Reconsidering the Issue of Cooperative Learning With Gifted Students

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This paper addresses the discussion regarding whether or not cooperative learning methods are good for gifted students by considering the processes of task-related interaction within different cooperative structures. Differences and similarities in the nature and type of task-related interactions that are promoted by different cooperative learning structures are discussed. Furthermore, the congruence between the types of student interaction that are promoted by different structures and theories of how students learn are considered. The implications of these points for gifted students are addressed. Finally, it is suggested that collaborative learning—an extension of cooperative group structures that is premised on social-constructivist theories of learning—can provide rich learning opportunities for gifted students in mixed-ability groupings.

Student interaction with other students about schoolwork, particularly in small groups, has long been identified as a means of promoting learning (e.g., Johnson & Johnson, 1975; Sharan, 1980; Slavin, 1980; Webb, 1983). Cooperative learning methods, or formats to structure interaction within small groups, have received considerable attention over the past 30 years. Many studies have shown that cooperative learning is associated with gains in achievement, in addition to having social and affective benefits (Sharan; Slavin, 1980; Webb & Palincsar, 1996). Thus, cooperative learning has become especially popular with teachers (Antil, Jenkins, Wayne, & Vadsy, 1998) and is recommended by researchers (e.g., Midgley, 1993), authors of education texts (e.g., Ormrod, 2003), and policy advisers or advocates (e.g., Jackson & Davis, 2000; National Middle School Association, 1995). However, there

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has been sustained concern about its use with gifted students. Specifically, the concern is that gifted students who are grouped with nongifted students may, due to a number of factors, have their opportunities for learning curtailed. Thus, there has been ongoing debate between proponents of cooperative learning and advocates of gifted education about whether or not gifted students should be grouped with less academically able students (e.g., Matthews, 1992, 1993; Robinson, 1990a, 1990b; Sapon-Shevin & Schniedewind, 1993; Slavin, 1990a, 1990b). The debate continues, unresolved (Robinson, 2003).

In this article, we raise a different perspective regarding the use of cooperative learning. We suggest that the discussion regarding whether or not cooperative learning methods are good for gifted students would be enriched by considering the processes of task-related interaction within those methods. Rather than viewing cooperative learning as a single approach, as is most typical, we focus on differences and similarities in the nature and type of task-related interactions that are promoted by different cooperative learning structures. Additionally, we consider the congruence between the types of student interaction that are promoted by different structures and theories of how students learn. We hope that taking this more nuanced approach to considering how and why different kinds of structures and student interactions may be related to learning may stimulate new discussions about the use of cooperative learning for gifted students. Ideally, we hope it will encourage a more differentiated view that takes into consideration the kinds of interactions, tasks, and structures involved in cooperative learning. To preface our argument, we briefly review research about cooperative learning and gifted students.

Cooperative Learning and Gifted Students

Cooperative learning encompasses a range of instructional formats within which small groups of students work towards a shared goal and depend on the efforts of others (i.e., interdependence). The energizing of multiple perspectives, abilities, talents, and experiences in reaching a common goal is believed to create learning opportunities for all group members that are less likely in traditional instruction. A substantial body of research has indicated that, in general, students learn more in cooperative groupings than with individualistic or competitive structures (e.g., Bossert, 1988–1989; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Slavin, 1980). However, because advocates of cooperative learning recommend that students be grouped heterogeneously (e.g., Aronson, Blaney, Stephan, Kikes, & Snapp, 1978; Johnson & Johnson, 1975; Sharan, 1980; Slavin, 1980), including by ability level, those concerned specifically with gifted students have questioned how much academic content they learn when they are grouped with nongifted students (Feldhusen & Moon, 1992; Matthews, 1992; Robinson, 1990a, 1990b).

Research studies have not provided compelling answers about outcomes of cooperative learning for gifted students. Few of the studies are methodologically sound (Neber, Finsterwald, & Urban, 2001; Slavin, 1990a). Furthermore, differences in terminology and in how gifted (or high-ability) students were identified make comparisons among studies, and generalization from them, difficult (Robinson, 1990a). However, a small number of well-conducted studies have indicated that gifted students can profit academically from cooperative learning. As a group, gifted students score equally high on achievement tests after either cooperative learning or regular individualized classroom instruction (Neber et al.). Furthermore, their achievement does not differ significantly as a function of having gifted or nongifted group members (Kenny, Archambault, & Hallmark, 1995).

