Cooperative Learning: Developments in Research

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Abstract

Cooperative learning is widely recognized as a pedagogical practice that promotes socialization and learning among students from kindergarten through to college level and across different subject areas. Cooperative learning involves students working together to achieve common goals or complete group tasks. Interest in cooperative learning has grown rapidly over the last three decades as research has been published that clearly demonstrates how it can be used to promote achievements in reading and writing, conceptual development in science, problem-solving in mathematics, and higher level thinking and reasoning. It has also been shown to promote inter-personal relationships with students with diverse learning and adjustments needs and with those from culturally and ethnically different backgrounds. In fact, Johnson and Johnson (2000) argue there is no other pedagogical practice that achieves such outcomes. The purpose of this paper is to review the research on cooperative learning and to examine the factors that contribute to its success. In particular, the review focuses on the key elements that underpin successful cooperative learning, including group structure, composition and task, and the key role teachers' play in developing students' thinking and learning. The intention is to provide insights on how teachers can effectively utilize this pedagogical approach to teaching and learning in their classrooms.

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Aprendizaje Cooperativo: Desarrollos en la Investigación

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Resumen

El aprendizaje cooperativo está ampliamente reconocido como una práctica pedagógica que promueve la socialización y el aprendizaje del alumnado desde educación infantil hasta nivel universitario en diferentes asignaturas. El aprendizaje cooperativo implica que el alumnado trabaje conjuntamente para alcanzar objetivos comunes o completar actividades grupales. El interés por el aprendizaje cooperativo ha aumentado rápidamente en las tres últimas décadas, en la medida en que las investigaciones publicadas demuestran claramente cómo se puede utilizar para promover resultados en lectura y escritura, desarrollo conceptual en ciencias, resolución de problemas en matemáticas, y nivel superior de pensamiento y razonamiento. También ha demostrado promover las relaciones interpersonales con estudiantes con diversidad de necesidades de aprendizaje y con aquellos con diferentes bagajes culturales y étnicos. De hecho, Johnson y Johnson (2000) argumentan que no hay otra práctica pedagógica que logre esos resultados. El propósito de este artículo es revisar la investigación sobre el aprendizaje cooperativo y examinar los factores que contribuyen a su éxito. En concreto, la revisión se centra en los elementos clave que sustentan el aprendizaje cooperativo de éxito, incluyendo la estructura de grupo, la composición y actividades, y el rol fundamental que juega el profesorado en el desarrollo del pensamiento y del aprendizaje del alumnado. El objetivo es proporcionar conocimiento sobre cómo el profesorado puede utilizar de forma efectiva este enfoque pedagógico en la enseñanza y el aprendizaje en sus aulas.

Palabras clave: aprendizaje cooperativo, enseñanza, aprendizaje

C ooperative learning is widely recognized as a pedagogical practice that promotes positive social interactions and achievement among students from kindergarten through to college level and across different subject areas (Johnson & Johnson, 2002; Slavin, 1996). It has been shown to enhance students' willingness to work cooperatively and productively with others with diverse learning and adjustment needs, to enhance intergroup relations with those from culturally and ethnically different backgrounds (Johnson & Johnson, 2000; Slavin & Cooper, 1999), and to promote social connectedness in transitioning from primary school to high school (Thurston et al., 2010). In the academic domain, it has been used to promote reading and writing achievements in students (Stevens & Slavin, 1995a), including those who are academically delayed (Stevens &Slavin, 1995b), conceptual understanding in science (Howe, 2009, 2013), problem-solving in mathematics (Slavin, 2013; Slavin & Lake, 2008), and higher-order thinking and learning (Gillies, 2011; Gillies & Haynes, 2011; Gillies & Khan, 2008, 2009). There is no doubt that the benefits attributed to cooperative learning are widespread and numerous and it is the apparent success of this approach to learning that has led to it being acclaimed as one of the greatest educational innovations of recent times (Slavin, 1996).

Research on Cooperative Learning

Interest in cooperative learning began to emerge in the 1970s as reports on the social and academic benefits students derived from cooperating began to be published (Allen, 1976; Brown et al., 1971; Gartner, Kholer & Riesman, 1971). These studies showed that children could be taught to facilitate each other's learning, help motivate underachieving children, improve interpersonal attitudes, and students' communication skills. However, it was argued that for these benefits to be realized, students needed to be trained in interpersonal skills as well as the content to be taught, groups should not exceed four members, and children should be encouraged to express their opinions and offer solutions to problems they were discussing. When this occurred helpers and helpees in the groups benefited from the experiences they had working together. Helpers benefited because they had to cognitively re-structure the information they were teaching in order to

explain it in a way that the helpee could understand while helpees benefited from the extra tuition they received (Damon, 1984). These findings were exciting and helped to stimulate further research on cooperating groups and how they could be used to facilitate learning and socialization.

