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Effects of co-teaching on student participation and math success on students with learning disabilities in the general education classroom

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EFFECTS OF CO-TEACHING ON STUDENT PARTICIPATION AND MATH SUCCESS ON STUDENTS WITH LEARNING DISABILITIES IN THE GENERAL EDUCATION CLASSROOM

A Thesis

By

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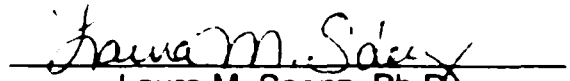

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ABSTRACT

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Numerous research studies have been conducted to determine the effects of inclusion on academics, few of these studies specify the method used. The purpose of this study was to determine whether co-teaching would increase student's participation in the regular math classroom. The study was conducted in a sixth-grade regular education classroom in which students with learning disabilities were included. The co-teaching consisted mostly of interactive teaching between the regular education and the special education teacher. The subjects were students identified with a learning disability in either math calculation or math reasoning. The results indicated that student participation was not negatively effected when co-teaching was introduced.

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CHAPTER 1

Introduction

The number of students who are being identified as needing special services within the school systems has dramatically increased over the years (Shapiro et al., 1993). The increasing concern regarding the fiscal responsibility of servicing these students has raised numerous debates on what to do with special education. As in any field, the trends have changed over the years. First, schools believed strongly in a separate education for students with disabilities; then, the belief was to include all students with disabilities within the regular education classroom (Shapiro et al, 1993; Kavale & Forness, 2000; Cronis & Ellis, 2000). Today, the debate continues. Inclusion is the current trend for servicing students with disabilities. This model supports the least restrictive environment yet it also provides the necessary individualized education that these students may need. Within the umbrella of inclusion, a specific model called co-teaching has recently begun to receive more attention.

Co-teaching services students with disabilities in their regular education classroom by providing an additional special education teacher, or support staff, to individualize the instruction and provide modifications to ensure their success. Although co-teaching is not a new model, it continues to be analyzed in its' actual

effectiveness in educating students with disabilities. Numerous studies have been conducted to discuss the social, academic, and behavioral effects co-teaching has on the students with and without disabilities (Murawski & Swanson, 2001; Welch, 2000; Self, Benning, Marston, Magnusson, 1991; Schulte, Osborne, McKinney, 1990; Salend & Duhaney, 1999; Banerji & Daily, 1995; Gerber & Popp, 1999). Despite the abundance of studies, few actually give quantitative data descriptive enough to be used by teachers in replicating the studies. Therefore, continued research needs to occur before schools, teachers, and parents can make educated decisions regarding the best placement and appropriate method for educating their students.

Problem Statement

Co-teaching is one method of including students with disabilities in the regular education environment. Parrott, Driver, and Evaes (as cited in Gerber & Popp, 2000) describe the collaboration of co-teaching as follows:

> Special educators come to general education classrooms to co-teach with general educators, and the expertise of teachers is viewed as complementary. The general education teacher shares expertise in all aspects of curriculum, effective teaching, and large-group instruction, whereas the special educator contributes knowledge in such areas as learning styles and strategies, clinical teaching and behavior management (p. 229).

Co-teaching, just like other forms of inclusion, has been subjected to much discussion, review, and criticism. Opponents argue that there are no academic benefits for students with disabilities when special education and general education teachers co-teach (Marston, 1996; Boudah, Schumacher, & Deshler, 1997; Klingner et al., 1998). Others adamantly disagree and state that co-teaching provides the best environment for students with disabilities (Schulte, Osborne, & McKinney,1990; Banerji & Dailey, 1995; Langerock, 2000). Research also suggests that there are social benefits as well, and that nondisabled students benefit from the co-teaching environment (Pugach & Wesson, 1995; Gerber & Popp, 1999; Ritter, Michel, & Irby; 1999).

