

Case Studies in Co-Teaching in the Content Areas: Successes, Failures, and Challenges

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This article presents recent findings from several long-term qualitative investigations of co-teaching in science and social studies content-area classes, in which collaborating teachers and students with and without disabilities were observed and interviewed regarding effective practices and challenges associated with inclusion. In some sites, collaborating teachers were provided with research-based effective strategies and materials for including students with disabilities in specific activities. Results were equivocal in that in some cases, collaboration was extremely effective and conducive for promoting success for students with disabilities in inclusive classes. In others, challenges remained that presented barriers for successful collaboration and inclusion for students with disabilities. Important mediating variables were identified as academic content knowledge, high-stakes testing, and co-teacher compatibility. Findings are discussed with respect to both successes and remaining challenges.

Schools and classrooms of the 21st century represent diverse student populations representative of our larger society. Some of that increased diversity reflects a growing number of students with disabilities who are included in general education class environments (U.S. Department of Education, 2002). Partly as a result of that diversity, collaboration has become widely practiced in today's schools; in fact, it is not uncommon to see a general and special educator teaching within a single classroom. Concomitant with this increased collaboration is the emergence of various models of collaboration and co-teaching. Some of these are predicated on the notion of shared instructional responsibilities and planning time (see Friend, 2000). According to Zigmond and Magiera (2001), the major goals of co-teaching and collaboration involve: (a) increasing access to a wider range of instructional options for students with disabilities, (b) enhancing the participation of students with disabilities within general education classes, and (c) enhancing the performance of students with disabilities.

Although co-teaching models have proliferated, there is a lack of consensus on the specific features required, such as the precise roles and responsibilities of both general and special education teachers and the best way to measure the effectiveness of co-teaching. The challenges associated with co-teaching are highlighted as a procedure to "use with caution," given the limited amount of efficacy data (Zigmond & Magiera, 2001). Nevertheless, co-teaching models have become commonly implemented and can, to date, be observed throughout the United States. This article presents case study data on existing collaborating teachers at the middle and secondary levels. Although many questions should be asked about co-teaching, research findings can present information of importance in deciding whether to use co-teaching and, if used, what features are most important in ensuring success.

Recent literature reviews on co-teaching have concluded that efficacy data provide only limited support for the use of co-teaching programs. Murawski and Swanson (2001) conducted a meta-analysis of co-teaching research and reported that only six studies contained sufficient information to code effect sizes (standardized quantitative indices of treatment efficacy), and the results varied so greatly that little could be concluded. Twenty-two effect sizes were computed on the six studies—involving dependent variables such as grades, achievement, attendance, social and attitudinal outcomes—that yielded a total mean effect size of .40, indicating a low to moderate average outcome effect. Murawski and Swanson concluded that additional efficacy research is needed before co-teaching can be generally recommended.

Several surveys conducted on students, parents, or teachers (e.g., Walther-Thomas & Carter, 1993) revealed satisfaction and reported positive outcomes associated with co-teaching. Studies of teacher perceptions of the co-teaching process (e.g., Trent, 1998) revealed that co-

teaching means different things to different teachers. However, voluntary participants tended to report more positive perceptions than did teachers who were assigned to co-teaching. More positive perceptions were also associated with administrative support, additional planning time, similar beliefs about teaching, and mutual respect of one another. However, observational studies (e.g., Baker, 1995) have revealed that in many cases, students with disabilities are receiving instruction of generally high quality but lacking in the distinctiveness and intensity considered to be important features of "special" education (see Mastropieri & Scruggs, 2004). Nevertheless, others (e.g., Boudah, Schumaker, & Deshler, 1997) have suggested that co-teaching partners can be trained to increase their efficiency, at least with respect to better exchange of roles and increased interaction with individual students. After reviewing 23 studies, Weiss and Brigham (2000) listed several overall problems with co-teaching research, including the following:

1. omitting important information on measures,
2. interviewing teachers only in cases in which co-teaching is successful,
3. finding in many cases that teacher personality was the most important variable in co-teaching success,
4. lacking a consistent definition of co-teaching, and
5. stating outcomes subjectively.

Weiss and Brigham stated that, overall, there were few reports of what teachers actually did in the classroom. This last point is relevant and important because careful analyses of what co-teachers are doing and how this relates to student success can help facilitate efforts to better understand and improve co-teaching practices.