As traditional methods of instruction where students are expected to be passive recipients of knowledge were common at this time, the focus of the research was on comparing cooperative learning to competitive and or individual methods of learning. In 1981, Johnson and colleagues (Johnson, Maruyama, Johnson, Nelson, & Skon) published the results of a meta-analysis of 122 studies that examined the effects of cooperative, competitive, and individualistic learning on achievement. The results showed that cooperation promotes higher achievement and greater productivity than do competitive or individualistic modes of learning and these results were consistent across all subject areas, all age groups, and for a variety of cognitively challenging tasks. Interestingly as cooperation increases, the authors found that groups produce a better group product when they compete against other groups, demonstrating that students still enjoyed competing but in an environment that was supportive of their efforts to achieve.

In a follow-up meta-analysis of 111 studies Johnson and Johnson (2002) examined the effects of cooperative, competitive, and individual learning on a number of academic, personal, and social dependent variables (e.g., achievement, interpersonal attraction, social support, self-esteem, perspective taking, and controversy) and found that the mean effect sizes (i.e, the strength of the relationship between the independent and dependent variables) for cooperative learning ranged from 0.58 to 0.70 in comparison to competitive and individualistic learning. These are effect sizes that are noticeable and can make "real-world differences" (Hattie, 2009, p.17) in educational interventions. In short, the results of this meta-analysis indicate that cooperative learning in comparison to competitive and individualistic learning has very powerful effects on achievement, socialization, motivation, and personal self-development.

Similar results were obtained by Slavin (1996) in a best evidence synthesis of 60 studies of the effects of cooperative learning in comparison to control methods on students' achievement in elementary and high school classes. Slavin not only found that students learned more when they worked cooperatively together but that opportunities for learning can be maximized

if group goals and individual accountability are embedded in the cooperative method used. The key difference Slavin argued between the studies that included these criteria and others is the importance attached to group members working together as a team to attain group rewards whereas traditional unstructured group work (ad hoc groups) where students are expected to work together but with few incentives to do so has little or no effect on learning. Similar results have been reported by Gillies (2003, 2004, 2006, 2008) who has consistently found that students obtain higher learning outcomes and they are more willing to cooperate when they work in structured small groups where they are interdependently linked together so that all group members understand that they must contribute if the group is to achieve its goal. In contrast in unstructured groups, students work in groups where members are not interdependently linked and there is little or no expectation to contribute to the group's goal.

There is no doubt that cooperative learning has had a profound effect on how learning environments in schools are structured to promote student learning and socialization. In a more recent meta-analysis of 148 independent studies comparing the relative effectiveness of cooperative, competitive, and individualistic goal structures, Roseth, Johnson and Johnson (2008) found that higher achievement and more positive peer relationships were associated with cooperative rather than competitive or individualistic goal structures. In a similar vein, in a best-evidence analysis of a series of systematic reviews of research on primary and secondary mathematics, reading, and programs for struggling readers, Slavin (2013) reported that programs that provide extensive professional development in well-structured methods such as cooperative learning and the teaching of metacognitive skills produce more positive effect sizes than those evaluating other curricula reforms or computer-assisted instruction. Given the volume of information that supports structuring cooperative learning experiences, the next section of this paper, focuses on identifying the key elements of cooperative small group learning that underpin structured cooperation.

Key Elements of Successful Cooperative Learning

It is well recognized that placing students in groups and expecting them to be able to work together will not necessarily promote cooperation. In fact,

groups often struggle with knowing what to do and in the process, discord can occur as members grapple with the demands of the task as well as managing the process involved in learning, including how to deal with the opinions of different members or working with students who make minimal contributions to the group's goal. In order to avoid these pitfalls, groups need to be established so the five key elements of successful cooperative learning are embedded in their structure (Johnson & Johnson, 1990).

The first of these key elements involves establishing a state of positive goal independence so group members understand that they are required to not only complete their part of the work but to ensure that others do likewise. When students understand that they cannot succeed unless others do and they must coordinate their actions to ensure that this occurs, cohesiveness develops in the group as a direct result of the perception of goal interdependence and perceived interdependence among group members. It is this psychological state of positive interdependence that creates the momentum for members to work together. When groups are formed where positive goal interdependence is not evident, as often happens when groups are formed on an ad hoc basis, groups are not truly cooperative.

The second key element involves group members understanding that they are individually accountable for their contributions to the group. This sense of accountability emerges when members accept responsibility for completing their part of the task while simultaneously encouraging others to do likewise. In classrooms, teachers will often establish requirements for individual accountability so that each students' contribution to the group can be identified, ensuring that each child is responsible for completing their assigned work or task in the group.

