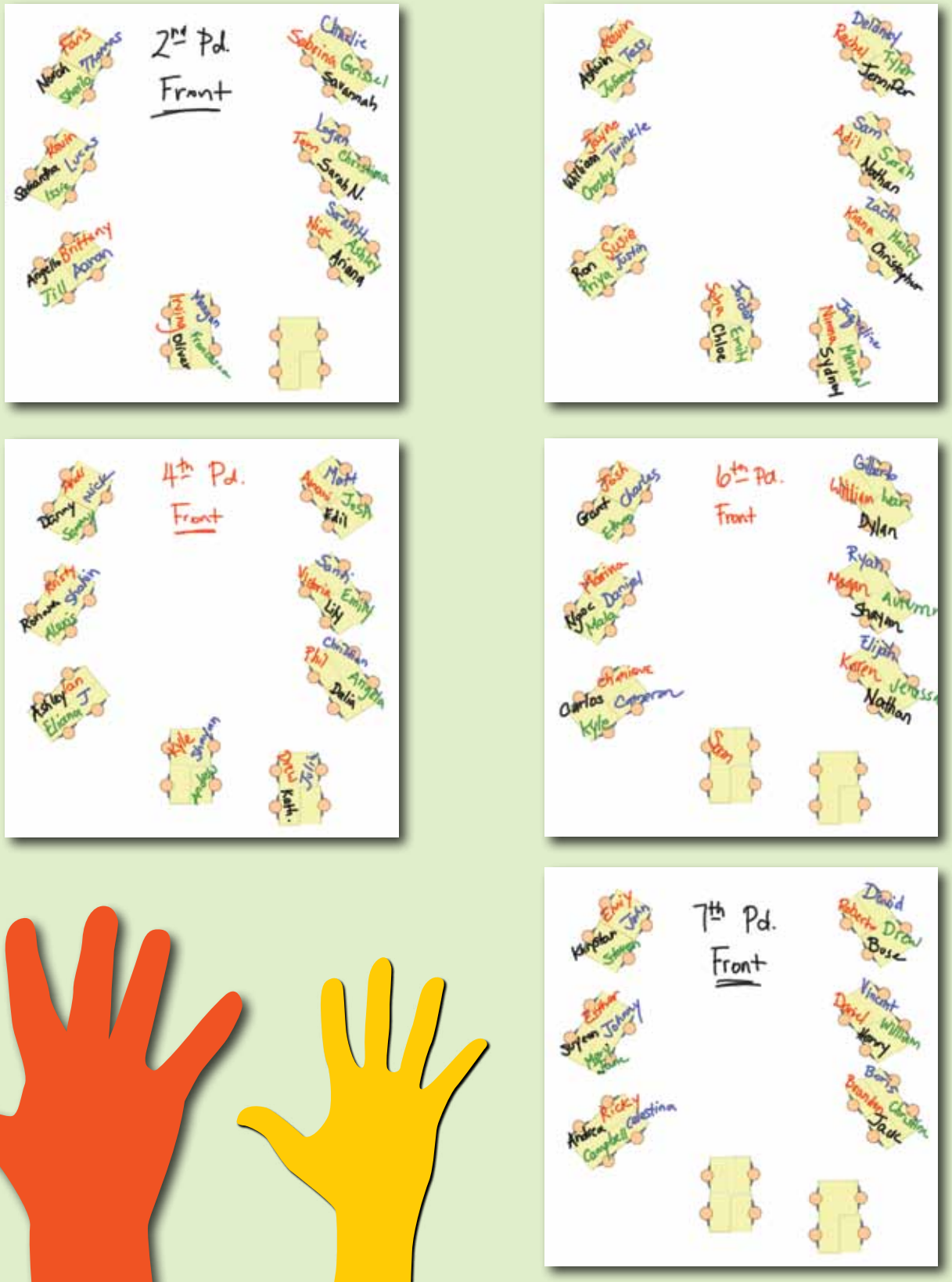
COOPERATIVE LEARNING IN AN INCLUSIVE SCIENCE CLASSROOM

by Teresa Jones and Donna R. Sterling

Including special education students in a general education classroom and ensuring that they are actively engaged in learning is paramount to helping these students master science content (Mastropieri and Scruggs 2001). However, many special education students—those who are in self-contained classrooms for most of their classes—are used to interacting with the same small group of students for the majority of their day. When they are mainstreamed into a science classroom, they are with a group two to three times the size of that in their "regular" classroom, and this can take them out of their comfort zone, making them reluctant to interact with other students. When they are also faced with manipulating lab equipment, learning science vocabulary, or applying science content to real-world scenarios, many of the special education students can become overwhelmed and opt out of the active learning process. They become passive listeners, disinterested in science and learning, and their mastery of content knowledge suffers.

