instruction, preparation of students for effective CL, features of GI, analysis of obstacles and difficulties, and practical experience planning a group investigation. Teachers must model thoughtful reactions to student questions, contributing to the creation of an environment that welcomes diversity in personal opinion [7]. They should also anticipate the central issues of the chosen problem, in order to uncover sensitive areas and generally prepare for student responses.

Another impediment to implementation involves student resistance [2]. When students have been exposed only to the direct method of instruction, GI comes as a surprise in various ways. For example, students may be uncomfortable not being told precisely what to know by the teacher. They may not be prepared for the types of evaluation GI entails, coming to prefer the usual tests and exams. This is especially true when only one or two classes use GI, so that students remain with direct instruction for the rest of the day. If school expectations do not change, and GI is used in a direct instruction world, students may see it as just a distraction from getting high grades (which are "what really counts").

7   Gaps in the Research

The systematic procedures for using GI, and its many apparent virtues, have been sufficiently documented. Lacking, though, is the answer to the question: why does GI sometimes go wrong?

For example, consider the study done in [2]. The goal of the study was

to assess the effects of achievement and motivation by the use of GI in grade 8 classes in two schools in Singapore. Also of interest was any differential effect of GI on high- or low-achieving students. The hypotheses were that GI would increase achievement and intrinsic motivation as compared with direct instruction, and do so more for low-achieving students. This is in concert with what would be expected. However, the findings did not support this: GI did not improve achievement or motivation at all.

The most dominant type of instruction in Singapore is the direct instruction "presentation-recitation" method. However, from previous studies cited in [2], we know that specific types of CL have been found successful (for example, increasing achievement or cross-ethnic tolerance), including Jigsaw, Learning Together, Kagan's structures, and STAD. These CL methods stress mastery of material more than GI, which focuses more on involvement in learning, positive social relations, and successful team functioning. For example, STAD employs team learning only after typical classroom instruction, which may set the stage for the gains that follow [5]. One explanation for the findings, then, is that as a CL method, GI just doesn't measure up.

Other hypotheses abound. Were the learners not prepared for the new method of instruction? Was the six-week GI experiment not long enough to have an effect? Were there school norms, attitudes or expectations that got in the way? Was GI rendered ineffective because the method of evaluation was unchanged? These hypotheses will have to be investigated further; for now, the authors posit that existing school norms are the overriding issue.

Sharan [6] further cautions against hastily drawing conclusions from research. For example, many studies do not include the frequency or duration of the cooperative learning, the competence of the teacher, or how motivated the teacher is to engage in the techniques. Furthermore, most CL methods (including, as we know, GI) have no clear guidelines for how long the CL should last, how long teachers should be trained, or how much time it takes for teachers to master the ideas. These types of variables make each research study potentially different, and increases the odds that a mistake will be made in practice.

8   Conclusion

The research into GI makes a compelling case for its use: it has been shown to improve achievement, increase motivation, and foster inter-ethnic friendships and respect across an array of age groups and subject areas. While teacher training, student resistance and contextual issues can stand in the way, it is certainly worth trying to overcome these for the sake of an authen-

tic implementation of GI. Compared with more lightweight CL approaches, GI focuses on more than the mastery of academic material. It transforms the classroom into a social world where each of its communities serves an important investigative role, and where mutual support and trust is required within and among groups. While single-classroom use of GI is a start, research described here encourages its more widespread use so that it becomes the expected or preferred mode for learning instead of just something of an experiment. Only then will we really understand the full positive effect GI can have on our students.

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