Although proponents of co-teaching state that there are academic benefits, it is unclear as to what exactly causes these improvements (Boudah, Schumacher, & Deshler, 1997; Reinhiller, 1996). There are many variables that could affect a student's academic success, and, as such, it becomes necessary to analyze co-teaching and question this intervention's strengths and weaknesses.

Need for the Study

The need for this study is evident after reviewing the research. Additional studies need to be conducted since there is no clear consensus on the effects of co-teaching for students with disabilities (Schulte, Osborne, & McKinney, 1990; Welch, 2000; Boudah, Schumacher, & Deshler, 1997; Zigmond et al., 1995). Furthermore, the majority of research has been conducted at the elementary level, which makes it difficult to transfer the findings to secondary educational

levels (Zigmond et al., 1995; Saint-Laurent et al., 1998). The majority of research studies have focused primarily on inclusion in general, and not on co-teaching or collaboration between educators (Salend & Duhaney, 1999; Banerji & Dailey, 1995; Klingner et al., 1998; Marston, 1996). Furthermore, the studies reviewed have not focused specifically on student participation (Schulte, Osborne, & McKinney, 1990; Self, Benning, Marston, & Magnusson, 1991; Boudah, Schumacher, & Deshler, 1997; Welch, 2000).

Statement of the Problem

Although co-teaching has shown positive effects on academic success, it is unclear as to what specific factors have contributed to students' success (Schulte, Osborne, & McKinney, 1990; Self, Benning, Marston, & Magnusson, 1991; Welch, 2000). Co-teaching has many benefits, but implementation of the program is costly. Co-teaching is also time consuming and requires much flexibility and a pedagogical change for everyone involved. Before more schools invest extra money and the additional personnel to begin co-teaching, more research needs to be conducted to determine what exactly is causing the academic success for students in these co-taught classrooms and if the success can be transferred to other areas.

Purpose of the Study

The purpose of this study was to determine if co-teaching has an effect on student participation and academic success for students with learning disabilities in a general education mathematics classroom.

Significance of the Study

This study may offer insight into what specific skills co-teaching focuses on that helps students' participation in the general education classroom. This is important because this study may suggest that complicated and time consuming strategies are not needed when implementing co-teaching, but rather, specific skills, or one-to-one instruction, can help students achieve higher participation levels within the classroom. The significance of studies like this is that they can potentially help schools and teachers become more receptive to co-teaching.

Research Question

There was one research question in this study: What are the effects of co-teaching on student participation and math success on students with learning disabilities in the general education classroom?

Definition of Terms

The terms used by the researcher in this study are defined in the subsections below.

504 students. Students who are identified as needing additional services other than special educational services pertaining to medical needs rather than educational need.

Academic success. Student's academic grade based on current six-week average determine by the regular education mathematics teacher.

Admissions, Review, and Dismissal (ARD) committee. Committee that meets to develop a student's IEP and appropriate modifications to ensure their success within the regular education classroom. Committee members consist of, but are not limited to, parent(s), regular education teacher, special education teacher, administrator and other supplementary staff members that may be needed.

Alternative teaching. A co-teaching model where one teacher teaches a lesson, or reteaches a concept for the benefit of a small group, while the other teacher teaches and/or monitors the remaining members of the class within the same environment.

At-risk students. Students who have been identified by specific characteristics that individual districts establish. These characteristics may include, but are not limited to, lower reading rates, SES status, and race.

Auditory learning. Learners who comprehend material best when presented orally.

Change in methodology. Any educational changes that are made to help the learner comprehend the material being presented. These may include visual, auditory, or tactile modifications.

Chapter I. Federal law established services for children identified as at risk to service their educational needs beginning at an early age.

Collaboration. The sharing of ideas, materials, strategies, and lessons between two individuals to facilitate communication.

Compensatory teacher. Teachers who provide related services for identified students that may include, but is not limited to, speech, orthopedic, visual and behavioral services.