More recent research has provided additional descriptions of what co-teachers do, particularly in secondary settings. Hardy (2001) observed special and general educators in secondary biology classrooms and concluded that the presence of special education teachers in co-taught classrooms

- contributes to changes in general educators' instructional behaviors,
- contributes to specialized instruction (albeit limited) for students with disabilities,
- contributes to a successful partnership, and
- facilitates success for some students with disabilities.

However, there is no guarantee that the new instructional practices will continue in the absence of the special education teacher. Magiera (2002) observed 11 co-taught middle school classes to document how students with disabilities spent their time and concluded that targeted students interacted more with the general education teacher and received more individual instruction and management when the co-teacher was present.

Weiss and Lloyd (2002) observed co-taught classrooms at the middle and high school levels and identified several significant challenges associated with co-teaching. Because of frequent gaps in academic and behavioral domains between general and special education students, the classes were frequently split; however, in these circumstances, students with disabilities did not receive high levels of direct skill instruction and interaction with teachers. Little time was identified for special education teachers to deliver or modify instruction. Overall, general education teachers were identified as content specialists, and all special education teachers, at some point, took on the role of instructional aide.

Weichel (2001) observed ninth-grade English classes and compared student academic performance and student self-concepts in co-taught classes, mainstreamed classes (no co-teaching, but students with disabilities were included), general education-only classes, and special education-only classes. Findings indicated no statistical differences among classes; however, when teachers co-taught, they rarely accessed all the components identified as important for co-teachers, such as using a variety of instructional models and co-planning. Although teachers may be in a room simultaneously, these results indicate that they may not be using optimal methods of co-teaching, and this could negatively impact student performance.

In this article, we provide information from several recent investigations regarding the implementation of co-teaching in a variety of different settings and content areas. By examining co-teaching practices in a number of different contexts, we hoped to draw some general conclusions about the experience of co-teaching.

CASE STUDIES OF COLLABORATION AND CO-TEACHING

Case studies examining effective teaching practices for including students with disabilities within upper elementary, middle, and secondary content-area classes were undertaken. Throughout these case studies, researchers worked closely with general and special education teachers, and observations ranged from 1 semester to 2 years. In most cases, both general and special educators worked collaboratively with researchers to identify optimal research-based instructional materials and practices to increase the performance of students with disabilities. Data sources consisted of extensive observations of class activities, field notes, videotapes of classes, interviews with teachers and students, and artifacts (e.g., samples of class activities, homework assignments, tests, exams). Data analyses in these cases were qualitative and inductive (LeCompte & Preissle, 1993; Scruggs & Mastropieri, 1995).

Case 1: Upper Elementary and Middle School Earth Science

Two different teams of teachers were observed during units on ecosystems. Each team consisted of a general and a special education teacher. All educators had teaching experience and credentials in their respective fields. One team was co-teaching in a fourth-grade upper elementary-age class (see Mastropieri et al., 1998, for additional details), and the other team was co-teaching in a seventh-grade science class. The fourth-grade class consisted of 25 students, with 5 representing various disabilities—learning disabilities, emotional disturbance, mental retardation, and physical disabilities. The seventh-grade class consisted of 25 students, of whom 7 were classified as having learning or emotional difficulties and 1 with a hearing impairment. The fourth-grade teachers and one seventh-grade teacher were veteran teachers; one seventh-grade teacher was a beginning teacher. The content was a hands-on unit on ecosystems and was highly similar at both grade levels; however, the seventh-grade class presented information at an advanced level, with greater depth and breadth of coverage, including more vocabulary. In both cases, students were not required to take an annual high-stakes test on science content covered at the end of the academic year.



Collaboration

Observational findings across these two teams of teachers yielded striking similarities in the ways in which collaboration and co-teaching occurred. Each team appeared to have (a) outstanding working relationships, (b) strengths as motivators, (c) time for co-planning, (d) a good curriculum, (e) effective instructional skills, (f) exceptional disability-specific teaching adaptations, and (g) expertise in the content area.