The three steps listed below incorporate cooperative learning strategies that ensure active participation by all students (Scruggs, Mastropieri, and McDuffie 2007). The same students who sat silent and confused will become engaged in the learning process and achieve a high level of success in learning and synthesizing science content.

FIGURE 1 Seating chart



Step 1: Observing how students learn/interact

The first few weeks of school are critical for observing students. During this time, teachers should pay close attention to how all students, both special education and general education, interact with each other. Provide icebreaker activities that allow students to get to know each other and explore each other's learning styles and preferences; a good idea is to have students perform review activities that are related to content learned in the previous year. Teachers should avoid seating charts at this point; instead encourage students to sit with different seatmates every day and rotate through different partners during activities. By the end of this time frame (about two weeks), teachers will have a good idea of which students are most suited to sitting with each other, and what groupings to avoid in an effort to minimize negative learning interactions.

Teachers do not have to abstain from introducing curriculum content during this observation time. In fact, it is helpful to see how students interact with each other while participating in learning science content. If this extended period of observation is not possible, it is important that science classroom teachers discuss groupings of students with special education classroom teachers. Often, special education teachers see these students in alternative, smaller settings, and can offer valuable insight into personalities. They may have a good idea of what groupings will enhance learning, and what groupings may detract from it. For example, special education students who face challenges in working with others can be grouped together with students who will help provide a safe, accepting atmosphere, which in turn encourages the special education students to actively engage in the process of learning science content.

Step 2: Cooperative sharing seating plans

The seating plan can be one of the most important components of an inclusive classroom environment. By placing certain students near each other, teachers can instill a feeling of safety and acceptance for all students. A good model for a seating plan is to place the desks in a quartet (see Figure 1). Angle them in such a way that all four students are facing each other, making sure they can still see the learning center of the classroom. Different desks in the quartet can be color coded to help with the cooperative learning activities. For example, the upper right desk could be "red," the upper left could be "purple," etc. This color-coding method is discussed further in Step 3.

After observing the interactions among students, classroom teachers and special education teachers should create a seating plan that ensures all students are arranged to facilitate active learning. For example, teachers can choose to place higher-ability learners with struggling learners for peer-tutoring purposes, and talkative students with students who are quiet in hopes that the former will facilitate discussion of concepts with the latter.

A mix of special education students and general education students usually yields the best results in terms of active learning (Mastropieri and Scruggs 2001).

Step 3: Cooperative learning strategies

The following three strategies are just a sampling of cooperative learning activities (Slavin 1980; Siegel 2005). They will quickly become mainstays in any classroom and work well in ensuring all students are actively participating. In order to ensure equal participation during these activities, rotate which students begin each strategy so the same students are not always starting and ending the activities. Using the color code is an easy way to accomplish this. "Red" can begin one strategy one day; "blue" can begin it (or another strategy) the next.

Round-robin

This strategy is a simple, yet effective, method used to check for student understanding. Teachers should listen closely to student dialogue as they walk from group to group to get a good idea of the comprehension of the concept being taught.

- **The strategy**: A question is posed to the class by the teacher or by a student. Everyone is given several minutes to think of an answer and, in some cases, to write it down. Then, beginning with one student in the quartet, each student gives an answer in turn (usually traveling clockwise or counter-clockwise around

