Instruction in Co-Taught Secondary Classrooms: An Exploratory Case Study in Algebra 1

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Abstract

Co-teaching is a widely-used service delivery model to support students with disabilities in accessing the general curriculum in the United States. The pairing of a special educator and general educator is meant to produce substantively different instruction than when the general educator teaches alone. Research into these instructional differences is still scarce. In this exploratory case study, we compare the instruction of a co-taught Algebra 1 Part 1 class to the instruction in an Algebra 1 Part 1 class taught by the same math educator alone in a rural high school, including grades nine through twelve. Few instructional differences were found. Implications of our findings and ideas for future research are discussed.

Keywords: algebra, co-teaching, students with disabilities

Instruction in co-taught secondary classrooms: An exploratory case study in Algebra 1

As of 2015, approximately 63% of students with disabilities received the majority of their education in general education classrooms in the United States (U. S. Department of Education, 2017). To meet the demands of these students and their continued need for special education services, many schools have turned to the co-teaching model of service delivery. Friend (2015) describes co-teaching as "educators [focusing] on integrating into daily lessons the special education strategies and techniques that will enable students to achieve the goals of their individualized education program (IEP)" (p. 18).

The idea of co-teaching is relatively simple – put two teachers in a classroom and have them teach; however, anyone who has been involved in its implementation understands its complexity. In reviews of co-teaching studies, authors report many factors affect implementation, such as teacher relationships and training, administrative support, equitable student distribution, planning time, and grade level (e.g., Friend, Cook, Hurley-Chamberlain, & Shamberger, 2010; Kloo & Zigmond, 2008; Scruggs, Mastropieri, & McDuffie, 2007; Weiss & Brigham, 2000). At the secondary level, particularly grades nine through twelve, these factors are complicated by the separation of academic departments, content area knowledge of teachers, pace of instruction, and high stakes nature of courses related to diploma requirements (Magiera, Smith, Zigmond, & Gebauer, 2005). Any of these factors can determine whether co-teaching is implemented in a way that fully utilizes the resources and expertise of two different teachers to make instruction unique or whether it is simply the same instruction with an extra pair of hands to help.

To that end, researchers have studied co-teaching in many different ways. In an early review of the research on co-teaching, Weiss and Brigham (2000) identified research that included evidence of program evaluations, teacher perceptions of roles, teacher perceptions of co-teaching, whether co-teaching included specially designed instruction, and types of observable teacher behaviors. The conclusions of the review were that, though there were many self-reports about co-teaching, there were few reports of the actual instruction that took place in co-taught classrooms. In a later synthesis of qualitative studies, Scruggs et al. (2007) reported (a) teachers generally perceived co-teaching positively; (b) there were a number of supports that were critical to its successful implementation; (c) the one-teach, one-assist model was the most frequently used; and (d) "general education teachers typically employ whole class, teacher-led instruction with little individualization, whereas special education teachers function largely as assistants in support of special education students and other students in need" (p. 411).

Substantively Different Instruction

The critical feature of co-teaching is meant to be the *substantively different* instruction delivered by two teachers to meet the needs of students with disabilities (Friend et al., 2010). Inherent in this definition is the concept of collaboration for difference. That is, comparing the instruction of a co-taught classroom to the instruction of a non co-taught classroom of the same content and level should yield differences in content delivery, organization of the classroom, strategies taught, practice opportunities, student-teacher interactions, and/or content. However, Magiera and Zigmond (2005) found no significant differences in the grouping of students for instruction, on-task behavior, whole-class content instruction, directions, or students' interactions with other students across co-taught and single teacher classes. Strogilos and Avramidis (2016) used an observational procedure similar to Magiera and Zigmond (2005) in a study conducted in Greece. Students were observed in co-taught classrooms, and then the special educators were asked to leave the classroom for observations on subsequent days. Findings indicated students with disabilities often worked alone or in small groups in both settings; they were more frequently on task and actively participating in co-taught classrooms, and total teacher-student interactions were more frequent in co-taught classrooms. Moin et al. (2009) compared their findings about the prevalence of lab activities in nine co-taught high school science classes to findings from earlier studies of general education classes. They concluded there was little difference between the settings and, if anything, instruction in the co-taught classes actually had fewer lab activities than had been reported in the other studies. Finally, in a study in high school mathematics classes, Magiera et al. (2005) found the most common role for special education co-teachers in these classrooms was monitoring student independent practice.