Outstanding Working Relationships. The fourth-grade teachers requested to co-teach; however, the seventh-grade teachers had been assigned to co-teach. Nevertheless, when both teams of teachers conversed, they frequently joked together, appeared genuinely at ease, and seemed to enjoy each other's company. Their personalities appeared to be upbeat, and they seemed to have respect for one another's positions and opinions. For example, during class observations, it was common to see either co-teacher presenting to the class as a whole while the other co-teacher would interject with elaborations or comments. This type of interaction between co-teachers was completed with ease and in a nonthreatening manner, which truly augmented class presentations. When asked about their working relationships, both teams indicated a genuine trust and respect for their partners, and this appeared to facilitate their working relationships.

Strengths as Motivators. Both teams appeared to serve as motivators for their students. Interestingly, both also claimed ownership for all of the students enrolled in their respective classes. Teachers emphasized importance of enthusiastic teaching while maintaining effective behavior management (interview data). One day we observed the teachers co-planning an activity that required students to build small paddles they would raise for responding to questions. The teachers were so enthusiastic that they built the researchers an example and exclaimed, "We couldn't wait to get to use the materials with the students" (interview data).

Time Allocated for Co-Planning. Both teams made time for co-planning. Because the elementary team had no allocated co-planning time, they managed to meet either before or after school or at lunch to discuss the science unit and the roles and responsibilities for each teacher and the students. Because the teachers enjoyed one another's company, the lack of scheduled co-planning time did not appear to be a barrier to effective instruction. However, during interviews, they mentioned it would have been easier if the administration had been able to allow them co-planning time.

A common free period at the seventh-grade level made it easier for the seventh-grade teachers to schedule co-

planning for science. During these planning periods, teachers met in the science teacher's lab classroom where they co-taught. They reviewed where they were in the content, what needed to be covered, and optimal ways to present information and complete activities.

Appropriate Curriculum. These two teams of teachers had a hands-on, activity-based approach to instruction that made the content more concrete for students and lessened the language and literacy demands of tasks. Given that many students with disabilities experience difficulties with language and literacy tasks, the curriculum itself provided an initial starting place for making specific teaching adaptations for students with disabilities. It has been seen from previous research that students with disabilities profit from hands-on approaches over textbook approaches (e.g., Mastropieri et al., 1998). This approach to instruction lends itself very well to co-teaching situations in that, by its very nature, teachers can share more equitably in instruction with a hands-on emphasis. In fact, our observations have suggested that in using a hands-on approach, teachers are more likely to share responsibilities and ensure all students understand and complete activities.

Effective Instructional Skills. Both of these teams were observed to use effective instructional skills (e.g., Mastropieri & Scruggs, in press), including effective classroom management skills with the entire class. For example, teachers employed a framework within lessons that comprised daily review, presentation of new information, guided and independent practice activities, and formative review. Moreover, it was clear effective classroom management skills were in place, as students were generally on task and completing assignments during activities. One elementary teacher mentioned the need for good student behavior, especially during activities using a wide range of manipulatives. She reported being very structured and using good behavior as a requisite for allowing students to participate in science activities. All teachers indicated they occasionally used reinforcers, such as positive comments, and tangibles, such as stickers, to reward students for good behavior and class performance.

Disability-Specific Teaching Adaptations. Both teams discussed specific adaptations that were required for students with disabilities to be successful in upcoming activities. They addressed individual student performance to date within the unit and how to handle individual differences in upcoming lessons. For example, the fourth-grade team discussed how it would adapt gas and water cycle worksheets so students with learning disabilities and other disabilities would be able to participate in the activity, complete major task demands, but have reduced language and literacy requirements. During this activity,

the special education teacher worked with students requiring adaptations, and the general education teacher worked with the remaining students in the class.

The seventh-grade teachers also implemented disability-specific adaptations. This team used PowerPoint® presentations that could be used as supplemental review for students with disabilities. The presentations displayed critical concepts in pictorial formats and provided questions and opportunities for students to answer the questions orally and pictorially. The special education teacher also adapted the tests written by the general education teacher by reducing the amount of written language in the questions. Both types of adaptations reduced the language and literacy demands of the tasks but provided essential practice and review on required concepts and vocabulary.

Expertise in the Content Area. Although the general educator was the science-content expert and the special educator the adaptation expert, both teachers in the fourth-grade classroom deferred to one another during instruction so all students would benefit. The level of content knowledge may actually have been different for teachers within teams, but if so, it was not overtly displayed during classes with the students. At the fourth-grade level, the teachers frequently exchanged roles as presenters.

