The CIRC program includes three principal elements: basal-related activities, direct instruction in reading comprehension, and integrated language arts/writing.

groups. The pairs are then assigned to teams composed of partnerships from two different reading groups. For example, a team might be composed of two students from the top reading group and two from the low group. Mainstreamed academically handicapped and remedial reading (for example, Chapter I) students are distributed among the teams.

Many of the activities within the teams are done in pairs, while others involve the whole team; even during pair activities, however, the other pair is available for assistance and encouragement. Most of the time, the teams work independently of the teacher, while the teacher either teaches reading groups drawn from the various teams or works with individuals.

Students' scores on all quizzes, compositions, and book reports contribute to a team score. Teams that meet an average criterion of 90 percent on all activities in a given week are designated "superteams" and receive attractive certificates; those that meet an average criterion of 80–89 percent are designated "greatteams" and receive less elaborate certificates.

Basal-related activities. Students use their regular basal readers (or whatever texts or reading materials are used in the school). Stories are introduced and discussed in teacher-led reading groups that meet for approximately 20 minutes each day. During these sessions, teachers set a purpose for reading, introduce new vocabulary, review old vocabulary, discuss the story after students have read it,

Cooperative Learning in Elementary School Science

Michael R. Hannigan

Science for Life and Living: Integrating Science, Technology, and Health is a new science program for elementary schools developed by the Biological Sciences Curriculum Study (BSCS) (Bybee and Landes 1988; in press). The program emphasizes concrete experiences; it gives students opportunities to observe phenomena, to record their observations, and to discuss them with other students. Cooperative learning is a central strategy of the program, for several reasons.

First, the Johnsons' research (1984, 1987a, 1987b) shows that cooperative learning enhances children's ability to construct knowledge. Working in groups gives children time to think and talk about what they are learning; they can carefully construct their knowledge of the world around them. In cooperative groups of two or three, each student can share experiences and thoughts with teammates; learning becomes more personal than in the traditional classroom.

Second, cooperative learning helps teachers with classroom management. Hands-on science requires that students interact with materials; and cooperative learning is structured so that students, not teachers, manage those materials. In a cooperative learning classroom, students help each other with assignments and problems, which alleviates some of the stress on the teacher to maintain order and to keep students on task.

A third benefit of cooperative learning is improved self-confidence for many students. Because many students do not feel comfortable taking the risk of being wrong in front of the entire class, they often say nothing at all. When working in small groups, however, more students risk speaking out. They then discover they have something important to contribute and that their ideas can be useful to others.

Fourth, science and technology are cooperative enterprises. Neil Armstrong was the first person to walk on the moon, but thousands of people in research, engineering, and industry labored for a decade to get him there. Cooperative learning reflects the way scientists themselves work in teams.

Of course, cooperative learning is not a magic wand to wave over students, but it can provide an effective framework for teaching about science, technology, and health. That is why it holds a prominent place in the new BSCS science curriculum.

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