Positive research findings have not alleviated many of the longstanding concerns about the use of cooperative learning with gifted students in heterogeneous ability groups. These concerns include worry about it stifling motivation and enjoyment of academics and impeding opportunities for learning. Many gifted students do not view cooperative learning positively (Clinkenbeard, 1991; Matthews, 1992) and prefer individualistic to cooperative structures (Li & Adamson, 1992). In formats where group members work on the same content and at the same pace, gifted students complain that they feel bored because the work is too easy or the pace is too slow. If they are called on often to tutor others, gifted students tend to feel used—as if they are doing the teacher's work (Robinson, 2003). They may feel that their contribution to a group product or score is greater than that of the others, thus carrying their group. This feeling of disproportionate input and inequity may lead to resentment or to putting forth less effort in the future. Students may also believe that working cooperatively leads to them receiving lower grades than they would have gotten individually or to feel dissatisfied with the quality of the group's end product (Robinson, 2003). Gifted education teachers, too, voice many of these same concerns (e.g., Nelson, Gallagher, & Coleman, 1993).

Towards Reconciling the Different Perspectives

The differences in positions about the desirability of cooperative learning for gifted students are striking. However, rather than add to calls for more high-quality studies on gifted students in heterogeneous or homogenous ability groups, we give prior consideration to some of the implicit assumptions within those two positions and address some of the factors that may account for different outcomes. We argue that this analysis affords a more considered understanding of the complex relationships involving curriculum and instruction for gifted students.

The literature on cooperative learning for gifted students contains implicit assumptions about both. One assumption is that gifted students are a uniform, homogenous group. Because giftedness is characterized by greater breadth and depth of knowledge and an ability to learn at a faster pace (e.g., VanTassel-Baska, 1998), there tend to be assumptions that gifted students learn all subject areas quickly, are more advanced in their knowledge than their nongifted classmates, and do not hold misconceptions. In reality, however, there is considerable heterogeneity; gifted students may have advanced knowledge in some subjects but not others, underachieve, have learning disabilities, or hold misconceptions that limit genuine understanding.

A second assumption involves cooperative learning as an instructional practice. The term is typically used as an all-encompassing "umbrella" label, as if all methods or structures are equivalent and have the same outcomes for students. This generic label belies crucial inherent differences (e.g., emphases on competition, use of external rewards, extent to which individuals' contributions to the group's product are salient and rewarded) that may be associated with different learning and motivational outcomes (Cohen, 1994; Robinson, 1991). Before we address apparent differences in processes and outcomes, however, we present an overview of the predominant cooperative structures (see Robinson, 1991, for a more extensive review).

Cooperative Learning Structures

Cooperative learning involves group members working together towards a shared goal. Slavin (e.g., 1983) has argued that to be successful, cooperative learning structures must require individuals to be accountable to each other with respect to the group's performance, rewards (e.g., certificates, grades) should be given to the group as a whole, and all students should have equal opportunities to be successful. However, benefits have been shown for some formats that have less structured accountability structures or do not use group rewards (e.g., Aronson et al., 1978).

Working cooperatively involves group members combining efforts to accomplish a task. Students are responsible for ensuring that everyone in the group is involved in the task and understands and learns the material. In the Learning Together model, group members share a set of materials, agree on the group's answers, complete a single product (e.g., a group worksheet), and receive a single group grade (e.g., Johnson, Skon, & Johnson, 1980). There is a strong emphasis on prosocial behaviors (e.g., helping others) and positive socio-emotional perceptions and beliefs (Johnson & Johnson, 1974; Johnson, Johnson, Buckman, & Richards, 1985). Competition among groups is not encouraged, and individuals' contributions to the group product or reward are not made salient. A similar model, Small-Group Teaching, involves more complex tasks and includes group decision making with regards to planning and carrying out aspects of the task (e.g., what will be learned), procedure, and product (how to display or present what is learned; Sharan, 1980). There is no recommendation for any one approach to assessment (individual or group grade, or both).

