

# **Collaborative Success: Teaching Mathematics Using Collaborative Instruction in a Low-Income, Culturally Diverse Middle School**

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Abstract: Collaborative teaching, or co-teaching, has been a predominant mode of instructing students with mild to moderate disabilities in the general education classroom since its inception in the late 1980s. The 1997 reauthorization of the Education for All Handicapped Children Act, brought about increased focus on providing "access to the general curriculum" for students with disabilities. In practice this most often meant that special education and general education teachers co-taught students with and without disabilities in general education classrooms. The accountability-related requirements of the No Child Left Behind Act (NCLB) of 2002 similarly led to increased use of collaborative instruction within the general education classroom. This paper describes the use of collaborative teaching in an inner-city academically-challenged middle school mathematics classroom, and draws upon the observations and experiences of the special education teacher in this co-taught environment. A review of the recent research and literature on co-teaching is followed by a description of co-teaching in practice within this school. The authors then give a detailed example of a small group lesson plan carried out successfully in this classroom, demonstrate how this project was successful within the co-taught classroom, and provide suggestions for improving the outcomes of students in collaboratively-taught classrooms.

Key words: co-teaching, collaborative Teaching, special education, mathematics, small-group instruction

# **1. Introduction**

Collaborative teaching has been defined as "a general and special education teacher working collaboratively to share responsibility for instructing a diverse group of students in a single classroom," (McKleskey, Rosenberg, & Westling, 2013). This approach to bringing the resources and supports of the special education system into the general classroom for the essential purpose of increasing effective access to the general curriculum for students with disabilities is most commonly termed "co-teaching". The use of this practice has steadily increased since the 1980s when this term was introduced, and now is the most common method of providing access to the general curriculum for students with mild disabilities (Cook, McDuffie-Landrum, Oshita, & Cook, 2011; Rea, McLaughlin, & Walther-Thomas, 2002).

The effective use co-teaching is a predominant and critical factor in helping students with disabilities succeed in K-12 schools (Friend, 2007). Significantly, research has also clearly demonstrated its effectiveness in raising the academic achievement of non-disabled, at-risk students negatively affected by poverty and other risk factors

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(Murawski, 2005; Friend & Cook, 2007; Dieker & Murawski, 2003).

Co-teaching creates opportunities for the implementation of active, student-centered instructional techniques such as the use of cooperative learning groups. In this article, we offer an example of this in practice, and describe how the added support of a co-teacher from the special education system clearly helped one teacher to implement this dynamic, interactive cooperative-learning approach in her middle school mathematics classroom.

In addition to the demonstrated positive effectiveness in teaching students with disabilities, co-teaching research clearly indicates significant positive effects for academically-challenged students without disabilities. The research clearly demonstrates that students at-risk for school failure due to poverty, and/or lack of educational opportunities, for example, often benefit greatly from co-teaching (National Association of School Psychologists, 2007; Villa, Thousand, & Nevin, 2004; Murawski, 2005). In fact, the modern view of disability as a type of diversity is now clearly reflected in the multicultural education literature, as well as the design of multicultural education classes in colleges of education (Gollnick & Chinn, 2013), demonstrating our need to "reach and teach" the entire spectrum of our academically-challenged students using the most effective practices possible.

### 2. Effective Practices in Co-Teaching

As Ms. Ballard, the special education teacher whose co-teaching in an ethnically diverse urban middle-school in the southeastern U.S. formed the inspiration for this article, states:

There are no "my" students in our classroom. They are all "our" students. We are both committed to what we are doing and have a positive attitude. We strive to provide a challenging learning environment that promotes the full participation of all students in each lesson.

Excellent supports from her general education math teacher, her principal and district-level special education leadership also played a large part in her success. One of her most significant supports was having *common planning time* with the general education math teacher. The relationship-building this common planning time supported allowed them to effectively plan lessons and activities, and also provided a solid foundation for the negotiations that successful collaboration requires. Having common planning time and meeting on a regular basis made the experience of negotiating differing opinions easier over time, as they became more familiar with each other's teaching styles and methods.

#### 2.1 Small Group Instruction

As we noted in the introduction, one of the most obvious benefits of co-teaching is that it greatly enhances the use of small groups in the classroom, most directly by halving the teacher-student ratio and allowing teachers to closely monitor more students. The use of small-group learning activities allows teachers to break away from a lecture- or worksheet-based approach and instead utilize problem-solving, student-centered activities that require students to use higher-level thinking skills. These teachers incorporated cooperative problem-solving activities in their classroom on a weekly basis throughout the school year, and we will describe one such activity in detail later in this article.

#### 2.2 Differentiation of Instruction

The co-teachers found it was necessary to differentiate instruction to the greatest degree possible, and found that co-teaching facilitated this. Differentiation allows all students to work on grade-level objectives while performing at different levels within the classroom. While more advanced students may have been working on subtracting mixed numbers in the context of word problems, for example, other students may have been solving simple subtraction of mixed numbers using step- by-step directions provided by the teachers.

To give another example, not all students were required to complete the same amount of work. While some students may have been assigned twenty metric conversion problems, other students were to complete only five. This allowed the co-teachers to determine whether or not every student grasped the concept, and allowed the students who were experiencing difficulty more time to devote to each problem. These accommodations — which were designed collaboratively — reflect these co-teachers' shared belief that the top priority in this classroom was for *each student* to arrive at a clear understanding of the mathematical concepts presented.

#### 2.3 Classroom Procedures

When presenting a new academic concept to the students in this classroom, the co-teachers often followed a similar procedure, as described below:

First, they briefly reviewed the most recently-covered concept with the class, often by demonstrating a few problems on the Whiteboard, Smartboard, or Powerpoint presentation.

