

Benefits of Co-Teaching in Secondary Mathematics Classes

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What can secondary special education teachers do to provide access to the general curriculum, especially in math? How are they to prepare their students for high-stakes testing programs, with new accountability requirements? How can special and general education teachers work together for the benefit of their students in secondary schools?

Here we examined a familiar topic, co-teaching, in a new light and in view of recent mandates and required measures (see box, “What Does Co-Teaching Mean?”). The article is based on observations of real-life co-teaching programs, and includes recommendations from practitioners and researchers for what co-teaching could bring to many students.

Why Co-Teach in Mathematics?

The mathematics curriculum at the high school level is more content specific than at the lower grades, often with high-stakes assessments attached to the courses. Secondary mathematics teachers have highly specialized training in mathematics content, with a limited number of courses focused on how to meet the needs of students with disabilities.

Special education teachers, on the other hand, have in-depth knowledge of individual student learning but limited knowledge of mathematics content. Secondary special educators are skilled at accommodating the general education curriculum to meet the needs of students with disabilities.

Co-teachers in mathematics are expected to blend their expertise in the mathematics classroom, and provide instruction to all of the students, includ-

ing students with disabilities. The secondary mathematics teacher brings content knowledge to the classroom while the special education teacher brings knowledge of student learning to the classroom. This “marriage” should improve instruction for students with disabilities placed in general education classrooms.

Let’s examine what co-teaching *looks* like in secondary mathematics classes and what it *could* look like when team members have the right supports.

Co-teaching helps provide students with disabilities access to the general education teacher and the general education curriculum, while providing the required accommodations from the students’ IEPs.

What Do Secondary Co-Taught Mathematics Classes Really Look Like?

As part of a larger study of secondary co-teaching, we sent observers out to eight typical high schools to observe and take notes in co-taught mathematics classes. In these classes, students with disabilities were included and two teachers (a special and general educator) were scheduled to be in the class-

room for the same period. Specifically, we wanted to know what special education teachers were doing in secondary classrooms during mathematics instruction.

Trained observers conducted 49 observations of secondary co-taught mathematics classes. The high schools were located in two mid-Atlantic states and included urban, suburban, and rural districts. There were 10 pairs of co-teachers whose classes were observed.

The observers hand-wrote narrative notes to document the roles of mathematics teachers and special education teachers. Every 5 minutes for an entire class period (40–50 minutes), the observers described the instructional roles of the teachers. We conducted three of the observations in the beginning of the second semester and up to three more observations later in the semester.

What Did the Observers Note?

The most common role assumed by both teachers in the mathematics classrooms we observed was monitoring of independent practice. Both teachers would check student progress in completing an assignment, which would often be done as homework if not finished in class. The other role most common to the special education teacher was assisting students in the classroom as the mathematics teacher maintained the role of primary instructor. Cook and Friend (1996) described this as an appropriate role in the beginning stages of co-teaching when the partners are developing a relationship with each other. Teachers participating in our study, however, had co-taught for 3 to 5

$$2x + 1 = 15$$

$$3x - 2 = 10$$

$$4x + 2y = 14$$

years but had not gone beyond this initial stage of co-teaching.

In 33 of the 49 mathematics observations, both teachers monitored students as they completed independent assignments. Observers coded “monitoring” when teachers checked that students were on task, with minimal feedback provided by either teacher. For example, in an informal geometry class, this was co-teaching:

General education teacher gave in-class assignment and wrote on the blackboard. Students asked questions about the problems. Special and general education teachers circulated. General education teacher emphasized the side that was the base [of the triangle]. Student asked if the answer was in feet squared or squared feet. General education teacher said either was acceptable. Students asked about metric conversions in the problems. General and special education teachers explained metric measurements. (Observation #4, 2/21/01, Grade 11–12, School C)

Also, in 33 of the mathematics observations, the mathematics teacher provided the primary instruction, whereas the special education teacher took on a more supportive role of drifting from student to student. An example of a 5-minute segment during a 9th grade algebra class was as follows:

Special education teacher circulated around the room. General education teacher reminded students to show all of their work so they could get at least partial credit. General education teacher reminded students they needed to memorize formulas. Students were able to come up with a different but more complicated way to solve the problem. (Observation #1, 2/22/01, Grade 9, School F)

In 24 of the 49 observations, the special education teacher assumed the supportive role of being an observer in the

What Does Co-Teaching Mean for Secondary Special Education?