At the seventh-grade level, the division between content and adaptation expert was more pronounced. In this case, the general educator appeared to have an advantage over the special educator with respect to content knowledge on the unit and assumed a lead role during the majority of instruction. However, the special educator viewed this as an advantage rather than a disadvantage. She indicated she was learning so much that she could use later in her teaching. During lessons, the special educator more frequently assumed the role of assisting individuals and small groups during class presentations. However, on occasion, she also presented to the larger group.

Case 2: Middle School Social Studies

A team consisting of a general and special educator who taught government and civics to eighth graders was observed throughout an entire academic year. Both teachers had several years of teaching experience and credentials in their respective areas. One man and one woman were assigned to team teach. The class included 30 students, of whom 8 had learning or emotional disabilities.

Collaboration

There were many illustrative examples of positive collaboration between these teaching partners. However, a number of struggles with collaboration also emerged.

The following provide examples of instruction during co-teaching that occurred: (a) co-planning; (b) teaching style; and (c) behavior management.

Co-Planning. Both teachers had allocated planning time in the school week during which they could meet to review plans for upcoming classes. However, this time was also allocated to individual planning time, parent conferences, and IEP meetings. Frequently, near the beginning of the academic year, the two teachers would spend one period a week discussing upcoming lessons and units in civics. Many of the planning meetings included the university research team members. Initially, relations between the teachers appeared very positive and congenial. During the planning sessions, the teachers would talk about the curriculum in general, where in the curriculum they should be on given dates, and types of major assignments and activities to emphasize for those units. Content considered difficult for students to learn was frequently the target of conversation. Early in the academic year, the teachers readily discussed ways to divide the teaching responsibilities. Often, decisions were made based on content expertise or preferences for particular activities. For example, the general educator was clearly interested in the U.S. Constitution and had very specific ideas about the types of activities that would be undertaken during those units. At other times, the special educator would assume the lead role for instruction on activities involving multiple steps, such as teaching students to research information about political parties using the Internet. She taught students the steps to use and provided a worksheet containing prompts. The worksheet and steps provided to all students subdivided the larger task into smaller steps. This type of more structured activity appeared to result in less student confusion during the activity and appeared highly similar to how a special educator might differentiate instruction for students with special needs.

However, noticeable tension began to emerge between the co-teachers as the year progressed. Most of the tension appeared outside of the inclusive classroom and was not noticeable to students within the room. For example, one of the teachers consistently spoke independently to researchers to discuss troubling aspects of getting along with his co-teaching partner (interview and observation notes). He identified the lack of planning as an obstacle to co-teaching and felt his partner appeared to place little effort on co-planning, resulting in lessons too advanced for all students. Student confusion from vague teacher directions led to classroom management difficulties. This teacher expressed feeling frustrated and trapped in an undesirable co-teaching situation. He expressed concerns of not having control of the class or curriculum, which augmented his feelings of helplessness in the situation. Researchers listened and asked questions intended to lead to resolution of the issues. Frequently, at subsequent meetings, the teacher would thank the re-

searchers for listening. To all outward appearances, the two teachers appeared to get along well outside of the teaching situation. But clearly, tension existed regarding the best ways to teach students and how to handle classroom behaviors. Interestingly, the other teacher never confided in the researchers regarding any co-teaching difficulties.

Simultaneously, it became more difficult to schedule meetings with both teachers. As the tension escalated, the teachers began to split the class into two small groups and move them into separate rooms for many of the activities. In effect, the teachers determined that one way to reconcile serious problems in a co-teaching situation was to divide the class in two. It was difficult to determine precisely what caused the erosion of the collaborative relationship, but as the vice-principal reported, "Forced marriages often fail" (interview notes). We have speculated that differences in individual teaching style, behavior management, and ideas about class preparation may have influenced the deterioration of the co-teaching.

Differences in Teaching Style. These two teachers exhibited distinct overall styles of instruction. One teacher appeared very relaxed and casual with the students. In sharp contrast, the other maintained a more structured and formal approach with students (observation notes and interview data). These styles appeared to complement each other in that they represented opposite ends of a continuum and offered students a wide range of teaching behaviors. When the more casual teacher was presenting, there was constant background noise with students talking and moving about the room. During these times, students would call out answers. Conversely, when the more structured teacher presented, she demanded students listen, pay attention, and raise their hands before speaking. For the most part, students appeared to adapt to the differences in teaching styles and expectations. Students appeared to be able to complete their assignments and perform adequately on tests under both instructional styles. However, as the year progressed, it may be that such extreme teaching style differences contributed to the deterioration of the collaborative working relationship between teachers.