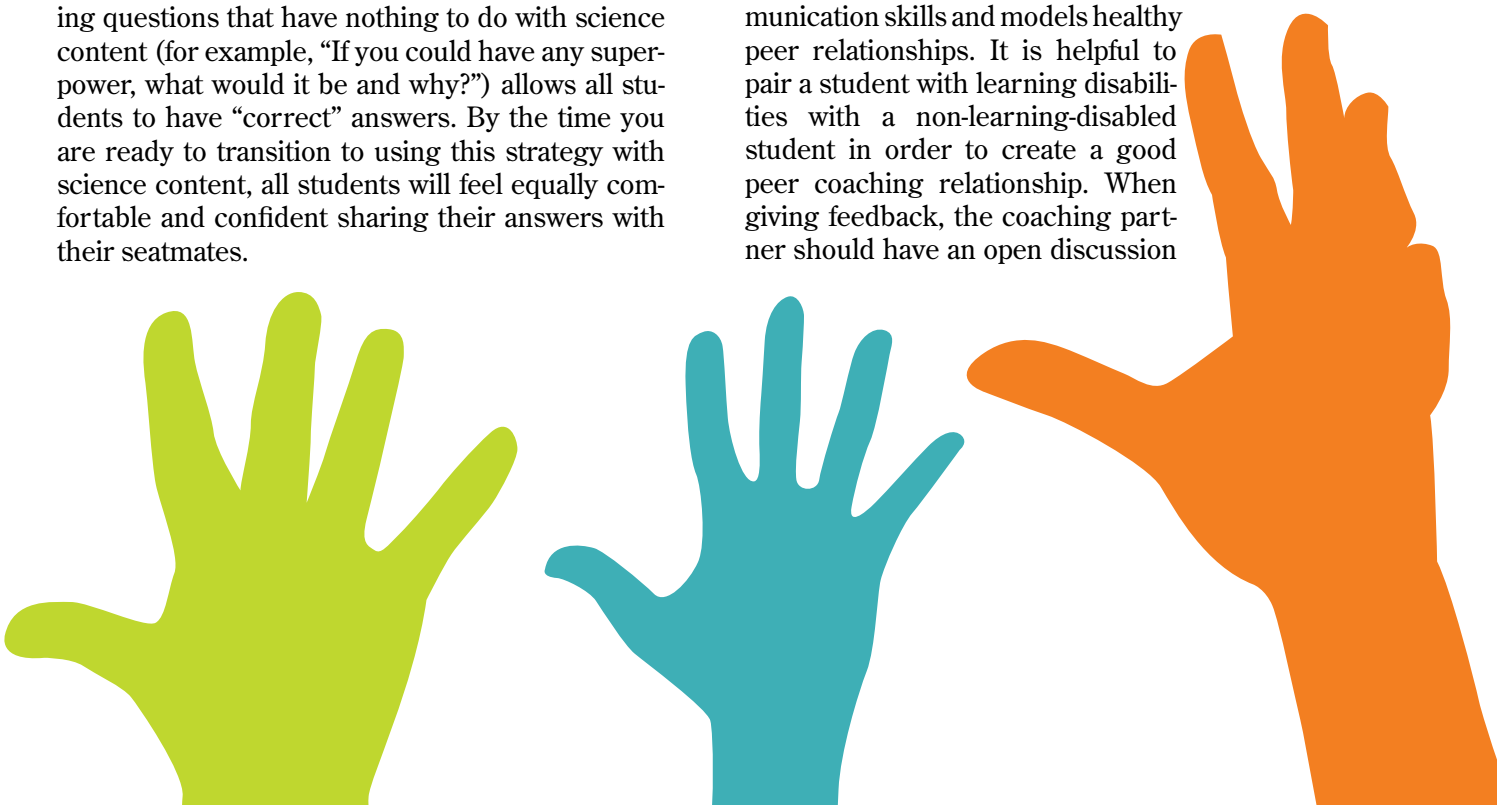
the quartet). It is also helpful to use a manipulative to indicate whose turn it is to talk (for example, a stress ball). When a student has the manipulative, it is that student's turn to talk; otherwise, students are actively listening to their group mates.

- **The benefits**: All students have to share their answer, and the visual aid of the manipulative allows the teacher to easily see who should be talking and who shouldn't. Many special education students who are unsure of their knowledge will often let others do the talking and thinking. The round-robin prevents this from happening and ensures that all students participate in the active learning process. If the question posed is difficult, the teacher may want a student who is comfortable with the content to begin the round-robin, and the student who struggles the most with the content will go last. Struggling students then hear three answers before having to give their own. This gives them time to either re-form their answer if they think it is wrong, or to receive affirmation that their thought process was correct. Other times, it is helpful for struggling students to begin the round-robin, especially if the question is a key concept; depending on their answer, teachers can easily tell if reteaching is needed.
- **Troubleshooting**: Students with learning challenges may not feel confident sharing their answers at first. To ease their anxiety, teachers can use this strategy as an icebreaker when the seating quartets are first arranged. Asking interesting questions that have nothing to do with science content (for example, "If you could have any superpower, what would it be and why?") allows all students to have "correct" answers. By the time you are ready to transition to using this strategy with science content, all students will feel equally comfortable and confident sharing their answers with their seatmates.
- **Examples of use**: Listing characteristics of different elements on the periodic table; naming parts of a microscope; giving examples from each of the kingdoms of life; listing examples of Newton's laws of motion in daily life.