Connected Math Program (CMP). Curriculum that uses the constructivist approach to learning to address mastery of math skills at appropriate grade levels.

Content Mastery Center (CMC). Classroom that provides students with individualized instruction or additional modifications that have been indicated by the student's IEP.

Cooperative learning. Groups of two or more students working together in the general education classroom to answer questions, problem solve, and/or learn. These cooperative groups may be grouped by abilities, or they may be random heterogeneous selections

Co-teaching. General education teachers and special education teachers working collaboratively to teach a heterogeneous group of students in which students with disabilities are included.

Individualized Education Plan (IEP). Objectives that are created by the ARD committee that focuses on the goals for the student to master in a stated amount of time.

Interactive teaching. A co-teaching model where one teacher teaches the lesson while the other teacher monitors the progress of students and may provide additional support or modifications.

Least Restrictive Environment (LRE). To the maximum extent appropriate, students with disabilities are educated alongside students who are not disabled in the same environment. Pull out classes only occur when the nature or severity of the student's disability is such that education in the general education with the use of supplementary aids and services cannot be achieved satisfactorily or prohibits the learning of others.

Limited English Proficient student (LEP). Students who have been identified as speaking another language at home other than English, and who have not mastered an acceptable rating on a standardized reading test or passed the TAKS Reading.

Modifications. Any supplementary aids and services--determined by the ARD committee--provided in the regular education classroom that assist the student to meet the educational need within that environment.

Nondisabled student. Students who are not classified as special education or 504.

One-to-one instruction. Individual assistance between student and teacher within a classroom.

Parallel teaching. A co-teaching model where both teachers teach the same content but the class is divided into two groups.

Social economic status (SES). Identifies the status of an individual based on an income scale.

Special education teacher. A certified teacher in special education.

Station teaching. A co-teaching model in which the classroom is divided into sections so that the two groups of students will rotate around the room to different stations in which the co-teachers teach different topics.

Student participation. The student has eye-contact with the teacher or speaker, the student writes down pertinent information, raises hand to respond to the teacher(s) or to ask questions. Also, the student engages in effective communication with peers and/or teachers, and the student actively engages in assignments during the class period by communicating with peers on the assignment.

Student with learning disabilities. Students that perform 16 points or more below the intelligence quota in an academic area and has an educational need.

Tactile learning. Learners who comprehend material best when presented with hands-on activities usually involving manipulatives, and they may need to move around the room or have some type of physical stimulation.

Team teaching. A co-teaching model where the teachers take turns leading instruction or the two teachers play roles in a demonstration.

Texas Assessment of Knowledge and Skills (TAKS). Statewide assessment that is used in the state of Texas to measure the knowledge of students in the areas of reading, mathematics, science, writing, and history.

Texas Essential Knowledge and Skills (TEKS). Curriculum mandated by the state of Texas for each subject and grade level.

Visual learning. Learners who comprehend material best when presented visually or with pictures.

Whole group instruction. All the students are included in the direct instruction within the given classroom.

CHAPTER 2

Review of Literature

The Education for All Handicapped Children Act (1975) addressed for the first time the issue of educating students with a disability in the least restrictive environment (LRE). Since the passage of this act, later renamed the Individuals with Disabilities Education Act (IDEA) and its revisions (1990, 1992,1997), the public school system has attempted to find the most appropriate educational program that will meet the needs of its students with disabilities (Fuchs & Fuchs, 1995). Many initiatives and programs have been tried, ranging from the Regular Education Initiative (REI) in the early 1980s, to mainstreaming and inclusion in the past twenty-three years (Kavale & Forness, 2000). The development of these initiatives and programs has lead special educators to ask: What is the most appropriate and beneficial program for educating students with a disability? Many argue that a separate education, such as a self-contained or resource classroom, is not equal and does not provide a fair education for those students identified as having a disability (Shapiro, Loeb, Bowermaster, Wright, Headden, & Toch, 1993). Others argue that a more inclusive environment will afford students the opportunity to gain nonacademic benefits as well as improve their overall achievement (Banerji & Dailey, 1995). Through the years since the REI proposed mainstreaming, schools have modified and adopted other programs that take into