Behavior and Classroom Management. At the beginning of the year, this classroom appeared to have little structure in place. For example, there were no specific class behavior rules posted. Teachers implied that general school behavior policies were the ones implemented in the class. One typical class period was observed as follows:

As the bell rang, students were milling about the door and wandering around the room. Students waited to be reminded to find their seats and get out required materials. Once they were reminded, they went to their desks but continued to talk with their neighbors, even when the

teacher was presenting information. The background noise and off-task behavior continued throughout the class period. (observation notes)

As seen from the above description, many might consider this level of classroom management less than desirable. On the other hand, some teachers may believe this type of classroom management is appropriate and feel comfortable with a less structured approach. In the present case, the management style suited one teacher but not the other. This type of approach to classroom management may have been a contributing factor to the erosion of effective collaboration between these two teachers.

Case 3: High School World History

Three different teams of teachers, each consisting of a general and special education teacher, were observed during 10th-grade world history. Teachers had from 3 to 20 years of experience in their respective fields. One team consisted of two women, and the other two teams were all men. All teachers held relevant teaching licenses. Teams were assigned to teach classes that ranged in size from 22 to 25 students, including 4 to 9 students with disabilities. Disability areas represented in the classes consisted of learning disabilities, emotional disabilities, and hearing impairments. The majority of the students were 10th graders, but a few juniors and seniors were enrolled.

The following instructional components were used by all teams: (a) presented information to the class as a whole; (b) reviewed the textbooks, major points or text-based chapter questions with the class as a whole; (c) assigned work that could be started in class but required work outside of class for completion; (d) assigned longer-term, project-based activities; and (e) implemented some technology-based graphic organizers.

Collaboration

Observations and interviews across the three teams yielded interesting findings regarding the ways in which collaboration and co-teaching occurred. Each team exhibited (a) distinct working roles and responsibilities and (b) an emphasis on the statewide end-of-year testing. Evidence supporting each area is described separately.

Roles and Responsibilities. General education teachers were the curriculum experts and clearly held the dominant role of teacher throughout the entire period. In contrast, it was rare to observe special educators delivering instruction to the entire class. Special educators more often assumed the role of manager of activities. In this capacity, special educators collected and graded assignments, circulated and assisted students individually as

needed or prompted them to improve their on-task behaviors. One illustrative example of this relationship is documented in the following observation:

This team of teachers interacted as a "boss" and an "assistant" when working with the students. The general education teacher assumed control of all aspects of the classroom at all times. She lectured on a daily basis, she dominated class discussions, and she guided all class activities. She asked students to read the text after she was done lecturing, in order to keep them engaged in the learning process. Throughout this time period, the special educator sat in the room and occasionally went around to individual students to see if they needed any assistance. (observation notes)

Several departures from these roles and responsibilities were also observed. On less frequent occasions, special education teachers might write on the blackboard or initiate short oral reviews with the entire class. One team, however, consistently shifted roles whenever computer technology was used. During those times, the special educator assumed more of a class leadership role (observation notes). This was true when the students were in the computer labs or when the single computer in the classroom was used.