A second approach, Jigsaw (Aronson et al., 1978), provides more explicit structure with respect to the contributions of each student.

Each group member is assigned to learn a different topic within a larger theme (e.g., colonial America), which thus sets up a situation where each student has unique expertise. Because students are required to learn all components of the theme, they are dependent on each other to learn the material they themselves did not focus on. Assessment is individual, however; students take quizzes or exams individually and group members may receive different grades from each other (Aronson et al.; Lucker, Rosenfield, Sikes, & Aronson, 1976). A modification, Jigsaw II (Slavin, 1980), adds to the structure and introduces competition among groups. All group members read the same narrative, however, each becomes an expert on a different section. After students hone their expertise with specialists from other groups, they return to their original group and teach and learn from each other, as in the original format. Students' individual quiz scores are summed within the group and groups compete among each other for the highest score.

The use of intergroup competition and greater structuring and uniformity of content that is part of Jigsaw II is also characteristic of other cooperative learning formats developed by Slavin (1980, 1991), such as Student Teams-Achievement Divisions (STAD), Teams-Games-Tournament (TGT), and Team Assisted Individualization (TAI). During instructional time, students work together on worksheets; they are also given answer sheets to check their answers. In the first two formats, all group members have the same materials and work at a uniform pace, whereas within TAI students work on individualized materials at their own pace. In all formats, the group as a whole is responsible for ensuring that each student understands the material, and peer tutoring occurs as needed. Assessment involves competition among groups for the highest group score, aggregated across group members' individual quiz or tournament scores.

As is clear from this brief overview, there are many different ways to structure cooperative learning. Some structures may facilitate learning different kinds of knowledge than others and may be more appropriate than other formats for gifted students. Thus, we argue that there needs to be more attention to process—how do cooperative structures relate to conceptualizations of learning? And what are the implications of these conceptualizations for gifted students?

Congruence Between Cooperative Learning Structures and Theories of Learning

Learning is sometimes viewed as the transmission of intact and well-defined bodies of knowledge (e.g., facts) from an expert source to a learner (Blumenfeld, Marx, Patrick, Krajcik, & Soloway, 1997). This involves students following prescribed procedures correctly, mastering basic skills through direct instruction and independent practice, and remembering content in the way it was presented. Learning is indicated by accurate replication. Thus, low-level strategies, such as repeating material over and over, are adequate for learning.

Although it is necessary for students to learn basic skills, many educators are concerned that students also develop higher level thinking skills and conceptual understanding. Some state and national standards emphasize the development of abilities such as generating questions and hypotheses, crafting reasoned arguments, using evidence, critiquing others' suggestions or explanations, creating conceptual models, and integrating evidence, with the objective that students will develop increasingly rich and accurate conceptual understandings (e.g., California Department of Education, 1997; National Council of Teachers of Mathematics, 2000; National Research Council, 1996).

The development of understanding and these high-level skills are explained best by constructivist theories of learning. Although they differ from each other in some respects, all constructivist theories view learning as a process in which students build understandings on the basis of experiences and active involvement; over time concepts become increasingly complex and interconnected (Phillips, 1995). Task-related interaction, particularly giving and receiving explanations, has a major role in promoting learning and understanding (Webb, 1983). Interaction encourages students to integrate information, explain it to others in their own words, consider different perspectives and opinions, evaluate conflicting ideas, and identify and rectify inadequacies or misconceptions (De Lisi & Golbeck, 1999; Hogan & Tudge, 1999; O'Donnell & O'Kelly, 1994). Higher level strategies are most appropriate for the successful accomplishment of these kinds of activities. The types of learning strategies that students use, however, are related closely to the types of academic tasks that are assigned.