Co-teaching is a popular strategy for implementing the inclusion of students with disabilities within secondary mathematics classrooms. It is a model in which students with disabilities and their special education teacher are integrated into general education classes, like mathematics.

In 1995, the National Council of Teachers of Mathematics (NCTM) stated that *all* students should receive a high-quality mathematics education. In the NCTM Equity Principle, mathematics educators called for a common foundation of mathematics to be learned in a focused curriculum by all students. NCTM stated, “Students with special educational needs must have the opportunities and support they require to attain a substantial understanding of important mathematics” (p. 4).

Later, in the 1997 Reauthorization of the Individuals with Disabilities Education Act (IDEA), the U.S. Congress stated that the preferred placement for students with disabilities is in general education classrooms. The act not only mandated that students with disabilities have access to the general education curriculum, but also required special education students to take the state accountability assessments.

As a result of these actions, educators have a favorable climate for the increased implementation of co-teaching models, such as secondary special education and content area teachers sharing instructional responsibilities. The purpose of co-teaching is to provide access to the general education teacher and the general education curriculum for students with disabilities while providing the required accommodations from the student’s individualized education program (IEP).

class while the mathematics teacher once more was the primary instructor. In one Grade 9 algebra class, it looked like this:

General education teacher continued the lesson using the overhead. General education teacher asked the class to name the numbered pairs. Several students answered. General education teacher used a large grid on the overhead for further explanation for finding slope. Special education teacher got up and observed from the side of the room. General education teacher passed out handout. (Observation #3, 2/29/01, Grade 9, School M)

Team teaching, where both teachers were active instructors, rarely occurred in mathematics classes. It was observed in only 9 of the 49 co-taught classes and lasted only a short time in each lesson (a total of about 60 minutes out of a possible 405 minutes).

The special education teacher was almost never the primary instructor in the co-taught mathematics classes. In three observations, for less than 20 minutes (four 5-minute segments), observers described the special education teacher leading a mathematics class while the general education teacher took on a supportive role. Across the entire study, co-teachers were observed only twice delivering instruction to small groups of students during secondary mathematics classes. Total small-group time during all 49 observations was less than 20 minutes.

What Did the Co-Teachers Have to Say?

Four of the mathematics teachers and four of the special education teachers were interviewed about their experiences with co-teaching at the secondary level. Their responses to interview questions also reflected the supportive roles assumed by the special education teachers in secondary co-taught mathematics classrooms. One general education

$$3x + 5 = 20$$

$$4x - 1 = 15$$

$$7x + 2y = 22$$

mathematics teacher explained that the role of the special education teacher was to provide attention to the students, as follows:

Certainly, I think they get a better understanding because they have more attention, because both of us are able to give them more attention just because we're not spread so thin. ... when I'm instructing she can sort of watch what they're doing and may pick up on when they're not attentive or what they're having more trouble with. Maybe they're afraid to ask questions. She can pick up on that and look over their shoulder and help them when they're working. We try to do it that way, and it seems to work well for us.

In a different interview, a special education teacher reported that her choices of classroom roles were constrained by the general education teacher's reliance on whole class instruction.

I think a lot of times at the high school level, you can see teachers getting in a lecture routine type of thing...there are so many more possibilities. I don't know if you noticed in math but neither one, the special ed or regular ed students, hesitate to ask myself or [teacher's name] questions. You get to help them more.