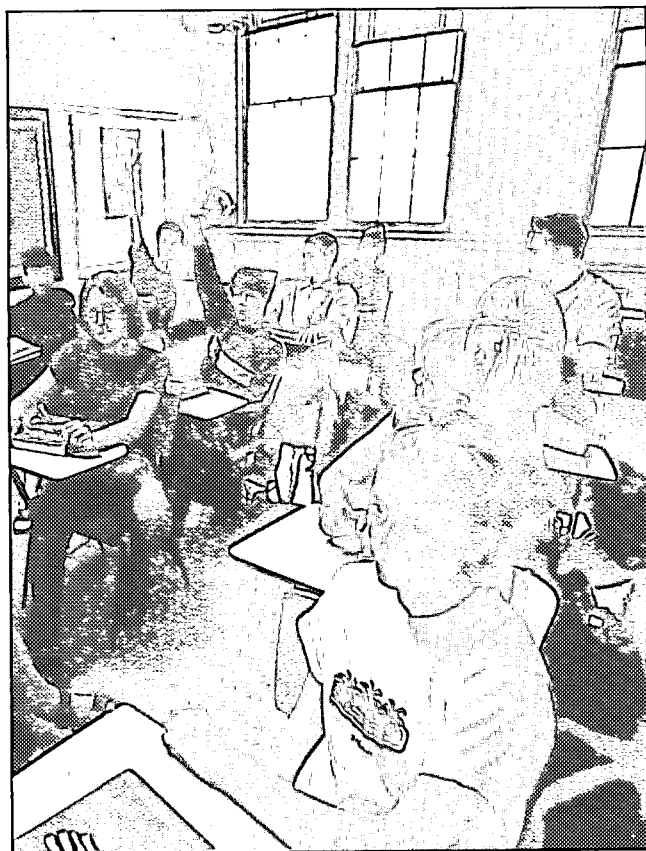
Interestingly, this division of roles and responsibilities appeared to be accepted by both teachers within teams. All working relationships appeared positive, and both teachers within teams appeared satisfied with their re-

spective roles. General education teachers assumed lead teaching roles because they believed they possessed more background knowledge in the content area. Special education teachers did not appear to feel uncomfortable with their roles as secondary to the general education teacher. They freely admitted they did not have as much knowledge in the content area as their co-teaching partners (interview data). They felt comfortable assisting students on an individual basis. In fact, it almost seemed as though special education teachers were relieved they did not have to prepare as much to teach in these classes. These findings are similar to those reported by Zigmond and Matta (2004), in that special education teachers rarely assumed the lead teacher role (see also Weiss & Lloyd, 2002). This, in part, may be due to the clear differentiation in background and teacher licensure. Because world history presentations required both breadth and depth of understanding of the content, perhaps the division of teaching responsibilities was made for pragmatic reasons, given that general educators possessed more relevant background in the content area and special educators had more expertise in adapting and modifying assignments.

High-Stakes Testing Emphasis. High-stakes testing at the end of the school year appeared to be the most significant driving force influencing all activities undertaken during instruction. Suggested timelines for teaching all of the content were provided by the district, and teachers were evaluated on the extent to which they adhered to those guidelines. All teams emphasized the need to cover content appearing on upcoming state-level high-stakes testing. All teachers were reluctant to stray from the guidelines, felt pressure to move through the content at a rapid pace, and felt pressure to have all their students pass high-stakes tests.

Teachers continually modified presentations based on the curriculum guidelines and timelines. For example, the amount of time originally allocated to spatial-organizational strategies in world history was reduced because of teacher concerns about losing classroom instructional time while using the computer labs. While in the computer labs, students generated spatial organizers using their world history content and printed both spatially organized and outline forms for studying. Students enjoyed these activities, reported that the activities were beneficial, and had higher test scores. One student with disabilities asked how she could obtain a copy of the program to use at home, as she felt it helped her to learn more (observation notes). Even though these activities were intended to facilitate learning and students enjoyed them, teachers perceived that using computer labs reduced the amount of time for lecturing and introducing new content and significantly decreased time for such activities (teacher interviews).

Little differentiation of instruction to address individual needs occurred in classes. The major adaptation



appeared to be one-to-one assistance while the special education teacher walked around the room. Unfortunately, attempts to differentiate instruction for students with disabilities appeared lost to the emphasis of moving quickly through the content in order to finish in time for the high-stakes tests.

Case 4: High School Chemistry

Two women were assigned to team teach four high school chemistry classes that were observed for more than 2 years. The special education teacher had more than 15 years of experience, and the chemistry teacher was in her first 2 years of teaching. Chemistry classes ranged in size from 22 to 27 students, including 5 to 7 students with disabilities per class. Disability areas represented were learning disabilities, emotional disabilities, and autism.

This team used instructional approaches similar to those used in Case 3: (a) teachers presented information to the class as a whole; (b) teachers reviewed the textbooks, major points or text-based chapter questions, and lab activities with the class as a whole; (c) teachers occasionally assigned longer-term more project-based activities; and (d) tests and quizzes were administered on a regular basis. However, in chemistry, significant class time was spent completing lab work, and students were typically required to justify their responses on labs, quizzes, and tests.

