Creating Optimal Opportunities to Learn Mathematics

Blending Co-Teaching Structures With Research-Based Practices

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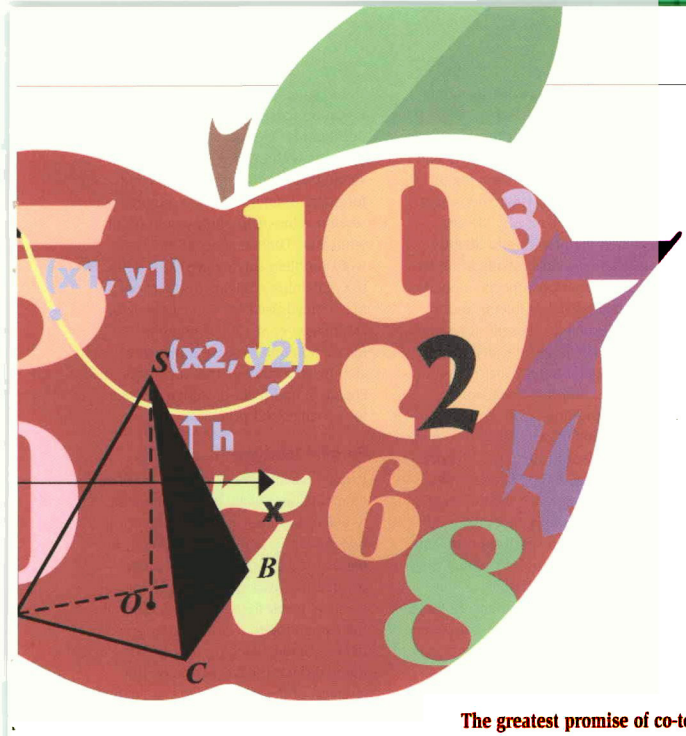
Ms. Thomas, the general educator, and Ms. Merced, the special education teacher, plan to co-teach mathematics classes during the upcoming school year. Based on previous interactions with students and knowledge of students' abilities from school records, they know that several students, including students with disabilities, struggle with mathematics (e.g., communication, problem solving, computation, and recalling facts, among other areas). Ms. Thomas and Ms. Merced also realize it is imperative to design lessons and activities in which all students have equal opportunities to develop mathematical knowledge and understanding. They discuss instructional content and methodology. Their biggest concern is how to create an effective learning environment. The teachers are familiar with co-teaching structures, but they believe it is important to use instructional strategies and practices that are effective for students with learning disabilities. The question is how to integrate the two practices. Throughout this article, we provide examples to demonstrate how Ms. Thomas and Ms. Merced integrated co-teaching and research-based mathematics strategies in their instruction.

As a result of the No Child Left Behind Act (NCLB, 2001) and Individuals With Disabilities Education Improvement Act (IDEA 2004), the U.S. Department of Education (2006) estimated that 48.9% of students with disabilities are educated in general classroom settings. Yet, many of these students struggle academically in various subject areas, including mathematics. Furthermore, approximately 5% to 8% of students experience learning disabilities in mathematics (Geary, 2004). Therefore, general and special educators need effective instructional strategies and service delivery models to meet the needs of all students.

A major expectation of teachers is their use of research-based instructional practices to teach mathematics (e.g., IDEA 2004; NCLB, 2001). Moreover, education literature includes many of these practices (e.g., strategy instruction) as well as instructional delivery models and structures (e.g., cooperative learning, co-teaching, and peer-tutoring) that are effective with students who have disabilities (Friend & Reising, 1993; Gately & Gately, 2001; Kroesbergen & van Luit, 2003; Montague & van Garderen, 2008; Pearl & Miller, 2007; van Garderen, Scheuermann, Jackson, & Hampton, 2009). However, the majority of research focuses exclusively on either instructional practices in mathematics or educational delivery models, such as co-teaching structures. Yet, the emphasis in education is to ensure that all students learn. Therefore, it is important to create optimal learning opportunities for everyone. The combination of research-based instructional practices in mathematics and co-teaching models may create powerful learning environments that enable all students to develop mathematical understandings.

What Is Co-Teaching?

