

“Knowledge and skills are of no use if the student cannot apply them in cooperative interaction with other people.”

Circles of Learning, 1986

MATH AND SCIENCE

STRUCTURING COLLABORATIVE LEARNING

Group or cooperative learning has a long history in educational practice and has always been a part of a skillful teacher’s repertoire. In a typical cooperative-learning situation in mathematics, students work on a problem in groups of two to five. They exchange views, discuss different approaches and solutions, and persuade each other of the soundness of their arguments. By explaining their ideas to others, students clarify their reasoning, order their thoughts, revise their strategies, and expand their conceptual understanding.

How Is Group Learning Best Used and How Is it Being Used Now?

- Effective cooperative-learning groups are structured to have shared leadership and to have both group and individual accountability for learning the material. Both factors provide incentives for students to help each other learn.¹
- Cooperative-group structures provide learning opportunities that do not typically occur in traditional classrooms, including opportunities to resolve conflicting points of view.² They result in greater self-confidence, better group relations, more cross-cultural integration, and improved acceptance of mainstreamed children.³ Small-group interaction helps students build the social skills necessary to work effectively on a team—skills that employers find valuable.⁴
- A review of the research reveals that 72 percent of cooperative-learning studies showed higher achievement for students involved in cooperative learning.⁵
- Learning experiences in small groups tend to produce higher results than individualistic or competitive learning situations, especially for more elaborated skills. This result is true for “all ages, subject areas, and for tasks involving concept attainment, verbal problem solving, categorization, spatial problem solving, retention and memory, motor performance, and guessing-judging-predicting. For rote-decoding and correcting tasks, cooperation seems to be equally as effective as competitive and individualistic learning procedures.”⁶
- The Third International Mathematics and Science Study (TIMSS) revealed that 11 percent of all U.S. fourth-grade math teachers report having students work in small groups without direct teacher assistance most or all of the time. For eighth grade, the figure is 12 percent.⁷ Comparable figures for science are 10 percent in Grade 4 and 11 percent in Grade 8.⁸
- In Ohio, 10 percent of third- and fourth-grade math teachers report that they have students work in small groups without direct teacher assistance most or all of the time. For seventh- and eighth-grade teachers the figure is 9 percent, and for twelfth-grade teachers it is 10 percent.⁹
- Ohio’s figures for science are higher: 16 percent of third- and fourth-grade science teachers have their students work in small groups most or all of the time; 19 percent of seventh- and eighth-grade teachers reported the same;

and 25 percent of twelfth-grade teachers use independent small-group learning most of the time.¹⁰

- A major review of studies of within-class ability grouping (creating groups within the classroom based on achievement) found that low-achieving students benefited from participating in groups that included higher-achieving students. Students of middle ability found more success in homogenous groups. For students of high ability, group composition had no effects. Overall, the results suggest that grouping students with similar abilities is only slightly more effective than using mixed groups.¹¹ One drawback in the use of groups is the “hitchhiker” problem, where certain students do the majority of the work. The hitchhiker shares in the success of the group without putting forth an equal amount of effort.
- Teachers in lower grades who spend more time per week with the same group of students than teachers in higher grades are more likely to use small-group instruction and to conduct classroom discussions about the classwork.¹²
- Teachers are seeking training in cooperative learning as an instructional strategy. In 1993-94, 50 percent of teachers reported they had attended a training session on cooperative learning since the end of the previous school year.¹³ Teachers who participated in professional development on cooperative learning were more likely to use small-group instruction in class.¹⁴

Routes and Destinations

Teachers play a critical role in collaborative learning by forming groups, observing and interacting with groups, answering and clarifying questions, and moderating and helping students tie ideas together.¹⁵ Teachers establish the guidelines and expectations for working cooperatively and must directly teach group-processing and interpersonal skills. Teachers who spend time explaining the reasons for cooperative group work and who do not grade on a curve encounter the hitchhiker problem less often.

The following are suggestions that may help make structured, cooperative lessons more effective:¹⁶

- Help students recognize that they must depend on one another to complete the task. “We sink or swim together.”
- Emphasize face-to-face interaction among group members.
- Emphasize interpersonal and small-group skills.
- As a class, reflect on group processes.
- Emphasize and discuss individual accountability.
- To lessen the likelihood of the “hitchhiker” problem, explain the reasons for cooperative group work and grade tasks on a curve.

While cooperative learning is well-suited to a variety of instructional purposes, tasks that require multiple abilities and contributions for goal completion are likely to promote better cooperative activity and collaboration by all students in a group.¹⁷

For all students, cooperative, heterogeneous, and flexible groupings for instruction are more effective for stimulating and improving achievement than the traditional independent-learner approach. The teacher is instrumental in structuring “a pervasive norm in the classroom that helping one’s peers to learn is not a marginal activity, but is a central element of students’ roles.”¹⁸

Endnotes

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