Why Is This Happening?

Most of the mathematics instruction in these 10 secondary classrooms followed the same traditional patterns: reviewing homework, introducing new types of problems (often with guided practice), and having students solve similar problems independently. Surprisingly, this traditional format of mathematics instruction was maintained even when a second, certified teacher (albeit special education teacher) was assigned to the classroom. Because whole-class instruction continued to be the norm in

most of the mathematics classes, special education teachers had few opportunities to offer individual instruction or to assist learners with special needs.

Rather than co-teaching these classes, the general and special educators shared a *co-assignment* of the classroom. These teachers often lacked training on co-teaching as well as co-planning time. Because the teachers lacked time to discuss the mathematics curricular goals and the individual needs of the students with disabilities, co-teaching was often done on "the fly." Small-group instruction with more immediate teacher feedback was almost never observed in co-taught classes because the teachers were not provided with the time to prepare for more varied instruction.

What Could Co-Teaching in Secondary Mathematics Look Like?

In the real world of secondary education, many special education teachers like Kelli (one of the co-authors), co-teach algebra in a typical high school with several secondary mathematics teachers. Students with and without disabilities are placed in these high school classrooms. Here is how Kelli described her initial experiences with co-taught mathematics classes:

The classes that I teach have two teachers: me (the special education teacher) and a general education secondary mathematics teacher. My first year teaching blended (co-taught) classes, I taught with three different teachers. All had different personalities and different teaching styles. I had to learn to adjust to their ways, as they did mine. The students with special needs had to adapt to a different type of classroom than they were used to. They were used to more one-on-one attention in a self-contained class. Now these students were included in regular education classes with their same aged peers.

Kelli goes on to explain how her co-teaching partnership with a particular secondary mathematics teacher evolved:

We have co-planning time together—without this time, co-teaching would be *very* difficult. We have both had training in co-teaching. We are both open to new ideas and are good at compromising with each other when we have a difference of opinions. She (the general education teacher) is accommodating with the needs of the special education students and all students for that matter. Another important aspect of co-teaching is that I am comfortable with the content in order to be able to modify and adapt it for the needs of the students. Co-teachers need to develop a rapport in the classroom so that the kids feel that

Teachers need time to discuss the mathematics curricular goals and the individual needs of students with disabilities.

both teachers are equals. If students see the special education teacher as an aide, they tend to only accept help from the general education teacher.

How Can a Special Education Teacher Become a Full Partner in a Co-Taught Secondary Mathematics Class?

The role of the special education teacher in a co-taught class is not to become a quasi-mathematics teacher (there is one already in the classroom) but to explicitly teach processes that help students with disabilities *understand* mathematical concepts. To make the best use of the special education

“Co-teachers need to develop a rapport in the classroom so that the kids feel that both teachers are equals.” —Co-teacher

teacher’s skills and expertise in a secondary mathematics class, smaller group instruction should become the norm; and teachers should design instruction to meet the needs of students, as stated in their individualized education programs (IEP; see box, “What Does the Literature Say About Co-Teaching”).

Before Co-Teaching Starts

When special education teachers know that they will be assigned to a secondary mathematics classroom, they can use several strategies to make co-teaching more effective that first year and beyond, as follows:

- Attend co-teaching workshops together as a team. Both teachers should take the time to envision what co-teaching will look like in their mathematics classroom. In our interviews, teachers rarely received enough training on how co-teaching should be implemented.
- Request common planning time so co-teaching can be planned and purposeful, not just a co-assignment. Use the time to plan for individual student needs, how the mathematics content will be taught, and who will take on what roles. In our observations, special education teachers frequently resorted to a supportive role when no planning time was provided for both teachers.
- Put both teachers’ names on the board, on handouts, on notes to families, and on exams. Have two teachers’ desks in the class, if possible. This was rarely observed in our classrooms.
- Become familiar with the NCTM standards, which emphasize active student involvement in constructing and applying mathematical concepts.