These results, as components of larger studies focused on students, provide a partial foundation for the study of the difference in instruction between co-taught and solo-taught classrooms. The purpose of this investigation is to provide a case study comparison of the instruction in a co-taught to a non-co-taught (solo-taught) secondary mathematics course to better understand what is happening. This line of research is critical for determining whether and how teachers are making the secondary general curriculum accessible to students with disabilities and how this might impact training and professional development efforts for teachers. Providing two licensed teachers in one classroom is a significant use of school resources; therefore, there is a continued need to expand our understanding of instruction occurring in co-taught classrooms and how it is

different or enhanced as a result of those increased resources (Solis, Vaughn, Swanson, & McCulley, 2012).

Conceptual Framework

Co-teaching is one example of collaboration in schools. Though used frequently, collaboration is difficult to define (Montiel-Overall, 2009; Wood & Gray, 1991). Definitions include varying degrees of equality of voice (Wood & Gray, 1991), dialogue and problem solving (John-Steiner, Weber, & Minnis, 1998), and a trusting relationship that builds on complementary expertise (Montiel-Overall, 2009). One commonality among definitions is in terms of outcomes. Authors describe the outcome of collaboration as change, new conceptual frameworks, and difference from what is created by a single individual. Specifically, John-Steiner et al. (1998) wrote:

> *the principals in a true collaboration represent complementary domains of expertise. As collaborators, they not only plan, decide, and act jointly, they also think together, combining independent conceptual schemes to create original frameworks. …work products reflect a blending of all participants' contributions*. (p. 776)

This definition provides several fundamental ideas related to co-teaching. First, there is the understanding that individuals with differing areas of expertise and skill are brought together to complement one another. Second, the combination of the differing areas of expertise produces a product that is different from what could be produced by any one individual involved. This difference is what makes co-teaching unique from traditional instruction with an individual teacher. As stated by Montiel-Overall (2005),

> *Through the process of working together and thinking about how to integrate individual ideas, a new understanding evolves that could not have come about through individual efforts. This is the essence of shared creation of integrated instruction, which results in the creation of a new educational experience or a learning opportunity*. (p. 5)

In co-taught instruction, these changes are meant to improve teachers' ability to effectively reach a broader spectrum of students (Pugach & Johnson, 1995).

But is this view of collaboration being realized in co-teaching? The literature has been so focused on the *process* of collaboration and co-teaching that the *differences* created by collaboration have not been thoroughly examined. The purpose of this case study is to examine instruction in a solo-taught course and its corresponding co-taught course within the conceptual framework of difference arising from thinking, planning, and acting jointly as teachers with differing areas of expertise. Given this conceptual framework, we hypothesize differences between settings would include instruction related to students' Individualized Education Programs (IEPs), content, methodology, delivery, and instructional approaches that are not required by all students (Friend, 2015).

This case study compares the instruction that took place in a co-taught Algebra 1 Part 1 class (Class CT) with that of a solo-taught Algebra 1 Part 1 class (Class S) under routine conditions in a rural high school. The research questions are:

1. What are the similarities and differences in how these secondary math and special education teachers describe their co-teaching and their instruction?
2. What are the similarities and differences in instructional actions that occur during lessons in a solo-taught and in a co-taught classroom?

Method

Setting

School. This case study took place at a rural high school in the mid-Atlantic region of the United States. According to the state department of education report card, the school met all accreditation standards when the study took place (State Department of Education, 2016). At the time, the school population was 1,251. Minority enrollment was 32%, and 29% of students participated in the free or reduced-price lunch program. Eighty-eight percent of all students passed the state performance standard in reading and 75% passed in mathematics. Ninety-four percent of students graduated with a standard or advanced studies diploma. For students with disabilities, 52% passed the state performance standard in reading, and 50% passed in mathematics. Ninety-three percent of students with disabilities graduated with a standard or advanced studies diploma. Sixty-seven percent of all students earned a Proficient score on the required Algebra 1 verification exam; 43% of students with disabilities earned Proficient.