Co-teaching is an instructional delivery model applicable to teaching students with disabilities in least restrictive integrated classroom settings in which general and special educators share responsibility for planning, delivering, and evaluating instructional practices for all students (Argüelles, Hughes, & Schumm, 2000; Villa, Thousand, & Nevin, 2008). Co-teaching allows teachers the opportunity to share expertise. General educators have knowledge of the curriculum, whereas special educators have knowledge of instructional processes for students



One Teach, One Observe

One teach, one observe occurs when one teacher teaches the whole group, and the other teacher observes the students (Cook & Friend, 1995). Because this was a new co-teaching relationship, Ms. Thomas and Ms. Merced decided that one teach, one observe was an excellent strategy to implement during the first few weeks of school. In one lesson, Ms. Thomas led a whole-class discussion about how to solve multistep addition computation problems. Ms. Merced observed students to determine who contributed to the discussion and then recorded the children's comments. The teachers paid particular attention to who was and who was not contributing to the discussion, as many students with disabilities have difficulty communicating what they are doing and learning, thus hindering their mathematical understanding (Baxter, Woodward, & Olson, 2005). Ms. Thomas and Ms. Merced used the process to determine which students needed extra encouragement and support to contribute to class discussions. As a way to promote dialogue, they provided students with question prompts, such as "What is the same or different about . . .," "Can you give an example from your own experience?," "Show me . . . tell me . . .," and, "If this is an answer, what might be the question?" (Watson, 2002).

During the school year, the teachers continued to use one teach, one observe to collect student data, monitor and support student behavior, and write and evaluate students' individualized education program (IEP) objectives in preparation for meetings with parents and colleagues. For example, Ms. Thomas noticed that a few students had difficulty attending to instruction during one lesson. As a result, she and Ms. Merced were concerned that these students were missing important information, which resulted in gaps in their knowledge

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who learn atypically (Ripley, 1997). In other words, "the expertise of the *masters of content*—the content area teachers—are blended with and supported by the expertise of the *masters of access*—the specialists in differentiating instruction" (Villa et al., p. 16). The greatest promise of co-teaching is the teachers' ability to provide academic and behavioral support for all students. It benefits (a) students with disabilities (e.g., improved academic performance, self-esteem, confidence, skills, and peer relationships); (b) students at risk of educational failure and others without disabilities with increased instructional time and individualized attention; and, (c) teachers with professional collaboration, satisfaction, and growth (Fontana, 2005; Jang, 2006; Kohler-Evans, 2006; Pearl & Miller, 2007; Villa et al.; Walther-Thomas, 1997).

Blending Co-Teaching Structures With Research-Based Instruction

According to Friend (2005), there are six basic co-teaching structures—(a) one teach, one observe, (b) team-teaching, (c) alternative teaching, (d) parallel teaching, (e) station teaching, and, (f) one teach, one drift—each of which may be modified depending on the academic subject and students' needs (Cook & Friend, 1995). These co-teaching structures blend nicely with selected research-based mathematics instructional practices that are appropriate for students who struggle with or have a disability in mathematics. The following discussion illustrates the application of mathematics instructional strategies and co-teaching structures in general education classrooms.

base. With this information, Ms. Thomas and Ms. Merced set up a system where students would self-monitor their behavior and note when they were and were not paying attention (Salend, 2008). In addition to self-monitoring, one teacher periodically observed students to determine the amount of time they spent on the task.

Team Teaching

Team teaching occurs when the teachers share equally in planning and delivering all components of academic instruction. In team teaching, both teachers typically teach a large group of students either by standing side-by-side in front of a class or when they jigsaw instruction. According to Silberman (1996), jigsaw instruction occurs when teachers break down new material into manageable segments to facilitate students' learning, and where students subsequently teach the newly mastered material to their classmates. In this manner "each student learns something which, when combined with the material learned by others, forms a coherent body of knowledge or skill" (p. 111). This type of team teaching is similar to two general education teachers who work side-by-side, however in a co-teaching setting, the student–teacher ratio is smaller and the teachers blend their expertise (Friend & Cook, 2006).

In September, Ms. Thomas and Ms. Merced were teaching a number and operations unit, which focused on the whole number operations of addition and subtraction. The unit addressed contextualized problem types, which included various situations such as "change" problems where a beginning amount is altered to get an ending amount that is more or less (e.g., 26 pieces of fruit, 6 are eaten, leaving 20 pieces of fruit); "group" problems where smaller groups or parts combine to form a larger group (e.g., 8 dogs and 6 cats grouped together equal 14 pets); and "compare" problems where a larger amount, smaller amount, or difference is determined by comparing two amounts (e.g., Sue had 6 dolls and Lucy had 9 dolls, Lucy had 3 more dolls than Sue; Jitendra, 2002). Observation of several students, including those with disabilities, when solving word problems revealed their tendency to "grab" all the numbers and to add or subtract rather than stopping to understand the operations necessary to solve the problem. Ms. Merced researched the literature to identify strategies that help students to understand mathematical concepts underlying contextualized problems and to solve the problems. Based on research, she and Ms. Thomas decided to use Schema-Based Strategy Instruction in conjunction with team teaching because it promotes both conceptual understanding of, as well as a strategy for, solving word problems (Jitendra; Xin & Jitendra, 2006). The teachers believed this approach would benefit all students, not only those with difficulty solving contextualized problems. In addition, this structure helped the teachers support each other as they presented the material to ensure they addressed all steps and accurately reinforced the mathematical concepts.