Children cooperate and work better when they have been taught the interpersonal and small group skills needed to manage group interactions and behaviours. In fact, these skills comprise the third key element in cooperative learning and include the following behaviours:

- Actively listening to each other during discussions
- Considering the other person's ideas and perspectives
- Stating ideas clearly without making disparaging comments
- Accepting responsibility for one's own behaviour
- Constructively critiquing the ideas of others

- Sharing resources
- Taking turns

The fourth key element that affects cooperative learning is promotive interaction. Promotive interaction involves group members encouraging and facilitating each other's efforts as they work together. This occurs when students listen to each other, exchange ideas and offer explanations to assist understanding, provide constructive feedback to improve performance on a task, and facilitate access to resources and materials. These reciprocal exchanges lead to group members feeling more accepted and valued, less anxious and stressed, and more willing to reciprocate and help others in return. The more members interact with each other, the more they will get to know each other as individuals and this forms the basis for caring and committed relationships (Johnson & Johnson, 1990).

The last key element in cooperative learning is group processing. Group processing is critically important as it allows members to discuss how well they are achieving their goals and maintaining effective working relationships. This involves members reflecting on what they have done well and what they will need to do to achieve the group's goals. Johnson, Johnson, Stanne and Garibaldi (1990) found that students had greater problem-solving success and higher achievement gains when they participated in either teacher-led or student-led group processing discussions than students who worked in a cooperative condition with no processing or those who worked individually, although the cooperative with no processing condition out-performed the individual learning condition. In this study, group processing involved the students in ensuring that all group members engaged in one of three processing skills: (a) summarizing group members' ideas and information, (b) encouraging members to participate in group discussions, and (c) checking to see that decisions made by the group were supported by members. Johnson et al. (1990) surmised that possible explanations for the results obtained included: the focus on metacognitive thinking increased members awareness of the need to think carefully and clearly about the topics being discussed, group processing assisted members to gain insights into how to behave more effectively when interacting with others, and feedback on social skills increased the frequency of their use.

Group Structure and Composition

Given the importance of establishing cooperative groups so they include the five key elements outlined above, teachers often seek clarification on how groups can be structured to maximize learning, the composition of the groups, and the types of tasks that students find engaging. While the research clearly indicates that groups need to be structured so that the five key elements, outlined above, of cooperative learning are embedded in their structure, it is also important to consider both the composition of the group and its size. In a metanalysis of 66 studies that examined the effects of within-class grouping (i.e., establishing small groups in classes) on student achievement at the elementary, secondary and postsecondary levels, Lou et al. (1996) found that students achieved higher learning outcomes when they worked in small cooperating groups than when they were not grouped or remained in whole-class teaching arrangements. Furthermore, students worked better and achieved more when they worked in groups of 3-4 members than in groups of 5-7 members. Interestingly, the effects of group ability composition were different for students of different relative ability with low-ability students learning more in heterogeneous groups (high-, medium- & low-ability), medium-ability students benefited significantly more in homogeneous ability groups than heterogeneous ability groups while group composition made no difference to high ability students.

Similar results were obtained in a meta-analysis of small group and individual learning with technology by Lou, Abrami and d'Apollonia (2001) with small group learning having significantly more positive effects than individual learning on students' individual achievement and group task performance. Group performance was higher in smaller groups (3-5 members) than those working individually and students gained more individual knowledge when they worked in small groups than those working individually with computer technology. Bertucci, Conte, Johnson and Johnson (2010) also found that students' achievement was higher in pairs and in groups of four than when they worked individually. Furthermore social support and self-esteem were higher when students worked in small groups than individually.

Given that previous investigations of small group structure have highlighted the academic and social benefits students derive from working

cooperatively together, Roseth, Johnson and Johnson (2008) examined the social-contextual view of the mechanisms and processes by which these benefits are promoted. In a meta-analysis of 148 studies that compared the effectiveness of cooperative, competitive and individualistic goal structures in promoting early adolescents achievement and positive peer relationships, the authors found that higher achievement and more positive peer relationships were associated with cooperative rather than competitive or individualistic goal structures. Furthermore, cooperative goal structures were associated with a positive relationship between achievement and positive peer relationships.

In a more recent meta-analysis of 24 empirical studies that examined the effects of small-group learning on transfer of learning, Pai, Sears, and Maeda (2014) found that small-group learning had a significant impact on students' transfer of learning performance when compared to individual learning with the authors suggesting that small group learning (both structured and unstructured) may naturally support transfer without the use of external structures such as scripts, roles or rewards, although the authors acknowledged that they did not distinguish between structured and unstructured groups in the analyses.