Course and schedule. We studied two sections of a course titled Algebra 1 Part 1. The course is the first of a two-course sequence for the completion of Algebra 1 content. It is approved for students seeking standard diplomas in the state where the school is located. In this high school, courses were offered on a block schedule. Each day, students attended four classes, meeting for 90 minutes in each class. Students took four courses each semester, and the entire course curriculum was completed within a semester (approximately 18 weeks). At the time of this case study, students were in the final nine weeks of the fall semester.

Observed classrooms. We observed two Algebra 1 Part 1 classrooms. The first classroom (Class S), solo-taught by Kevin (all names are pseudonyms), a licensed math teacher, included 23 students who were in the 9th grade. A fully-certified English as a Second Language teacher served as an assistant to the general educator. This assistant did not provide instruction but would translate teacher statements to Spanish as necessary or remind students to stay on task. At the time of the study, there was no expectation for these two teachers to co-teach. The second classroom (Class CT), co-taught by a special educator (Karen) and the same general educator (Kevin) as in Class S, included 20 students who were in the 9th grade. Table 1 includes student characteristics for both classes.

Table 1
Student Characteristics and Evaluation Performance by Class

Characteristic		Class S	Class CT
Total Students		23	20
Gender	Male	13	13
	Female	10	7
Students with Disabilities	LD	0	7
	Other	0	4

English Language Learners	11	0

Participants

After a brief presentation of the proposed study to staff, the co-teaching team of Kevin and Karen volunteered to participate. Kevin taught Class S as a fully-licensed secondary mathematics teacher. He was in his 11th year of teaching and had a computer science background. He had previously worked in business and was in his 50s. He was a former basketball coach and current golf coach at the school. Kevin taught Computer Science, Algebra 1 Part 1, and algebra courses. This was the first time he had co-taught Algebra 1, Part 1 with Karen, but they had previously co-taught Algebra 1, Part 2 together.

Karen taught with Kevin in Class CT as a fully-licensed special educator and math educator. Karen was in her seventh year of teaching and was assigned to work only within the mathematics department of the high school. She co-taught with other math teachers in algebra topics and also taught one section of Algebra 1, Part 1 in a self-contained, small group setting for students with disabilities.

Kevin and Karen had been co-teaching the course for approximately four months before we began observations. Karen had received extensive training in co-teaching through a program sponsored by the State Department of Education, for which she and one of her other co-teachers had been identified as exemplary co-teachers. As a result, she had also provided professional development on co-teaching for the staff, including Kevin, at the high school.

Measures

Observation field notes. During each observation, researchers wrote general notes about the overall sequence of activities during the class session. These notes were then compiled, and specific activities were categorized by instructional events.

Classroom Teaching Scan (CT Scan). To measure the instructional practices used in each setting, researchers employed an observation instrument called the Classroom Teaching (CT) Scan (Kennedy, Rodgers, Romig, Lloyd, & Brownell, 2017). This instrument is designed to capture the specific instructional practices teachers use, kinds of student-teacher interactions, and student behavior.

At the core of the CT Scan are lists of instructional practices teachers may use in their classrooms. These lists were compiled by the instrument developers based on extensive literature reviews, personal teaching experience, and classroom observations (Kennedy, Rodgers, Gressick, Romig, & Alves, 2019). Construction of the lists was iterative, with the development team watching classroom videos using the lists and then comparing selections afterward. Through this process, codes were deleted, added, or combined to create lists that were manageable for observers to learn but comprehensive of potential practices they may see. The CT Scan also allows for more discrete data to be collected, such as number and types of questions teachers ask and feedback statements teachers provide. The rationale for adding these counts was based in literature that has shown the benefits of frequent progress monitoring and specific feedback for students (Chan, Konrad, Gonzalez, Peters, & Ressa, 2015; MacSuga-Gage

& Simonsen, 2015). In practice, the CT Scan is a software program with an interface that combines selection menus, counter buttons, and narrative fields. It includes a running timer, which time-stamps each selection the observer makes. Once an observer clicks the Start button, the timer begins, and all selections are captured until the observer clicks Stop. For continuous events, such as instructional practices and student actions, the program records duration, and for discrete events such as questions and feedback statements, it records the time the events occurred (Kennedy et al., 2019). See Table 2 for the instructional categories and associated practices we included in this study.