consideration the LRE when educating students. One of these models is co-teaching, which falls under the umbrella of inclusion. The four studies included in this section have all used a form of co-teaching and/or collaboration to address the individual needs of students with disabilities while being educated in the LRE. In three of the studies, the researchers used specific models of co-teaching or collaboration (Self, Benning, Marston, & Magnusson, 1991; Welch, 2000; Boudah, Schumacher, & Deshler, 1997). Despite the use of a specific co-teaching model, the majority of the research studies neglected to give adequate descriptive data. This limiting factor alone clearly shows that that further research is needed before co-teaching can be considered a leading method. Furthermore, as the reviews will show, there are also other areas of weakness that warrants the need for continued research.

In the first study, Schulte, Osborne, and McKinney (1990) investigated the results that two types of consultation, direct and indirect, had on students' academic outcomes compared to their peers in resource room environments. Specifically, they compared academic outcomes of students with learning disabilities in first through fourth grades using four different programs: consultation/indirect (C/I), consultation/direct (C/D), resource room for one period (RR1), and resource room for two periods (RR2). In the first program, C/I, the researchers described the dynamics of the consultation as "the special education teacher assists the classroom teacher in assessing needs, planning instruction, and preparing or adapting materials for a child with disabilities," but no other services are provided (p. 162). In the second program, C/D, the level of services

provided by the consultation or special education teacher has increased. The consultant still assists the regular education teacher as described in the C/I program, but also provides instruction to the student(s) in the general education environment. In the final two programs, RR1 and RR2, the students received either one or two periods of resource room instruction per day in a pull-out situation in which instruction, taught by the special education teacher, focused on the specific students' individualized education plan (IEP). "These two levels of resource service[s] represent the most widely used service-delivery options...as such they provide a standard with which other programs can be measured" (p. 164).

A total of 67 subjects with learning disabilities were selected from eleven schools within the district. All of the teachers volunteered for the study, but the researchers hired three master-level teachers to provide the consultation services. These consultation teachers had worked as resource teachers previously and had received twelve hours of training as well as participated in bimonthly in-services, training, and supervision during the duration of the study. The researchers stated that there were some collaboration between the teachers and the consulting teachers for the C/I and C/D models. This collaboration allowed the teachers to determine instructional and behavioral objectives for the subjects, as well as develop lesson plans. The duties performed by the consultant--the special education teacher working with the regular teacher in the regular classroom environment--consisted of providing modifications of instructions, teaching in smaller steps, monitoring students' progress, reteaching,

reducing the quantity of assignments, and using self-monitoring or other motivational strategies for the students. The researchers did not describe the collaboration between the consulting teachers and the regular teachers adequately enough for this study to be replicated. Furthermore, the researchers failed to describe the types of modifications or additional services that were provided for the subjects.

Despite these limitations, the researchers did find that the students in the C/D program made greater overall academic gains than students assigned to either resource room programs. Although the students in the C/I model did not improve as drastically, they, nevertheless, also made achievement gains "comparable to those of students in the resource room" (p. 169). The results of this study are encouraging, however, when achievement was viewed separately for reading, written language, and mathematics, no gains were evident for the subjects in the consulting models. The criterion-referenced reading tests did not show any significant differences between the groups either. Schulte, Osborne, and McKinney hypothesized that this may have been caused by the difficulty of the students' disabilities, or that the treatments did not produce achievement in the limited time of the study. They also suggested that the heterogeneous sample of the subjects might have affected the outcome of the results since the subjects were identified as having both reading and written language learning disabilities.