Collaboration

Even though these teachers had been assigned to co-teach, both teachers appeared to have developed an excellent sense of collaboration. Findings regarding the ways in which collaboration and co-teaching developed consisted of (a) distinct working roles and responsibilities, (b) differentiated instruction, and (c) an emphasis on the statewide end-of-year testing.

Roles and Responsibilities. The general education teacher was the curriculum expert while the special education teacher was the adapter of assignments, the assistant, and the extra help teacher. Both teachers felt completely comfortable in these roles, and both executed the roles with diligence. During observations, it was common to see the general education teacher standing at the front of the class delivering instruction to the entire class while the special education teacher either stood or sat at the back or side of the class. Following completion of the delivery of instruction, both teachers circulated around the room and assisted students with labs or class activities. Because many classes were devoted to labs and some peer tutoring activities, it was also very common to observe the teachers circulating around the room, each working with small groups of students. In these situations it would not be easy to identify the general from the special educator.

During the second year together, this team appeared even more comfortable co-teaching and, on occasion, the special education teacher would lead class review sessions. When asked about working together, these teachers acknowledged mutual respect for one another and the unique skills each brought to the class. The special education teacher spoke very positively about the chemistry teacher's strengths and skills, and the chemistry teacher frequently commented on how helpful the special education teacher was with her more challenging students and classes. The special education teacher worked on challenging chemistry content with students with disabilities during other periods of the school day or after school when necessary. Over time it appeared that familiarity with each other's teaching styles and the content facilitated the co-teaching. They clearly felt classes benefited from having them co-teach. On the other hand, the chemistry teacher taught an honors class alone and readily acknowledged that it would be unnecessary to have a special educator co-teach that class because "honors students do not require any extra assistance" (interview).

Differentiated Instruction. Two types of differentiated instruction for students with special needs were employed. First, peer tutoring materials that presented content with and without embedded strategies were used. These strategies were, in fact, effective in increasing achievement for both general and special education students, as described by Scruggs, Mastropieri, and Graetz (2003). Second, a majority of class time was spent completing lab activities. During labs, students worked in groups of two to four and roles and responsibilities were shared. During these times, students with disabilities were provided role-specific work and assistance from peers. Both of these examples show how even in complex classes such as chemistry, co-teachers can provide differentiation of instruction. However, the enormous amounts of vocabulary, the high reading level of the textbook, and the high abstract level of content may have been too challenging for many of the included students given the rapid pace of instruction.

High-Stakes Testing Emphasis. Both teachers felt enormous pressure from the end-of-year high-stakes tests, which appeared to be a significant factor influencing class activities. The district-recommended timelines created pressure for teachers to cover content at a rapid pace, which took precedence over maximizing student learning. This, perhaps, was one of the largest obstacles to effective co-teaching in this case. For example, the teachers reviewed student performance regularly to identify students needing additional practice. In spite of knowing that some required additional practice, the pressure to move through the content was so overwhelming that additional practice was offered at a slower pace after school and on Saturdays, rather than in class.

OVERALL FINDINGS AND DISCUSSION

Findings across all case studies were examined using analytic induction and the constant comparative method (LeCompte & Preissle, 1993). Major themes emerging from this analysis included academic content, influence of high-stakes testing, and compatibility of co-teachers.

Academic Content

Overall, academic content *per se* did not exert a significant influence on co-teaching success. That is, considerations such as science versus social studies, history versus government, or life sciences versus chemistry did not in themselves prove to be significant factors. However, the interaction between course content and teacher knowledge did prove to have a substantial influence on co-teaching. Simpler content that was more likely to be known, or quickly assimilated, by the special education teacher led to a partnership that operated on a more equal basis. If, for example, chemistry or world history was not completely mastered by the special education teacher, he or she was more likely to play the role of an aide, helping with the management of the classroom and giving occasional individual assistance but not operating as a true partner in instruction. However, in the case of the ecosystems classes, co-teachers in both cases clearly understood the content and were able to share teaching responsibilities more equitably.