Table 2
Instructional Practices and Definitions

Category	Instructional Practice	Definition
General content instruction	Lecture	Presenting information verbally, with or without visual aids, and with limited student participation.
	Model task/activity	Modeling completion of task or activity to students using a think aloud.
	Facilitate student demonstration	Asking student(s) to present or demonstrate their knowledge about something.
	Review prior knowledge	Leading an activity designed specifically to review information students have previously learned.
Classroom procedures	Transition time	Monitoring students as they transition, or setting up for the next activity.
	Gives directions	Stating steps for students to follow in completing a task.
Observe/ assess students	Proctoring	Monitoring as students do independent work without interacting with students.
	Prompts/scaffolds	Assisting/ supporting student(s) who are struggling with a concept or task.
	Feedback	Gives evaluative comments to student with specific example.
	Talks to students	Talking to a student or group of students, but the observer cannot hear what is being said.
Not teaching	Not teaching	Engaging in a non-instructional activity.

Interviews. Following completion of our observations, Kevin and Karen responded individually to a set of open-ended questions via email and in person. The questions were: (a) How many times have you co-taught Algebra 1, Part 1 together? Have you co-taught any other math courses together? (b) What were your goals for co-teaching in Class CT? (c) What do you see as the major differences in the solo-taught and co-taught classes? (d) In general, what do you two talk about when you discuss Class CT? (e) What are your ideas about feedback and support to

students in either or both of your classes? Follow-up questions for clarification were asked as needed. Interviews were transcribed for analysis.

Procedures

Observations took place in both Class S and Class CT on the same days for the duration of each 90-minute block period. Classes met every day, so we conducted observations for seven consecutive school days, covering approximately 20 hours of instruction. The CT Scan was used during each coding session by the authors. Both had been trained to use the CT Scan and had experience using it in classrooms. For 20% of the total observed minutes, both authors observed and coded in the same classroom. Reliability was determined in several steps. First, observation data outputs were split into 30-second intervals and compared. Overlap of the broad instructional category was calculated by counting the number of intervals of agreement, dividing by the total number of intervals and multiplying by 100. Overall inter-rater reliability was determined by averaging the reliability in each observation and was an acceptable 83% (Graham, Milanowski, & Miller, 2012).

For research question one, we compared interview responses from both teachers question by question and identified similarities and differences. In addition, we compared field notes for the different classrooms taken during observations, categorizing similarities and differences by themes. For research question two, output files from the CT Scan were examined with a compare tool that divided them into 30-second intervals. The observations were then grouped by broad instructional category and instructional practice. The percent of total intervals for each general category was then calculated. The average percent of time spent in each instructional category for Class S was calculated and compared to the same percentage for Class CT using a two-tailed independent samples *t*-test. In addition, we used field notes to describe typical instruction across lessons.

Results

Views of Co-teaching and Instruction

To answer the first research question, we interviewed the teachers and asked them to describe their co-teaching ideas and process. Kevin and Karen did not have a common planning time, so they did most of their planning for Class CT through email. According to Karen, “We used the pacing guide as an umbrella. I acted as the scheduler.” They divided the class into thirds, consisting of a warm up, notes, and then an activity (the course structure and content are described in more detail below).

Goals. In terms of goals, Karen stated her goal for co-teaching was for the students to pass the state competency test at the end of the course so they could move on. Kevin said he did not have specific co-teaching goals; rather, “I just want to help the students believe in themselves so they can perform to their maximum potential and support and learn from my co-teaching partner. It’s about a team and helping everyone to succeed.” Karen was excited when she learned she would be teaching with Kevin because he was a man “who commanded respect” and “was so open to other ideas.” Karen indicated Kevin was good at classroom management and getting students’ attention.

Differences. When asked what the major differences were between the two classes, Kevin stated they were very different. In Class S, nearly half of the students were learning English. This made him slow down in his delivery of new content, but asking constantly if the students understand, them saying yes even though they really didn't, was challenging to say the least. However, they were a very respectful class so by the end of the year I was able to do more with them than with [Class CT].

Kevin went on to say that Class CT was one of the most challenging he ever had in terms of behavior management and lack of motivation. He and Karen would spend a great deal of time after class talking about how to help students and "what can we do to make the dynamic better. Also, for individual students, what can we do to reach them as people? What are our personal strengths that might more closely align with the students so we can connect…."