As stated earlier, there were several limitations to this study that prevent it from being duplicated or extended. The researchers did not provide sufficient

information regarding the consistence of the consultation. The fact that the consulting teachers were hired out-of-district may have produced different results than if familiar personnel had performed these duties. The researchers also stated the caseload of the consulting teachers were much smaller than what is normal for a special education teacher. Also, due to the construct of the study, only one student with a learning disability was placed in each of the consultation classrooms. This is, obviously, highly unlikely to occur in an average classroom. Although the limitations make this study difficult to duplicate, the researchers' data supports the use of collaboration and consulting when educating students with disabilities. Furthermore, the fact that no visible loss was observed in the subjects' academic outcomes suggests that students placed in the LRE, when afforded the appropriate levels of support, can be successful.

In this next study, Self, Benning, Marston, and Magnusson (1991) used a specific form of cooperative teaching, the Cooperative Teaching Project (CTP), to determine the reading success of identified students with disabilities, as well as at-risk students. CTP was developed to help facilitate a working environment in which the special education teachers and the regular teachers could work together to address the educational problems of low-achieving students "without the fragmentation that usually occurs" (p. 26). Additionally, the researchers also analyzed the effect CTP would have on the number of referrals for special education services and teachers' attitudes towards cooperative teaching. The researchers felt that using CTP should improve the reading rate of elementary aged students identified as high risk. High-risk students were identified as

students having reading scores below the 25th percentile and teachers or parents had expressed concern regarding the student's progress. A total of 170 students were selected from grades K-3 for a three-year period. "The students [were] placed in groups by skill level, and special education teachers work[ed] with students at highest risk for academic failure" within the classrooms (p.27).

The researchers described the cooperative teaching that occurred between the regular education teachers and the special education teachers with the regular education teacher having primary responsibility for meeting the academic needs of the high-risk students, and the special education teachers providing supplemental instruction within the classroom (which is similar to the interactive model of co-teaching). For the purpose of this review, special education teacher includes Chapter 1 tutors and compensatory teachers-specifically a speech/language clinician, unless otherwise specified within the text. The use of the CTP, along with curriculum-based measurements, allowed the teachers to monitor the students' reading levels and to make decisions regarding "instructional strategies, motivational techniques, and placements in [the] reading groups" (p. 27). This supplemental instruction provided by the special education teachers consisted of "25 minutes of supplemental reading/readiness instruction in small groups 5 days per week," and the speech language clinicians also worked with the students with the most limited language skills for 25 minutes, three days per week, in small-groups (p.27). Although the researchers mention these services, they failed to adequately describe the

specific methods used by the co-teacher, or special education teachers, to teach the reading instructions.

Despite this limitation, the researchers did state that the common goal was "to maximize student time on task, correct student responses, and generalization of target skills" (p. 28-29). Although the researchers did not specify how they taught these skills, the supplementary lessons, which were provided in the regular classroom during the reading periods, would focus on these three areas. One of the benefits of co-teaching, the researchers discovered, was the subjects were "viewed as full participants in the classroom because they remain[ed] with [their] classmates throughout their school day" (p. 29).

As mentioned in the first study conducted by Schulte, Osborne, & McKinney, the authors discussed the importance of having collaboration between the co-teachers to help facilitate communication and to develop strategies for improving the subjects' overall success. Similarly, Self, Benning, Marston, & Magnusson also discuss the importance of having time for collaboration between the co-teachers. The co-teachers met once a month to review individual student's progress and make any instructional changes for those students. In addition to monthly meetings, the special education teachers also met twice a month to plan, problem solve and to share instructional strategies. "Classroom teachers and supplemental teachers exchange[d] formal lesson plans weekly" as well (p. 29). This collaboration between the teachers greatly helped them to identify any areas of concern and to discuss the needs of the identified high-risk students being serviced through the CTP.