The co-teachers then administered an informal pre-assessment on the new concept. These pre-assessments were usually simple and brief: presenting a few problems during students' extended-learning time, for example. This allowed the co-teachers to identify the students that needed the most help, as well as the students who might be effective peer buddies.

The co-teachers then presented the new material. These co-teachers believe it is most effective to equally share in the presentation of new material. Some of the specific techniques they used include:

- Utilizing a variety of materials to teach new skills and concepts.
- They used hands-on activities whenever possible, reflecting their belief that keeping students actively engaged is critically important to their success in learning.
- During the presentation of the new material, they both provided examples and often restated and rephrased what the other said.
- Regarding visual aids, they used different colors to point out the steps of mathematical problems, symbols, etc.

The co-teachers next provided guided practice to give examples, simultaneously using "talk outs" in which the teachers verbalize aloud the steps to completing the problem. In demonstrating and explaining how to solve the math problems, they often incorporated real world examples to help students understand how the specific math concepts are applied in life, a technique they found to be very helpful in engaging the interest of students.

Next, they provided time for students to work independently. During this time, they monitored the students working and gave them feedback on their progress.

Finally, they provided a post-assessment to determine if the skill was mastered. In instances when the assessment indicated that certain students had not sufficiently mastered a given concept, these students were scheduled for additional targeted instruction in a "pull-out" setting during their usual homeroom time.

#### 3. Design for a Cooperative Learning Activity

Here is a sample lesson plan design for a cooperative learning exercise that these co-teachers found worked quite well for a wide variety of academic tasks.

• Place students in pairs or small groups of 4 or 5 students per group. When using pairs, pair high-performing

students with lower-performing students. When using groups, put one or two of the students with special needs in each group and then one or two of the highest-performing students in each group. The rest of the students should be divided evenly among the groups. Within the groups, there is an assigned leader (usually the highest performing student in the group) that is responsible for keeping the group on task and completing the given assignment.

- Assign each group a set of five problems that the group must solve collaboratively. These problems should range from relatively basic to very challenging. Given in the order of increasing difficulty, each problem is given a designation as one of the following: A, B, C, D, or E.
- Each student in the group is also designated as one of the following letters: A, B, C, D, or E. The "A" student, then, will be assigned the "A" problem within his group. As you can see, the difficulty level of the problem thus approximates the prior performance levels of the students.
- Write each of the problems on different colored index cards with the assigned letter in the top corner of the card. Each student works on his/her assigned problem and then, taking turns, each student must explain to their group how the problem is correctly solved. You can see the multiple benefits; students must first work independently to solve the problem, then use language skills to explain the solution to the problem, reinforcing their own understanding of the concept in the process of teaching it.

If a particular student is struggling, the other members are encouraged and expected to help the student work through the problem. After each member has shared the problem and answer, the entire group must agree that the solution was correct.

• Taking turns, each group leader will raise his/her hand and one of the teachers will either give them the answer cards to match up with the problem cards or will have the leader write down each answer on a sheet of paper. Often times when we use the matching answer cards, the groups will have an answer card that doesn't match one of their answers and they will work as a team to figure out the correct answer for the unmatched problem.

# 4. Predictors of Success in Co-Teaching

Listed below are aspects of co-teaching that we have identified as critical predictors of success, specific strategies, and helpful resources for teachers who want to put these ideas into action:

- A positive attitude and good professional relationship between the two teachers
- Identification of the differing strengths and talents of the two teachers and efforts to maximize these talents for the benefit of the students.
- Planning time together.
- Willingness to change or alter plans when circumstances change.
- Willingness to talk about the students with special needs and discuss their IEP's- especially the needed modifications/accommodations, and IEP goals.
- Discussion of expectations, classroom procedures, student behavior, consequences, and grading *before* the first day of class!
- Commitment to making it work and putting the students first.

# 5. Strategies for Reaching Struggling Students

- Provide additional instruction for reinforcement (during homeroom, etc.)
- Develop guided worksheets and step-by-step notes with examples on how to solve problems.
- Demonstrate/model solving a math problem with "think alouds" during instruction.
- Use cooperative groups to allow students opportunities to reinforce each others' learning.
- Provide multiple opportunities for practice.
- Provide proximity seating to help keep students focused.
- Use preferential seating to facilitate peer buddy work
- Use an agenda for daily communication between home and school.
- Provide visual displays (graphic organizers) when learning new skills.
- Computer-assisted instruction (we visit the math lab once every two weeks and use a math program to reinforce the skills and concepts we are currently working on.

# 6. Online Resources for Co-Teachers

- The Access Center, at: http://www.k8accesscenter.org/training\_resources/Co-TeachingModule.asp.
- The Co-Teaching Connection, at: http://www.marilynfriend.com/.
- The Teacher Tap, at: http://eduscapes.com/tap/tap2.htm.
- Center for Teaching and Learning, at: http://teaching.berkeley.edu/co-teaching.
- National Dissemination Center for Children with Disabilities, at: http://nichcy.org/schoolage/effective-practices/coteaching.

# 7. Summary

For these co-teachers, some of the most gratifying moments in this entire year of teaching came when observing the students working in their groups. Looking at their faces, they saw young adults working cooperatively, negotiating academic tasks and civility, personally attending to the needs of the group as well as the needs of their individual classmates. From observing them, one could see that the students clearly understood they had been given responsibility for a tangible learning task — and they clearly wanted to succeed, both collectively and individually. They observed their students demonstrating personal responsibility, appropriate uses of humor, and a sincere engagement in mathematics. The students clearly loved working in these groups, and this increased engagement and motivation led to their significantly higher achievement in mathematics.

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