Feedback. Finally, we asked Karen and Kevin to talk about how they provided feedback and support. Karen used independent practice and formative assessment to gather data about student performance. She used paper and pencil for concrete feedback and asked students to write more "to see what's going on in their heads." She stated that she used modeling and think-alouds frequently in her instruction. Kevin believed he did not use much of a different approach between the two classes. He tailored his communication to the personality of the class and the individual student, emphasizing my big picture item that I am trying to get across is responsibility. That they must take responsibility for their learning and I am here to support them but they must make the effort to help themselves. They are adults and not children anymore. For Kevin, feedback and support came in the form of giving opportunities for questions and feedback, providing students with breaks so that he could interact with specific individuals, and rewarding students when they asked questions. He believed by providing these opportunities and positive encouragement, students would attempt to do math on their own even if some would fail in their attempts. He stated, "Sometimes failure is the best teacher for some students. We as adults must be willing to let some students learn that so they can move forward."

It was interesting to note that both Kevin and Karen spoke of the students first, not teaching together during our discussion of co-teaching. They were both focused on helping the students be successful. However, they were different in that Karen believed independent practice and individual assessment assisted her in understanding individual student mastery, but Kevin wanted the students to be more active in determining their own understanding. Although Karen focused on students passing the state assessment, Kevin focused on getting the students to develop confidence and self-determination. Finally, Karen did not discuss behavior management issues in the co-taught course, but Kevin felt it was a major concern.

The teachers gave two quizzes during the time of our observations, and they administered the final exam for the course immediately after our observations concluded. Kevin shared these results to supplement his interview responses. Table 3 presents scores on these assessments for both classes.

Table 3
Average Assessment Scores for Both Classes

Characteristic	Class S	Class CT
Slope quiz	54.6%	68.1%
Direct Variation quiz	56.9%	69.3%
Final exam	62.5%	65.2%

Instructional Practices in the Two Classrooms

For research question two -- what instructional actions occur in these classrooms and are they similar or different -- we examined the instructional categories by 30-second intervals across classrooms and observations. To put the practices within context, the lesson topics for both classes on each day of observation are presented in Table 4.

Table 4
Type of Lesson and Topics Taught

Date	Class	Lesson Type	Topic(s)
12/2	Class S	N	Graphing line given equation (use calculator and not)
	Class CT	N	Slope intercept form
12/3	Class S	R/E	Review; slope quiz
	Class CT	R/N	Review; equation of line review; x and y intercepts introduction
12/4	Class S	E	Quiz on slope, direct variation, inverse variation
	Class CT	R/E/N	Review; quiz on slope, equation of line; lesson on x and y intercepts
12/7	Class S	R/A	Equation of line review and application
	Class CT	A/N	Finding x and y intercepts; line of best fit
12/8	Class S	N	Slope intercept form
	Class CT	R/E	Review; quiz on slope, equation of line, x and y intercept
12/10	Class S	A	Changing given equations into slope intercept form
	Class CT	A	Line of best fit activity
12/11	Class S	A	Writing equation of line given different parts
	Class CT	R/E	Review; quiz on line of best fit

Note: N=new material, R=Review, E=evaluate, and A=application

For both classes, the four general instructional categories presented in Table 2 covered 99% of the intervals. General content instruction typically included teacher-directed instruction in new content or review of previous content. Classroom procedures included directives or actions related to getting tasks accomplished or beginning lessons. Observing/assessing students occurred when students were working on tasks independently. Not teaching was used whenever teachers were not directly involved in instruction or interactions with students (e.g., sitting at his/her desk while the students completed a test or quiz). Table 5 shows the mean percent of intervals for each category across observations in both classrooms. The only variable to be

significantly different between classrooms was classroom procedures, which represented a higher average percent in Class S than in Class CT (see Table 5).

Table 5
Mean Percent of Intervals in which Instructional Categories Occurred

Instructional Category	Mean % of intervals Class S (SD)	Mean % of intervals Class CT (SD)	t(6)
General content instruction	25.43 (10.64)	29.29 (14.8)	0.586
Classroom procedures	18.71 (5.53)	13 (3.92)	0.045*
Observe/assess students	37.86 (13.15)	36.57 (10.69)	0.844
Not teaching	18.5 (16.29)	20.8 (18.81)	0.811

* $p<.05$

We also coded the occurrence of specific instructional practices within broad instructional categories. For example, within general content instruction, practices such as lecture, model task/activity, facilitate student demonstration, and review prior knowledge are available codes. It is within these more specific practices that we found descriptive differences between classrooms. For example, across the seven class sessions we observed, Kevin used a lecture on six of seven occasions and facilitated student demonstration on four of seven occasions in Class S whereas Kevin and Karen utilized lecture on only four of seven occasions and facilitated student demonstration on only two of seven occasions. With the exception of feedback, the occurrences of other actions were identical (see Table 6).