Low-Level Skills and Learning as Transmission of Information

As already noted by some researchers (e.g., Neber et al., 2001; Robinson, 1990a; Sharan, 1980), many of the tasks used in cooperative learning research involve lower level skills that can be learned relatively quickly and have single correct answers. This is true particularly for the structures designed by Slavin (1980, 1991; e.g., TGT, STAD, TAI, Jigsaw II), who has noted that "STAD is most appropriate for teaching well-defined objectives with single right answers, such as mathematical computations and applications, language usage and mechanics, geography and map skills, and science facts and concepts" (1991, p. 73). This is also consistent with how the Learning Together format has sometimes been used (e.g., Johnson et al., 1980). These approaches seem well-suited to facilitating basic skills and mechanics. Indeed, a comparison of learning structures indicated that TGT and STAD were better than other methods at teaching low-level skills (Slavin, 1980). However, they do not appear useful for promoting more complex learning; "high level skills have not been specifically measured in the TGT and STAD studies, but it is unlikely that such effects [i.e., greater achievement] would be found" (Slavin, 1980, p. 335).

The emphasis on low-level skills within these structures is significant, because it relates to many of the concerns about gifted students—that they often find the pace too slow, feel unchallenged or bored because they already know the information, and resent tutoring others in the absence of their own learning. This may explain why Kenny et al. (1995) found that gifted students were more productive, and worked more quickly, when grouped with gifted than nongifted peers, even though this did not result in significant differences in achievement. Although cooperative learning advocates have noted the importance of ensuring that gifted students have not already learned the material assigned, it is difficult to accommodate these students when the entire group is given the same task.

A second significant aspect to consider is that these structures invoke a transmission view of learning. Within cooperative structures such as STAD, TGT, TAI, and Jigsaw II, the group interaction and accountability system provide motivation for students to persist at the task and to help others learn. In line with this analysis, Slavin

(1990b) has noted "cooperative learning is . . . a means of effectively transmitting knowledge and skills to students" (p. 29). Furthermore, "the important issue is how to get individuals to practice these skills [i.e., how to multiply fractions or punctuate sentences] until they master them" (Slavin, 1980, p. 335). Similarly, Johnson and Johnson (1974) recommended that "cooperative goal structures should be used when instructional objectives focus upon such cognitive and affective outcomes as . . . memorization and retrieval of information" (p. 230). Thus, when structures and tasks are aligned with transmission views, students are not required to transform or apply what they have learned in new ways or to generate evidence to address their own questions. This factor also merits consideration, because it does not involve students asking new questions or investigating complex problems—tasks that are well suited to gifted students' needs. With this analysis, TAI may also not be recommended; even though it addresses gifted students' concerns about task difficulty and pace by individualizing tasks, it nevertheless involves worksheets with tasks that have single correct answers.

High-Level Skills and Learning as Construction of Knowledge

The standards that emphasize higher level thinking have led to inquiry-based and problem-based curricula being used increasingly often in regular education. Such curricula have long been emphasized in gifted education (e.g., Boyce, VanTassel-Baska, Burruss, Sher, & Johnson, 1997; Feldhusen & Kolloff, 1986; Gallagher, 1997), because they are consistent with gifted students' needs to face challenging questions and problems and to have opportunities to be inquiring and produce new ideas and products (VanTassel-Baska, 1998, 2003). These curricula typically do not require extrinsic factors, such as group rewards, to provide incentives for students to be involved; engagement is facilitated by factors intrinsic to the task. That is, inquiry is focused on questions or issues that students find intrinsically interesting, relevant, or meaningful. Furthermore, these curricula are successful at promoting student learning (e.g., Hickey, Moore, & Pellegrino, 2001; Schneider, Krajcik, Marx, & Soloway, 2002). Because these curricular approaches are premised on social-constructivist views of learning, student interaction is central (Blumenfeld et al., 1997). The model of interaction for these approaches is collaboration or "the construction of shared meaning for conversations, concepts, and experiences" (Webb & Palincsar, 1996, p. 848). Although cooperative contexts can lead to coconstructed learning, they need not if interactions are not truly mutual—as happens when some task responsibilities are reserved for certain group members, or when groups contain "leaders" and "followers" (Parr & Townsend, 2002). Whereas some forms of cooperation may occur without collaboration, collaboration includes but extends cooperation, particularly with respect to how knowledge is addressed (Blumenfeld, Marx, Soloway, & Krajcik, 1996). Although "cooperative learning typically highlights the reproduction of knowledge . . . collaboration can encompass both the reproduction and production of knowledge" (Blumenfeld et al., 1997, p. 836).