Alternative Teaching

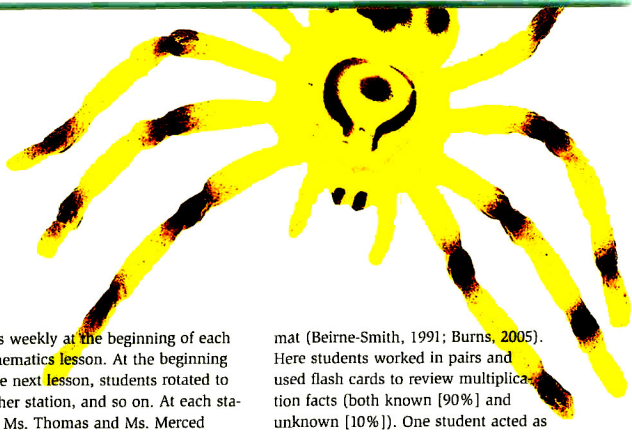
Alternative teaching occurs when one teacher teaches a small group of three to eight students while the other teaches the whole class (Cook & Friend, 1995). Alternative teaching is an excellent format to provide students with more intense and individualized instruction in a specific academic area.

As the school year progressed, Ms. Merced, the special education teacher, was concerned with the difficulty several students (both with and without disabilities) continued to incur when solving word problems. Therefore, to better understand their difficulties, she assessed them by requiring students to think-out-loud while solving the word problems and by asking them questions such as, "How did you solve this problem?" after they solved it. Assessment results highlighted students' need for further support and help to acquire and apply cognitive (e.g., visualization, paraphrasing, and estimation) and meta-cognitive (e.g., self-checking, self-monitoring, and self-questioning) processes and strategies that underlie effective and efficient problem solving (Montague, Warger, & Morgan, 2000). Based on these results, the teachers decided Ms. Merced would provide the students with explicit instruction on solving word problems twice weekly for approximately 15 to 20 minutes per session. This instruction would occur while Ms. Thomas worked on other word problem-solving activities with the remaining students in the class. Ms. Merced used the *Solve It!* program (Montague et al., 2000) to guide instruction and to teach students a step-by-step strategy that incorporates cognitive and meta-cognitive strategies for solving word problems.

Parallel Teaching

Parallel teaching occurs when teachers plan collaboratively and simultaneously teach the same academic content to two student groups (Friend, 2005). In parallel teaching, the class is often divided into two equal groups, and the teachers teach the same curriculum at the same time to a small group of students. Parallel teaching may be used in many different ways. However, the strength of the format is that it enables teachers to work with smaller numbers of students and to provide all students, but especially those with disabilities, an opportunity for individualized and hands-on learning.

Both Ms. Thomas and Ms. Merced recognized that use of various representational forms such as manipulative objects, diagrams and visual displays, and written symbols is an important part of developing students' mathematical understanding (Pape & Tchoshanov, 2001). Ms. Merced also knew that several studies demonstrated successful use of concrete–representational–abstract (CRA) instructional processes to teach numerous mathematical concepts and skills (e.g., algebra, multiplication, coin sums, place value, and geometry) to students with disabilities (Cass, Cates, Smith, & Jackson, 2003; Miller, Harris, Strawser, Jones, & Mercer, 1998; Miller, Mercer, & Dillon, 1992; Witzel, Smith, & Brownell, 2001). Although research has identified CRA as a successful instructional process, both teachers found it daunting to use



manipulatives with a large group of students and to monitor student progress concurrently to ensure students' understanding of their new learning.

In February, Ms. Thomas and Ms. Merced taught a geometry unit that focused on the concepts of perimeter and area, in which they used the parallel teaching structure and CRA instructional process. Ms. Thomas and Ms. Merced divided the class into two groups, moved the desks accordingly, and taught the same set of lessons to each group. This structure enabled them to utilize a more hands-on instructional approach, which, in turn, reduced potential problems using manipulative materials with a large group of students. More important, however, it allowed students to receive supplementary individualized instruction.