Peer coaching

This strategy is best used when there are questions to be answered (e.g., about the lab, on a review sheet). It is done in groups of two.

- **The strategy**: One of the two students (student A) reads the question and answers it to the best of his or her ability (answers can be written or spoken, depending on students' needs as laid out in their Individual Education Plans). Using accurate information already studied (for example, teacher notes, lab results, or a section of the textbook), the second student (student B) checks to see if the answer is correct and provides feedback. If student B agrees with the answer, student B gives some kind of positive feedback to student A, whether in the form of a star, a smiley face, or a praise phrase. If student B would like to change something about the answer, he or she coaches student A in re-crafting the answer using the teacher notes or other accurate information as a guide, if necessary. The partners then switch roles, with student A becoming the coach and student B giving the answer. This continues until all questions are answered.
- **The benefits**: This strategy promotes good communication skills and models healthy peer relationships. It is helpful to pair a student with learning disabilities with a non-learning-disabled student in order to create a good peer coaching relationship. When giving feedback, the coaching partner should have an open discussion



with the partner giving the answer to make sure both understand the thought process.

- **Troubleshooting**: Teachers should make certain that both partners are participating in this activity. One way to ensure this is to have each partner use a different color pencil or pen, which provides an easy visual cue as the teacher walks around the classroom.
- **Examples of use**: A worksheet for determining whether something is a compound, mixture, or element; a review guide for a quiz on cells; a matching list of the different parts of the atom.

Using whiteboards

Students love using personal whiteboards to display answers (cut sections of whiteboard into 8" × 10" rectangles), and even the most passive students are more apt to participate when they get a chance to write and show what they know in a small groups, rather than in front of the entire class.

- **The strategy**: Create some review questions and put them in a pile in the middle of the four desks. The leader (this position is rotated with each question) reads the question out loud, and all four students answer it silently on their whiteboards. When everyone is done, the leader asks to see the boards, and the answers are displayed and read aloud to the group.
- **The benefits**: The biggest benefit of this strategy is that students who are unsure of their knowledge or have misunderstandings about the material can immediately see and hear correct information from their peers. Teachers can easily see who is participating and who is not, as every few minutes answers are displayed to groups. It is also easy to tell who is struggling most with the material and who will need to be remediated by quickly glancing at answers.
- **Troubleshooting**: Students really get into this strategy, and so the classroom climate of acceptance and safety is important. The first few times this strategy is implemented, keep a close eye on students who do not always work well with others, as they may struggle with appropriate behavior during this activity. Students should never be ridiculed or reprimanded by their seatmates for answering a question incorrectly or disagreeing on a point; in fact, this is a good time to model the thinking process that scientists use—they disagree and talk through ideas as a way of clarifying and extending understanding.
- **Examples of use**: Discussing follow-up questions regarding genetic and environmental traits; reviewing for quizzes and exams (this strategy clearly shows the teacher who is in good command of the material and who needs some extra studying).

Conclusion

Encouraging students with learning challenges to actively participate in the learning process can be difficult, especially when they are tentative about their knowledge level as compared to their peers. By implementing these steps and strategies in the classroom, an environment of safety, acceptance, and respect is created, and all students will feel secure in sharing knowledge. If using these strategies feels like a lot to keep track of at first, start small and persevere; you will soon find that the students who were most reticent in the classroom are now comfortable and confident in their knowledge, and you will have helped science content be available to all students. ■

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Teresa Jones (*jonestini79@gmail.com*) is a life science teacher at Joyce Kilmer Middle School in Vienna, Virginia. ***Donna R. Sterling*** is a professor of science education and the director of the Center for Restructuring Education in Science and Technology at George Mason University in Fairfax, Virginia.