Table 6
Instances of Instructional Practices across Seven Observations

General Category	Instructional Practice	Class S	Class CT
General Content Instruction	Lecture	6	4
	Models task	7	6
	Reviews prior knowledge	5	5
	Discussion	2	1
	Facilitates student demonstration	4	2
Class Procedures	Gives instruction	7	7
	Transition time	7	7
Observing/assessing Students	Proctoring	6	6
	Prompts/scaffolds	7	7
	Feedback	6	4
	Talks to students (misc)	4	4

Not Teaching	7	7

There were some differences, but time allotment was similar across the two settings. Field notes did indicate that Kevin encouraged and facilitated dialogue and student interaction during independent practice by having students work together to accomplish the tasks. Students actively discussed the math algorithms and options for solving problems, and they frequently asked each other questions. Independent practice in the co-taught classroom, on the other hand, did not include student to student interaction at all. Students worked independently and when they had a question, they waited for a teacher to respond. Kevin also presented clear goals for independent practice (e.g., number of problems) in his solo-taught class, and did not in the co-taught classroom. In this class, directions for students were to begin work, and Karen focused more on personally monitoring students' work to identify their strengths and areas of need.

Typical Instructional Day in Each Classroom

We used qualitative field notes from the CT Scan observations to answer research question two about what a typical instructional sequence looked like in Class S and Class CT. In Class S, Kevin usually began with an anticipatory set or an introduction to the activity for the day, sometimes accompanied by feedback from previous work. Then, four activities often occurred but not necessarily in a prescribed order. The first common activity would be to have students go up to the board to work out problems, presenting their thinking process to the class. A second common activity was Kevin lecturing about a new topic while students took notes. Third, Kevin often talked to his students about the importance of motivation and hard work. Finally, students would work on practice problems from a workbook. This final activity, independent practice, was one area of significant difference between the two classes. In Class S, Kevin provided a clear goal for their independent work, and students worked on the problems in pairs or small groups. There was extensive discourse between students about the problems and about ways to solve them. Students brought their work to Kevin when they were finished so he could check it and provide feedback. If they demonstrated understanding, he usually directed them to assist someone else. If they did not demonstrate understanding, he sent them to a student who had mastered the concept or he would reteach it himself and assign more practice problems to the student. Kevin awarded points for student participation with their partners, for helping others, for following directions, for completing work, and for demonstrating problems for the class. When given the opportunity to earn points, virtually every student would attempt to participate. Kevin included application activities in his lessons frequently, and this was the opportunity for students to work in small groups, try problems, and seek feedback.

In Class CT, Karen and Kevin used the one teach, one assist model of co-teaching in every class session observed. For all but a very small amount of our observational time, Karen was the one teaching and Kevin was the one assisting. Each day began with a warm up posted on the board. Students were directed to come in, sit down, and begin working independently on it. Karen then went over the warm up, demonstrating its solution on the board. There was a short lesson on the topic of the day that included a reference and review of previously learned material related to the new task. Then, Karen would give the students an assignment, usually a page in the workbook or a worksheet. Students would work independently while Karen and/or Kevin circulated around the room, answering student questions or giving feedback. Karen often told the students they

could work together, but few ever chose to do this. No point system existed in this classroom. As Karen stated in her interview, she used assessment as a way to determine student understanding. Therefore, four of the lessons we saw were designated as having a Review objective, and three of these included an evaluation of some type (e.g., quiz, test, independent work sample).

Students in both classes took the same slope and direct variation quizzes, as well as the same final course exam (see Table 3). Interestingly, in Class S, students' average percent correct increased from the slope to direct variation quiz and was higher than both quizzes on the final exam. Though the average percent correct on the quizzes in Class CT increased slightly, the average percent correct on the final exam grade was lower than the quiz grades. However, neither class average final exam grade indicated mastery of content.