Station Teaching

According to Friend (2005), station teaching occurs when teachers divide responsibility for instructional content. In station teaching, teachers typically divide the class into groups with each group working on a different activity that contributes to attainment of one or more learning goals for all students (e.g., recalling multiplication facts 0 to 81).

As the year progressed, Ms. Merced and Ms. Thomas noticed a number of students still had difficulty recalling basic facts when working on complex mathematics problems. Ms. Merced identified several instructional practices that help students, particularly those with disabilities, to learn and recall basic facts. She and Ms. Thomas discussed the instructional practices and decided that the station teaching structure was an excellent format in which to practice and review math facts. In March, they decided that student groups would work at one station for approximately 5 to 10 minutes three times weekly at the beginning of each mathematics lesson. At the beginning of the next lesson, students rotated to another station, and so on. At each station, Ms. Thomas and Ms. Merced used a research-based instructional practice that helped students to practice and, in turn, reinforce their retention of multiplication facts.

At station one, students worked on their own where they used the Cover, Copy, Compare technique (McLaughlin & Skinner, 1996; Skinner, Ford, & Yunker, 1991). Here, students were presented an arithmetic fact (e.g., $3 \times 4 = 12$) that they look at, cover, and write an equation for, and then compare their written equation to the original example. If the written response matches the sample, students then move on to the next fact (Skinner et al.). In station two, the students used a visual mnemonic technique (Wood, Frank, & Wacker, 1998) that relied on flash cards containing a math fact with a picture that reinforced it. For example, a visual mnemonic for doubles involves using picture flash cards of objects to learn the two times math facts. The flash cards may include pictures of a skateboard with two sets of two wheels, a six-pack of soda with two sets of three cans, and a toy spider with two sets of four legs. First, the students had to find the two in the math fact and then remember the double picture related to the number that provided the answer. In station three, the teachers used a variation of a rehearsal drill model/peer-tutoring format (Beirne-Smith, 1991; Burns, 2005). Here students worked in pairs and used flash cards to review multiplication facts (both known [90%] and unknown [10%]). One student acted as a tutor and presented a fact with the answer, which was then repeated by the other student. Then, the tutor presented all problems without the answers to the second student—first in order and then randomly. The teachers worked with students in stations two and three, while the students worked independently in station one. In the teacher-led stations, the teachers charted the facts that students had mastered and/or were still learning to ensure students progressed over time. Ms. Thomas and Ms. Merced planned to use this format for the remainder of the year to practice and review other mathematics concepts.

At each station, Ms. Thomas and Ms. Merced used a research-based instructional practice that helped students to practice and, in turn, reinforce their retention of multiplication facts.

One Teach, One Drift

The one teach, one drift co-teaching format is similar to one teach, one observe. However, in this structure, while one teacher is teaching, the other teacher is drifting throughout the classroom. Co-teachers use this structure as a way to check for student understanding. It allows the opportunity to provide one-to-one instruction to students who may be struggling with a particular concept (Friend, 2005).

Throughout the school year, Ms. Merced and Ms. Thomas asked students to write in a journal about various aspects of mathematics (Baxter et al., 2005). They used prompts to elicit students' feelings or opinions (e.g., How do you feel about . . .) and their mathematical thinking (e.g., Explain to a third grader how to solve a two-digit by two-digit multiplication problem. What strategies did you use to solve

the word problem?). The teachers encouraged students to use words, pictures, and symbols to explain and describe their mathematical thinking. They also asked students to write in journals before, during, and after lessons. Occasionally, when students appeared confused during the middle of class, the teachers instructed them to write about their thoughts on a particular topic. After each prompt, Ms. Merced and Ms. Thomas examined the journals. Several times, students' journal writing enabled the teachers to identify those who misunderstood a mathematical concept. The teachers then addressed the students' misconceptions using the one teach, one drift structure.

During a guided practice portion of the lesson taught by Ms. Merced, Ms. Thomas (who was drifting) approached students identified as having misconceptions and difficulty learning the new content. Where necessary, she provided additional one-to-one assistance, such as reminding students about the first step to solve a problem, prompting students' use of a diagram to help understand the problem, or providing the definition of a concept to address students' difficulties and to ensure their understanding of the new material.