Some of the cooperative learning formats can be used in ways that are consistent with a constructivist focus and concern with promoting understanding and higher level skills. These include the Learning Together, Jigsaw, and Small-Group Teaching approaches. However, it is not the format per se that is key but the way it is used, including tasks involved. As an example, Jigsaw has been used very successfully by Brown and her colleagues (e.g., Brown & Campione, 1994) in the Fostering Communities of Learners program. This program involves theme-based interdisciplinary learning with elementary and middle school students. Once a theme is introduced, the class identifies questions of interest, which are then grouped into related categories. Students are assigned to a learning group and a research group. Each research group is assigned a category, which then specializes in learning about that topic. For example, as part of a theme about changing populations students became specialists in extinct, endangered, artificial, assisted, or urbanized populations. Students later reconvene as learning groups (a member from each research group), where they explain what they have learned to others. With this approach students tend to raise complex questions that afford rich opportunities for learning. For example, students learning about endangered species generated questions about "the amount of food eaten, amount of land required, [and the] number of young," which led them to "consider the deeper principles for metabolic rate, and survival and reproductive strategies" (p. 249).

Such collaborative approaches are appropriate for gifted students in regular classes, for a number of reasons. First, the concerns expressed typically about cooperative learning (e.g., content too easy or boring, pace too slow, mostly tutor others) do not apply because students identify questions or issues they want to understand but do not. The pace and scope of the inquiry can be individualized. Collaborative, social-constructivist-based formats allow for all students to stimulate the learning of others, rather than involving the most able student tutoring less knowledgeable students. Because the emphasis is on conceptual understanding developed through dialogue (e.g., raising questions, asking for examples, giving alternate explanations, identifying inconsistencies), less knowledgeable students can promote gifted students' understanding without knowing the content themselves. Even when students discuss an issue that none understand completely, the process of discussion can promote more advanced conceptual thinking (Schwarz, Neuman, & Biezuner, 2000). Furthermore, the benefits of peer discussion are most pronounced when students do not begin in agreement; the processes involved in reaching intellectual consensus demand thoroughly addressing the issue (Chapman & McBride, 1992). Thus, grouping students with differing levels of expertise, such as gifted with nongifted students, is not problematic. This point also relates to the notion that gifted students may have misconceptions or partial understanding, even when they know a lot about a topic. Being challenged by others, even those less knowledgeable, may uncover misconceptions and promote more accurate understanding. We illustrate these points in the following section with examples of a gifted student's interactions with his nongifted group members while they were engaged in science inquiry.

Collaborative Learning for Gifted and Nongifted Students: An Example

An eighth grade science class one of us observed spent 6 months investigating global climate phenomena, centered on the question "Why do scientists think people are making the Earth's climate warmer?"[1] (Edelson, Gordin, & Pea, 1999). During this period Raymond,[2] a student who had been identified previously as gifted, worked in a group with three nongifted students.

Although Raymond knew more than the others in his group about science, his interactions indicated that his understanding was not complete. He expressed misconceptions, such as saying there are no plants in the desert. The others in his group disagreed with him, and generated a list of plants and animals. At times, he took a number of days to consolidate conceptual understanding. One example involved the group's lab that illustrated how the intensity of the sun's light varies according to the angle at which it hits the Earth's surface. Raymond articulated understanding of what the investigation showed; he noted that, as they moved the flashlight from 90 degrees, its beam became "less concentrated, because it spreads out over more area [of the graph paper]." However, he continued to argue that the equator is warmer than the Earth's poles because the sun's rays have less distance to travel to the equator, and not because of the Earth's tilt. Students discussed the impact of distance from the sun versus the angle the rays hit the Earth's surface on temperature across latitudes. After being faced with different views and evidence for 3 days, Raymond conceded that the Earth's tilt is a factor. Additionally, Raymond's arguments were not always consistent. For example, he argued that carbon dioxide (CO_2) is a greenhouse gas. He said, "I think that CO_2 is an atmospheric gas that contributes to the greenhouse effect because it's been here for thousands of years, because naturally animals breathe it out." He added that there is more CO_2 now due to increased burning of fossil fuels. In the same discussion, however, he used that same line of reasoning to explain why sulfur dioxide (SO_2) is not a greenhouse gas: "[because] we had the greenhouse effect a long time before we found a way to burn fossil fuels, and SO_2 is formed by burning fossil fuels." When questioned, he also noted that fossils fuels are not the only source of SO_2. Another student, Brian, pointed out that early humans burned wood. The teacher summarized some of the critiques by saying, "The point is, if it [i.e., SO_2] was there [in the atmosphere], and if it is part of all these gases that go together to make up this blanket around our planet—if it was there in any amount, how is it different from CO_2?" This debate resulted in Raymond and Brian further researching information about SO_2 to feed back to the rest of the class, inevitably increasing understanding for them both.