Discussion

Algebra is a critical graduation requirement and, in recent state reports, only 29% of students with disabilities at this school passed the Algebra standard (State Department of Education, 2016). In this case study, our research aim was to find similarities and differences in the instruction provided in a solo-taught secondary mathematics classroom and a co-taught secondary mathematics classroom, specifically Algebra 1 Part 1, in a rural high school. The same general educator taught in both classrooms. We observed a total of approximately 20 hours of classroom instruction across both classes. Our hypothesis was that there would be evidence of difference in instruction between the two classrooms.

Several findings were precisely in line with what past observation studies of co-teaching have shown (e.g., Fenty & McDuffie-Landrum, 2011; Harbort et al., 2007; Moin, Magiera, & Zigmond, 2009; Rice & Zigmond, 2000). For example, the predominant model of co-teaching employed in Class CT was one-teach-one-assist, and, except for time spent in independent practice, instruction was delivered in a whole-group format. Unlike previous research, the special educator was the primary instructor in Class CT, not the general educator. This may have been because Karen was certified to teach math as well as special education, so she was comfortable with the content. This is not common among special education teachers, who often do not have extensive content-area training. Having the special educator as the main instructor provided a unique situation in which to examine differences between the two settings. Given the emphasis in special education research literature on explicit instruction (e.g., Gersten et al., 2009), it might be assumed that more time would have been spent on activities such as modeling and guided practice in Class CT, but this did not seem to be the case with these two teachers. One might hypothesize greater instructional difference because the classes were essentially taught by different teachers; however, when examining the data on a broad level, few differences were readily apparent.

Teacher-driven, whole group instruction and independent practice were approximately equal in both settings. There were more subtle differences in the ways in which the teachers implemented the broad types of instruction, however. Kevin tended to use lecture and to facilitate student presentations more often than Karen and Kevin did together. In the co-taught classroom, the majority of time in whole group was spent on direct instruction and independent practice then involved teachers moving from student to student to assist or reteach. Our hypothesis as to why

this was happening related to Karen's thought that the best way to determine if students were understanding the content was to actually get them to work problems in a traditional paper and pencil way individually. This is definitely an area of further inquiry, particularly given the reliance on whole group instruction in secondary classrooms.

In short, we did not see evidence of true collaboration in this co-teaching team, despite their prior experience working together. They did not plan, decide, or act jointly. Although they brought different expertise to their partnership, with Kevin understanding math instruction and Karen having understandings of evidence-based special education practices along with knowledge of math instruction, they did not blend these areas to create new understandings or instructional systems. For example, although Kevin exceled at facilitating student-centered dialogue around mathematics, a known evidence-based mathematics practice (Walkowiak, Berry, Meyer, Rimm-Kaufman, & Ottmar, 2014), because he and Karen did not collaborate on planning or implementing instruction, they did not capitalize on this strength in Class CT.

Limitations

This was a case study of one teaching pair who volunteered to participate in a study of their co-teaching practices. The teachers were at a beginning stage of co-teaching, having co-taught together for one semester but not having co-taught this specific course. Their situation was not ideal in that they did not have common planning time; however, they did volunteer to co-teach and they both had backgrounds in the content area. Our observations were limited to a single math course, chosen because passing an algebra course is a requirement for graduation in this state. We compared instruction in a singly-taught classroom with that of a co-taught classroom. However, the singly-taught classroom included an assistant and several students who were English Language Learners, unlike the co-taught classroom, so comparisons should be interpreted cautiously. Even with these limitations, our findings are similar to those who have compared co-taught and solo-taught classrooms in other ways. Our case study is unique in that the special educator was providing the bulk of the instruction in the co-taught classroom. However, that instruction was similar to the instruction in a solo-taught classroom in that it relied heavily upon whole group instruction and independent practice.

Research and Practice Implications

This case study describes two Algebra 1, Part 1 classes, one singly taught and the other co-taught by the same math teacher and a special educator. Both teachers focused on student success and spoke positively about co-teaching. However, we did not see the critical differences in instructional practices or individualization we expected. In addition, we found the teachers did not articulate these differences when asked. Given the literature's focus on relationships, roles, and models of co-teaching, we suggest further study of co-teaching include examining what teachers believe *should* be different between classrooms. In addition to being critical for teachers and instruction, it is important to identify and clearly define these differences in instruction so teachers can meet the unique needs of students with disabilities and ensure that co-teaching is an effective use of resources.

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