Figure 1. Suggestions for Blending Co-Teaching and Research-Based Practices

- Teachers may modify instructional practices to complement students' specific ages and instructional needs. For example, they may use a middle school/secondary level problem-solving strategy with elementary children by reducing the number of steps and simplifying the vocabulary. (We offer caution with modifying any research-based strategy as this may reduce its effectiveness. It is preferable to use age-appropriate practices, where possible.)
- Teachers may adapt special education research-based practices from other content areas when teaching mathematics. For instance, they may use a reading vocabulary technique, such as reciprocal teaching to help promote students' understanding and retention of key mathematical concepts (van Garderen, 2004).
- Teachers may use general mathematics education research-based practices to supplement or address topics not covered specifically for students with disabilities. If necessary, they can restructure the strategy by providing additional opportunities for guided practice that address specific needs of students with disabilities.
- Teachers may incorporate instructional strategies, within different co-teaching structures, that have been documented to work with children with disabilities (Cobb Morocco, 2001; Fuchs & Fuchs, 2001; Maccini & Gagnon, 2000; Montague, 1998). These practices include but are not limited to (a) teacher modeling, such as thinking aloud while problem solving; (b) providing opportunities for practice and cumulative review that involves new and previously learned materials; (c) offering immediate and corrective feedback, as well as continuous monitoring of student performance; (d) using authentic tasks to promote students' ability to generalize learning; (e) teaching students how to use cognitive and meta-cognitive strategies, such as different representational forms (e.g., symbols, concrete objects, and diagrams) to reinforce mathematical concepts and solve word problems; and (f) promoting use of dialogue and communication as well as social mediation strategies, such as peer-tutoring and cooperative learning.

Potential Challenges to Blending Co-Teaching and Research-Based Practices

Teachers' knowledge of research-based instructional practices for mathematics is critical to create supportive classroom learning environments for students with and without disabilities (Hudson & Miller, 2006; Miller, 2002). The research-base limitations regarding mathematics instruction for students with disabilities creates potential challenges to successfully blending co-teaching and research-based practices. In particular, we acknowledge three concerns.

First, it may be difficult to identify research-based practices designed specifically for students with disabilities in some mathematical content areas and for all age groups. For example, there are very limited research-based practices for students with disabilities in the mathematical fields of geometry, algebra, and data and probability. Moreover, the majority of available research-based practices are designed for elementary or middle school students.

Second, some instructional practices, including those presented in this article, are not necessarily appropriate for all students or age groups. For example, Montague's *Solve It!* strategy was developed for middle school students and may not be appropriate for children in the primary grades (K–2). In addition, *Solve It!* is one of a number of problem-solving strategies (e.g., Schema-Based Instruction) available that teachers may choose for implementation in their classrooms. Using all practices may be too numerous and overwhelming and potentially could create confusion for some students. Thus, it may not be advisable to introduce students to more than one word problem-solving strategy for a given year.

Finally, existing research-based practices present a limited range of instructional strategies, such as drill and practice and strategy instruction for solving word problems. It is also possible that some practices may not lend themselves to co-teaching structures or general education settings. With this in mind, we offer suggestions (see Figure 1) to address these concerns. Also, Figure 2 provides resources for supplementary research-based instructional practices to teach mathematics to students with disabilities.

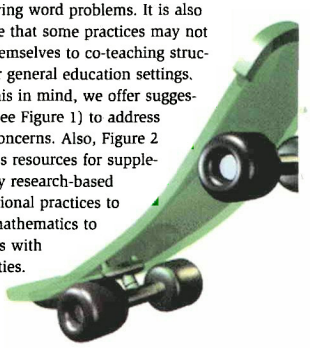


Figure 2. Supplementary Information About Research-Based Practices and Other Ideas for Teaching Mathematics

Allsopp, D. H., Kyger, M. M., & Lovin, L. H. (2007). *Teaching mathematics meaningfully: Solutions for reaching struggling learners.* Baltimore, MD: Paul. H. Brookes.

Gurganus, S. P. (2007). *Math instruction for students with learning problems.* Boston, MA: Allyn & Bacon.

Hudson, P., & Miller, S. P. (2006). *Designing and implementing mathematics instruction for students with diverse learning needs.* Boston, MA: Allyn & Bacon.

Jitendra, A. (2002). Teaching students math problem solving through graphic representations. *TEACHING Exceptional Children, 34*(4), 34-38.

Miller, S. P., & Hudson, P. J. (2006). Helping students with disabilities understand what mathematics means. *TEACHING Exceptional Children, 39*(1), 28–35.

Montague, M., & Jitendra, A. K. (2006). *Teaching mathematics to middle school students with learning difficulties.* New York, NY: The Guilford Press.

Montague, M., Warger, C., & Morgan, H. (2000) Solve it! Strategy instruction to improve mathematical problem solving. *Learning Disabilities Research and Practice, 15,* 110–116.