Over the course of the curriculum, Raymond's group members were able to "push" his thinking by critiquing his comments, asking questions, and making suggestions of their own, even though they did not know as much content or were not as advanced in their understanding as he was. Furthermore, both Raymond and others in his group were able to extend their understanding, which was indicated by a sizable increase from pretest to posttest on tests of conceptual understanding. Of course, we do not know whether or not Raymond would have learned even more if his group members had also been gifted.

Recommendations

We close by outlining some recommendations that follow from our analysis of the research we have reviewed (also see Robinson, 1991).

Teachers need to give consideration to the tasks in which students engage. Tasks, particularly worksheets, that can be achieved by using low-level skills and formats in which group members can be successful by copying from another group member are not appropriate for gifted students (many argue not for nongifted students either).

There must be accountability, so that all students contribute to the group activities. Accountability dissuades the social loafing that results in gifted students, in particular, feeling used and angry, and prompts them to respond by withdrawing effort.

Students need to learn positive interaction patterns. Thus, teachers need to model thoughtful reasoning and justification and press and assist students to do the same. For example, students can learn to provide supporting evidence when making arguments, however, they do not usually do this without instruction. Furthermore, students need to learn interpersonal skills such as how to question someone's argument without it being construed as a personal attack; this also usually needs to be taught explicitly.

Because all students must contribute to discussions and share their thoughts and reasoning, a climate of respect and trust is necessary for collaborative formats to be successful. Students must feel confident that their ideas will be considered and that they will not be ridiculed for being incorrect or for being seen as different.

Mixed-ability grouping is not a substitute for special education provisions for gifted students. The delivery of a differentiated curriculum demands that gifted students experience a variety of classroom organizational structures responsive to the nature of giftedness itself. Accelerated activities aimed at their faster rate of learning will likely occur in individualized or homogeneously grouped settings. However, given that most formal education for gifted children takes place in regular classrooms, in the company of nongifted peers, some use of heterogeneous collaborative activities can also be appropriate. Of course, these formats should allow for use of above-grade materials and flexible pacing where appropriate.

Summary

As we have argued and illustrated, it is *possible* for gifted students' intellectual needs to be accommodated in mixed-ability groups without the negative outcomes that have concerned some advocates of gifted education. We do not maintain that mixed-ability grouping is *inevitably* beneficial—indeed, establishing norms for productive interaction among students is challenging for teachers (Meloth & Deering, 1999). Neither do we argue that mixed-ability collaborative grouping is the *best* option for gifted students; there is still not the research to say what is. However, we do argue that it is imperative to move beyond a simplistic argument that either heterogeneous or homogenous ability grouping lead to good or bad outcomes; the type of task and the cognitive and interactive processes involved are important factors to take into consideration. Formats that emphasize transmission of factual information seem most likely to engender concerns about gifted students' learning when they are grouped with nongifted students. Their capacity to learn quickly, in particular, is likely restrained in such situations. Collaborative formats that emphasize the development of higher levels of understanding and that require students to explain and justify their ideas can promote the learning of both gifted and nongifted students as they interact together.

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Endnotes

1 Details of the Global Warming curriculum can be found at the following Web address: http://www.letus.northwestern.edu/projects/gw

2 All student names are pseudonyms.