Early Stages of Co-Teaching

Special education teachers should go beyond the monitoring and observing roles so frequently noted in our classroom observations. Try to accommodate students’ needs by using one of the small-group configurations that Cook and Friend (1996) suggested. Other ways special education teachers can be active instructors in the classroom are:

- Be able to fully explain to the general education teacher, in understandable terms, the nature of the disabilities of students placed in the co-taught classroom and how it affects mathematics instruction. General education teachers commented that they wanted to know about how a disability affects a student’s learning in their classrooms.
- Discuss every aspect of teaching with your co-teaching partner, including management of the classroom, critical elements of the mathematics curriculum, pet peeves, and how to provide feedback to each other. The special education teacher should be truly invested in how the class is conducted.

More Advanced Stages of Co-Teaching

Later in the school year, the special education teacher could collaborate with

What Does the Literature Say About Co-Teaching?

Several authors (Bauwens & Hourcade, 1995; Cook & Friend, 1996; Vaughn, Schumm, & Arguelles, 1997; Walther-Thomas, Korinek, McLaughlin, & Williams, 2000) have described various models of co-teaching, that emphasize instruction in smaller groups (i.e., not whole-class instruction). In these models, the special education teacher or the general education teacher can assume responsibility as the primary teacher, the support teacher, or the leader of a smaller group. These authors have described in detail the various kinds of instructional options and roles that could be assumed because there are two teachers instructing.

the general education teacher on more variations of co-teaching. When co-teachers trust each other, students can benefit from a greater array of co-teaching configurations.

- Vary small-group instruction frequently to allow for more teacher–student interaction, closer student monitoring, and one-to-one instruction. These configurations were rarely observed in our study, but are recommended in the NCTM standards.
- Teach mathematical concepts, not just procedures. These may include allowing extra time for students to develop mathematical language and understanding, providing students with the whole idea behind mathe-

To make the best use of the special education teacher’s skills and expertise in a secondary mathematics class, smaller group instruction should become the norm.

mathematical reasoning, demonstrating many ways to solve problems, giving students the opportunity to create and think in all parts of mathematics. The co-teachers in our observations were focused on teaching just mathematical procedures.

A Winning Team

After the first full year of co-teaching together in a secondary mathematics classroom, the special education teacher should assume an active role in the classroom. Teachers noted that the first year was the most challenging, but afterward the special education teacher should do the following:

- Build on the co-teaching model from the previous year. Look at varying the instructional groupings even more to accommodate individual student needs.

- Periodically, review the strengths and challenges of the partnership. Adjust instruction based on assessment of student learning as suggested by NCTM.

Because of the presence of a special education teacher in secondary mathematics classes, co-teachers are expected to provide a wider range of instructional alternatives, to enhance the participation of students with disabilities, and to improve performance outcomes for all students (Cook & Friend, 1996). In co-taught mathematics classes, the general and special education teachers are expected to work together to accommodate the learning needs of students with and without disabilities. This accommodation is possible only if the special education teacher is an active partner in the instruction of all students.

Final Thoughts

Effective co-teachers in secondary mathematics classrooms can make learning for all students, including students with disabilities, a dynamic process. By blending the content skills of the secondary mathematics teacher and the strategy skills of the special education teacher, students with a variety of abilities can become more fully engaged in acquiring mathematical knowledge. When the special education teacher is a full partner in a secondary mathematics classroom, he or she is no longer a sideline player but a fully functioning member of a winning mathematics team!

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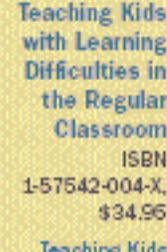
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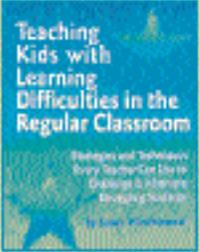
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