Promoting Co-Teaching Practices Among General and Special Education Teachers

Co-teaching requires thoughtful planning and consideration to ensure students' success in heterogeneous classrooms and to provide appropriate support for teachers (Walther-Thomas, 1997). Planning is integral to successful co-teaching and implementation of the instructional practices described in this article. However, the biggest challenge to co-teaching is allocating time for teachers to plan (Walther-Thomas; Sileo, 2003). As one teacher stated, "We have co-planning time together—without this time, co-teaching would be very difficult" (Magiera, Smith, Zigmond, & Gebauer, 2005, p. 22). Teachers are busy teaching throughout the day and after school meeting with parents and colleagues about school-related issues. As a result, it is difficult to plan together and planning often occurs "on the fly." According to Magiera et al., co-teachers are not successful when they do not have proper time to meet and discuss curriculum and instructional practices. Therefore, Murawski and Dieker (2004) suggest (a) planning together at least twice a week; (b) discussing content and how it will be taught; (c) using a common plan book; and (d) including lessons where special educators take the lead in planning and instruction.

Another challenge associated with co-teaching relates to scheduling opportunities, particularly if the special education teacher must work in general education settings and within a resource-based classroom. One possible solution involves clustering students and allowing them to travel from class to class for instruction, thereby decreasing the number of classrooms rather than the number of students who receive services (Walther-Thomas, 1997). For example, rather than requiring students to attend the resource room for instruction, Ms. Merced provided services to some students in Ms. Thomas's classroom. This approach allowed Ms. Merced the opportunity to increase the level and intensity of services she afforded students in a general education setting.

The co-teaching structures presented in this article may not work for all teachers. Further, it may be advisable for teachers to implement one structure at a time. Teachers can implement different structures as they develop collegial relationships and a comfort level working together. Throughout the year, Ms. Merced and Ms. Thomas became more comfortable co-teaching

Figure 3. Additional Print and Nonprint Resources About Co-Teaching

Print Resources

Dieker, L. A. (2006). The coteaching lesson plan book (3rd ed.). *Knowledge by Design:* Whitefish Bay, WI.

Friend, M. (2005). *Power of Two* [DVD/Video]. Bloomington: Indiana University. A Forum on Education.

Friend, M., & Cook, L. (2006). *Interactions: Collaboration skills for school professionals* (5th ed.). Boston, MA: Allyn & Bacon.

Murawski, W. W. (2005). *Co-teaching for success: Effective strategies for working together in today's inclusive classrooms.* Bellevue, WA: Bureau of Education and Research.

Villa, R. A., Thousand, J. S., & Nevin, A. I. (2008). *A Guide to co-teaching: Practical tips for facilitating student learning* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Internet Resources

http://www.2teachllc.com/index.html
This Web site provides lesson plans and information about professional development opportunities for teachers who work in co-teaching classrooms (K–12).

http://www.marilynfriend.com/
This Web site provides resources for teachers and administrators who want more information on co-teaching.

and eventually implemented lessons that utilized all co-teaching structures. Essentially, no one co-teaching structure is better than another. It is also possible to use the structures for different instructional purposes and to (a) pre-teach concepts, (b) re-teach information taught previously, (c) review content, (d) make up material missed during students' absences, (e) provide enrichment activities, (f) allow students to pursue specific interests, and (g) assess students' progress in developing skills and understanding critical concepts (Cook & Friend, 1995). See Figure 3 for additional information about co-teaching and suggestions for implementation.

Finally, another challenge that may arise between general and special education teachers and hinder co-teaching efforts, particularly in mathematics, relates to different philosophies of instruction (Parmar & DeSimone, 2006) that influence their instructional recommendations for students with and without disabilities. A tension that often exists concerns teachers' specific ideas regarding the one best approach for teaching students with disabilities. For example, many special education teachers and researchers may support explicit teaching methodologies in contrast to inquiry-based or reform-based approaches (Hudson, Miller, & Butler, 2006). No one tactic is the best for students with disabilities, and it may be appropriate to blend practices to attain students' goals and objectives (Karp & Voltz, 2000). Parmar and DeSimone recommend that teachers discuss their individual perspectives as a way to understand various points of view. Possible discussion topics include, but are not limited to, inquiry versus direct/explicit instruction; using particular motivators, grading systems, and grouping practices; and scheduling and pacing curricular content (Parmar & DeSimone).