Research by Zigmond and Matta (2004) and Weiss and Lloyd (2002) also reported that special education teachers frequently took on the role of instructional aide in secondary content-area classrooms. The issue is not specific content areas in themselves but rather the special education teacher's level of knowledge of these content areas. To the extent that some content areas are more challenging than others and more likely to be mastered (or well remembered) by special education teachers might provide implications for co-teaching success. Zigmond and Matta reported that the role of the special education teacher varied across content areas, with the lowest level of lead teaching observed in high school mathematics classes. If special education teachers were also highly knowledgeable in mathematics, their findings might have been different. In states such as Virginia, where students are required to attain a bachelor's degree in an area other than education prior to obtaining licensure, more content knowledge may exist for all teachers. Overall, the notion that general educators provide content knowledge while special educators contribute pedagogical knowledge and learning strategies, as equal partners, was not entirely supported by the observations in the present investigation. Rather, level of content knowledge was likely to determine who the dominant teacher would be.

High-Stakes Testing

High-stakes testing, where it existed, exerted a strong influence on how content was covered and how co-teachers collaborated. In sites where high-stakes testing was not a factor, teachers were freer to determine what content to cover and the best way to cover it. However, where high-stakes testing was a factor, classroom instructions and collaborative efforts were much different. In some situations, specific guidelines were provided that recommended initiating and ending dates for all content within particular grade levels, irrespective of whether students were ready to move on or not. Such guidelines directly influence the pace of instruction that teachers maintain. Further, this rapid pace minimizes the amount of extra practice or supplemental review activities that can be inserted in the curriculum, which directly influences the role of the special educator in modifying content for students with disabilities in inclusive classes.

A rapid pace of instruction determines, to a great extent, how the content will be covered. Where high-stakes testing was a tangible factor, teachers believed that covering all relevant content had a definite priority over implementation of pedagogical features, such as computer labs, learning strategies, and practice and review activities. Such activities were more likely to be sacrificed because teachers thought that covering all content, regardless of pace and manner of presentation, was desired over activities, however effective, that would slow the pace of instruction and result in some content not being addressed by the end of the year. Although it is not necessarily true that quantity of content coverage results in superior achievement over quality of content coverage, teachers were extremely reluctant to omit covering any material that might appear on the tests. In such cases, the special education teacher's role is very likely to be diminished.

Co-Teacher Compatibility

The relationship between the co-teachers is a major critical component influencing the success or failure of the inclusion of students with disabilities. When co-teachers are getting along and working well together, students with disabilities are more likely to be successful and have successful experiences in the inclusive environment. Conversely, when co-teachers experience conflict with their co-teaching relationship due to any number of issues, then the inclusive experience for students with disabilities is more challenging. There appear to be several interacting factors, rather than a single "curable" factor, that contribute. For example, in healthy co-teaching situations, the relationship between the general and special education teachers appeared to be built upon a mutual trust and respect for one another's expertise in each respective field. When this was happening, each teacher treated the

other with respect and professionalism. In these cases, it appeared that more efforts were undertaken to attempt to provide extensive modifications and accommodations for students with disabilities. On the other hand, a teacher's number of years experience in itself did not appear to be a factor in co-teaching pairs that otherwise worked well together.

Co-teaching appeared to be most successful where both co-teachers practiced effective teaching behaviors (Mastropieri & Scruggs, in press), such as structure, clarity, enthusiasm, maximizing student engagement, and motivational strategies. Not only did effective teaching behaviors lead to increased academic achievement (Mastropieri et al., 1998) it also led to a greater degree of effective collaboration between the two co-teachers.

Compatibility of perspectives on effective teaching was also a significant component of successful co-teaching relationships. As in the case of the civics teachers, conflicting beliefs about how to plan for co-teaching, how to manage behavior, and how to interact with students can seriously inhibit positive relations. In this case, the class essentially split in two, where it was difficult to characterize it as co-teaching. Although it seems likely that teachers who volunteer to work together would make ideal co-teachers, teachers who have not volunteered have also worked together effectively. Alternately, availability of common planning time also impacts effective co-teaching but could improve with administrative support. Thus, although the relationship of the co-teachers is a significant factor, teachers' content knowledge plays a factor, as does administrative decisions regarding such matters as testing and allocation of planning time. Overall, it can be seen that a substantial number of factors, both within and outside of the province of the co-teachers, are required to be in place to make co-teaching successful.

Our findings largely support those of previous researchers and collectively extend our knowledge of the practice of co-teaching. Our investigations reveal that specific variables interact strongly with co-teaching success, and that these variables—academic content knowledge, high-stakes testing, and co-teacher compatibility—interact strongly with co-teaching success. Additional research could refine these and other variables to provide further implications for use of particular features of co-teaching.

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