In summary, the results of these meta-analyses indicate the students derive both academic and social benefits when they work cooperatively together rather than when they compete or work individually by themselves. Furthermore, students are more likely to achieve more when they work in groups of four or less members and preferably in mixed-ability groups rather than homogeneous ones.

Type of Task

The type of task students undertake in their groups is important because Cohen (1994) found that it affects the discussion that occurs. In well-structured tasks such as mathematical and computational tasks where there are specific procedures to follow, students only need to exchange information and explanations and to request assistance as they work cooperatively together. With this type of task, achievement is consistently related to giving detailed explanations to each other on how to solve the problem at hand. In contrast, in ill-structured tasks where there are no right

answers or procedures to follow, as occurs in open or discovery-based tasks, students need to exchange ideas and information if they want to find creative solutions or discover the underlying principles of a problem. Under these conditions, achievement depends on task-related interactions. In a study of Grade 3-8 students, Hertz-Lazarowitz (1989) found that when the task involved high-level cooperation, 78% of the interaction involved applicative or evaluative thinking whereas on 44%of the interaction in low-level cooperative tasks involved higher level thinking processes.

Similar results were obtained by Gillies (2008) in study of high school students who worked in high- and low-level cooperating groups on a science-based learning activity. The results showed that not only did the students in the high-level cooperating groups provide more explanations and assistance to each other but they also demonstrated more complex thinking and problem-solving skills in their discourse and on their responses on a follow-up learning probe. In short, both Hertz-Lazarowitz (1989) and Gillies found that when students work on high-level cooperative tasks, they demonstrate higher-level reasoning and problem-solving discourse and this, in turn, positively affects the learning that occurs.

The Teacher's Role in Cooperative Learning

Teachers play a critical role in promoting interactions among students and cooperative learning provides opportunities for these interactions to be encouraged. Having students interact and work together not only enables students to learn from each other but also accept more autonomy over the tasks they have to complete and the decisions they need to make. It is this opportunity to be more active in their own learning that engages students' interest, reduces disruptive behaviour, and has a positive effect on the learning that occurs (Sharan & Shaulov, 1990). Interestingly, Hertz-Lazarowitz and Shachar (1990) found that when teachers change their instructional style to cooperative learning they become more involved in a complex process of linguistic change as well as their language becomes more caring and personal as they work more closely with small groups. As a consequence their language is often more spontaneous, varied, and creative and they communicate more positive affective messages to their students. This is in contrast to traditional, whole-class teaching where teachers'

language is often regarded as authoritarian, rigid, and less friendly, and teachers are often perceived as distant or impersonal. In these classrooms, teachers often direct the learning while students are expected to be passive and respond only when required to do so.

Interaction among group members is critically important to the success of small group activities and Shachar and Sharan (1994) argued that this will only happen when teachers create conditions that enable students work in small groups on tasks that require cooperation among group members. The importance of arriving at a synthesis of everyone's contributions and the expectation that the group product will be presented to the wider class are structures that are designed to foster group cohesion and motivate students to complete the task. When teachers structure small group activities so that these conditions are met, students are more interactive, using more words per turn of speech, communicate more equitably so ideas are shared among group members, and elaborate more to explain the problem at hand.

In a study that built on the studies of Hertz-Lazarowitz and Shachar (1990) and Shachar and Sharan (1994) of teachers and students verbal behaviours during small group work, Gillies (2006) investigated whether teachers who implement cooperative learning engage in more facilitative interactions with their students than teachers who implement group work only. The study also sought to determine if students in the cooperative groups modelled their teachers' behaviours and engaged in more positive helping interactions with each other than their peers in the group work only groups. The results showed that teachers who implement cooperative learning engage in more mediated-learning interactions or language designed to challenge and scaffold students' learning and make fewer disciplinary comments than teachers who implement group work only. Furthermore, the students modelled many of these interactions in their groups with the students in the cooperating groups recording nearly twice as many elaborations, short responses, and helping behaviour as their peers in the group work only groups. In short, Hertz-Lazarowitz and Shachar, Shachar and Sharan and Gillies demonstrate that teachers play a critical role in promoting interactions among students and cooperative learning provides opportunities for these interactions to be encouraged.

Conclusion

The purpose of this paper has been to review developments in research on cooperative learning focusing on the key elements that underpin successful cooperative learning, the importance of structuring groups, the effect of different group compositions and task structures on student learning, and the key role teachers' play in developing students' thinking and learning. The intention was to provide insights on how teachers can effectively utilize this pedagogical approach to teaching and learning in their classrooms. While cooperative learning is well recognized as a teaching strategy that promotes learning and socialization, research also shows that students have much to gain when they have opportunities to interact with each other, listen to what others have to say, share ideas and information, ask questions, critique others' ideas, and use the information obtained to reason and problem-solve together.

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