Summary

Co-teaching structures can benefit students and teachers. Nevertheless, although structures can enhance student learning, it is also important to consider the subject matter. General and special educators can work together to blend their knowledge bases. This relationship is invaluable because it weds content and strategy specialists, and allows teachers an opportunity to meet all students' mathematical learning needs.

References

Argüelles, M. E., Hughes, M. T., & Schumm, J. S. (2000). Co-teaching: A different approach to inclusion. *Principal, 79*(4), 48, 50–51.

Baxter, J. A., Woodward, J., & Olson, D. (2005). Writing in mathematics: An alternative form of communication for academically low-achieving students. *Learning Disabilities Research and Practice, 20*, 119–135.

Beirne-Smith, M. (1991). Peer tutoring in arithmetic for children with learning disabilities. *Exceptional Children, 57*, 330–339.

Burns, M. K. (2005). Using incremental rehearsal to increase fluency of single-digit multiplication facts with children identified as learning disabled in mathematics computation. *Education and Treatment of Children, 28*, 237–249.

Cass, M., Cates, D., Smith, M., & Jackson, C. (2003). Effects of manipulative instruction on solving area and perimeter problems by students with learning disabilities. *Learning Disabilities Research and Practice, 18*, 112–120.

Cobb Morocco, C. (2001). Teaching for understanding with students with disabilities: New directions for research on access to the general education curriculum. *Learning Disability Quarterly, 24*, 5–13.

Cook, L., & Friend, M. (1995). Co-teaching: Guidelines for creating effective practices. *Focus on Exceptional Children, 28*(3), 1–16.

Fontana, K. C. (2005). The effects of co-teaching on the achievement of eighth grade students with learning disabilities. *The Journal of At Risk Issues, 11*(2), 17–23.

Friend, M. (2005). *Power of two* [DVD/Video]. Bloomington: Indiana University. A Forum on Education.

Friend, M., & Cook, L. (2006). *Interactions: Collaboration skills for school professionals* (5th ed.). Boston, MA: Allyn & Bacon.

Friend, M., & Reising, M. (1993). Co-teaching: An overview of the past, a glimpse at the present, and considerations for the future. *Preventing School Failure, 37*(4), 6–11.

Fuchs, L. S., & Fuchs, D. (2001). Principles for the prevention and intervention of mathematics difficulties. *Learning Disabilities Research and Practice, 16*, 85–95.

Gately, S. E., & Gately, F. J. (2001). Understanding coteaching components. *TEACHING Exceptional Children, 33*(4), 40–47.

Geary, D. C. (2004). Mathematics and learning disabilities. *Journal of Learning Disabilities, 37*, 4–15.

Hudson, P., & Miller, S. P. (2006). *Designing and implementing mathematics instruction for students with diverse learning needs*. Boston, MA: Allyn & Bacon.

Hudson, P., Miller, S. P., & Butler, F. (2006). Adapting and merging instruction within reform based mathematics classrooms. *American Secondary Education, 35*(1), 19–32.

Individuals With Disabilities Education Improvement Act of 2004. Pub. L. 108–446.

Jang, S. J. (2006). Research on the effects of team teaching upon two secondary school teachers. *Educational Research, 48*(2), 177–194.

Jitendra, A. (2002). Teaching students math problem-solving through graphic representations. *TEACHING Exceptional Children, 34*(4), 34–38.

Karp, K. S., & Voltz, D. L. (2000). Weaving mathematical instructional strategies into inclusive settings. *Intervention in School and Clinic, 35*(4), 206–215.

Kohler-Evans, P. (2006). Co-teaching: How to make this marriage work in front of the kids. *Education, 127*(2), 260–264.

Kroesbergen, E. H., & van Luit, J. E. H. (2003). Mathematics interventions for children with special needs: A meta-analysis. *Remedial and Special Education, 24*, 97–114.

Maccini, P., & Gagnon, J. C. (2000). Best practices for teaching mathematics to secondary students with special needs. *Focus on Exceptional Children, 32*, 1–22.

Magiera, K., Smith, C., Zigmond, N., & Gebauer, K. (2005). Benefits of co-teaching in secondary mathematics classes. *TEACHING Exceptional Children, 37*(3), 20–24.

McLaughlin, T. F., & Skinner, C. H. (1996). Improving academic performance through self-management: Cover, copy, and compare. *Intervention in School and Clinic, 32*(2), 113–118.

Miller, S. P. (2002). *Validated practices for teaching students with diverse needs and abilities*. Boston, MA: Allyn & Bacon.

Miller, S. P., Harris, C., Strawser, S., Jones, W. P., & Mercer, C. (1998). Teaching multiplication to second graders in inclusive settings. *Focus of Learning Problems in Mathematics, 20*, 50–70.

Miller, S. P., Mercer, C. D., & Dillon, A. (1992). Acquiring and retaining math skills. *Intervention, 28*, 105–110.

Montague, M. (1998). Mathematics instruction in diverse classrooms. In K. R. Har-

ris, S. Graham, and D. Deshler (Eds.), *Teaching every child every day: Learning in diverse schools and classrooms* (pp. 168–207). Cambridge, MA: Brookline Books.

Montague, M., & van Garderen, D. (2008). Evidence-based interventions for students with learning and behavioral challenges. In R. J. Morris and N. Mather (Eds.). *Research-based practice for effective mathematics instruction* (pp. 236–257). New York, NY: Taylor & Francis.

Montague, M., Warger, C., & Morgan, H. (2000). Solve it! Strategy instruction to improve mathematical problem solving. *Learning Disabilities Research and Practice, 15*, 110–116.

Murawski, W. W., & Dieker, L. A. (2004). Tips and strategies for co-teaching at the secondary level. *TEACHING Exceptional Children, 36*(5), 52–58.

No Child Left Behind Act. Pub. L. 107–110, 115 Stat. 1425 (2001).

Pape, S. J., & Tchoshanov, M. A. (2001). The role of representation(s) in developing mathematical understanding. *Theory into Practice, 40*, 118–127. doi: 10.1207/s15430421tip4002_6

Parmar, R. S. & DeSimone, J. R. (2006). Facilitating teacher collaboration in middle school mathematics classrooms with special-needs students. In M. Montague and A. Jitendra (Eds.), *Middle school students with mathematics difficulties* (pp. 154–174). New York, NY: Guilford Press.

Pearl, C. E., & Miller, K. J. (2007). Co-taught middle school mathematics classrooms: Accommodations and enhancements for students with specific learning disabilities. *Focus on Learning Problems in Mathematics, 29*(2), 1–20.

Ripley, S., (1997). *Collaboration between general and special education teachers.* (ERIC Digest). (ERIC Document Reproduction Service No. ED409317). Retrieved from www.eric.ed.gov

Salend, S. J. (2008). *Creating inclusive classrooms: Effective and reflective practices for all students* (6th ed.). Upper Saddle River, NJ: Pearson.

Silberman, M. (1996). *Active learning: 101 strategies to teach any subject.* Needham Heights, MA: Allyn & Bacon.

Sileo, J. M. (2003). Co-teaching: Rationale for best practices. *Journal of Asia–Pacific Special Education, 3*(1), 17–26.

Skinner, C. H., Ford, J. M., & Yunker, B. D. (1991). A comparison of instructional response requirements on the multiplication performance of behaviorally disordered students. *Behavioral Disorders, 17*, 56–65.

U.S. Department of Education. (2006). *Twenty-fourth annual report to Congress on the implementation of IDEA.* Washington, DC: Author.

van Garderen, D. (2004). Reciprocal teaching as a comprehension strategy for understanding mathematical word problems. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 20*(2), 225–229.

van Garderen, D., Scheuermann, A., Jackson, C., & Hampton, D. (2009). Supporting collaboration between general educators and special educators to teach students who struggle with mathematics: A review of recent empirical literature. *Psychology in the Schools, 46*(1), 56–77.

Villa, R. A., Thousand, J. S., & Nevin, A. I. (2008). *A guide to co-teaching: Practical tips for facilitating student learning* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Walther-Thomas, C. (1997). Co-teaching experiences: The benefits and problems that teachers and principals report over time. *Journal of Learning Disabilities, 30*(4), 395–407.

Watson, A. (2002). Instances of mathematical thinking among low attaining students in an ordinary secondary classroom. *Journal of Mathematical Behavior, 20*, 461–475.

Witzel, B., Smith, S. W., & Brownell, M. T. (2001). How can I help students with learning disabilities in algebra? *Intervention in School and Clinic, 31*, 101–104.

Wood, D. K., Frank, A. R., & Wacker, D. P. (1998). Teaching multiplication facts to students with learning disabilities. *Journal of Applied Behavior Analysis, 31*, 323–338.

Xin, Y. P., & Jitendra, A. K. (2006). Teaching problem-solving skills to middle school students with learning difficulties: Schema-based strategy instruction. In M. Montague & A. Jitendra (Eds.), *Teaching mathematics to middle school students with learning difficulties* (pp. 51–71). New York, NY: Guilford Press.

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