In analyzing the effectiveness of CTP, the researches used a single-subject time series analysis to evaluate the students' learning rate with CTP and without CTP. Nine students' data was analyzed during the second year resulting in an average rate of correct word gains of 2.89 with CTP for those subjects. In the third year, 28 students' learning rate was analyzed. Again the average gain of words correct was higher with CTP than without, 1.78 and 0.58 respectively. In analyzing the impact of cooperative teaching, the researchers looked at the average performance of each grade level during the fall, winter, and spring. "Pupil performance increased significantly from fall to winter and winter to spring at each grade level" (p. 31). They also found that the number of students qualifying for special education decreased with the implementation of CTP. Overall the effectiveness of using the CTP was beneficial to all students, not just those identified as needing special education services.

Despite the encouraging results of their study, Self, Benning, Marston, & Magnusson had several factors that contributed to weakening their study. First, the subjects were not limited to students with learning disabilities but included all high-risk students. For many schools, the funding may not be available to support the personnel needed to work with all identified high-risk students. Secondly, would the results have been stronger if the focus of the special education teacher was primarily on students with disabilities rather than being split between students with disabilities and at-risk students? And, as was a major fault in the first study, the researchers did not adequately describe what specific methods were used during the implementation of the CTP. Self, Benning, Marston, &

Magnusson's study, while encouraging, still lacks the empirical data that is needed in order to make generalizations regarding students with learning disabilities and co-teaching.

In the next study, Welch also used a specific co-teaching model, team teaching, to examine whether there would be academic improvement for identified students with disabilities, specifically, learning disabilities. He wanted to discover which type of team teaching was most frequently used. Welch was interested in the following types of co-teaching: one teaching/one assisting (same as interactive teaching), station teaching, parallel teaching, alternative teaching and team teaching. Each of these models consisted of a regular education teacher and a special education teacher working in the same environment. In addition to these main concerns, Welch examined the amount of time team teachers spent on planning, implementing, and he assessed their activities and what types of student groupings the team teachers used.

Welch used two classrooms from two different schools to gather data for his study. In the first school, School 1, there were a total of 28 students in a fourth-grade classroom with 5 students with learning disabilities and one student identified as having an intellectual disability. In School 2, there were a total of 17 students in a fifth-grade class with 3 students with learning disabilities. The main difference between the two teams of teachers was the years of experience for the special education teacher. In School 1, it was nearly 10 years, while in School 2 it was only two years. Additionally, the study was conducted over 16 weeks at School 1 and 19 weeks at School 2. Despite these differences, both

groups of team teachers "set an instructional goal of a 20% increase in student performance on curriculum-based assessment... in the broad areas of reading and or/spelling" (p. 369). Both teams of teachers focused their instructional objectives on accuracy of word recognition. School 1 also specified reading fluency, while School 2 targeted reading comprehension of factual information, vocabulary knowledge, and spelling.

The two teams of teachers identified a 30-to 45-minute period of time of their choosing to implement the different models of co-teaching. The researcher met with the team teachers "once per month to provide technical support and collect weekly logs" (p. 369). The teachers were instructed to keep logs recording their planning dates and duration of these meetings. Again, as in the previous two studies, Welch alludes to the importance of collaboration and planning when attempting to co-teach. Three different activities were recorded: prep time, which included preparing of lessons and materials prior to instruction, non-teaching time, which consisted of activities other than instructional exercises, and follow-up times, which is when the teachers debriefed with the researcher. The teachers also coded student groupings on their weekly logs. Welch discovered that School 1 spent more time on both planning and follow-up than School 2 as the trimester progressed, 76 minutes per week and 65 minutes per week compared to 38 minutes, and 33 minutes respectively. Regardless of the amount of time in planning and follow-up, both groups of students showed gains in their post-test scores. School 1's scores for reading fluency was significantly higher, but there

was no significance on word recognition. School 2's scores revealed a significant difference in their four variables: reading comprehension, vocabulary knowledge, spelling, and word recognition.

Each of the teaching teams met the 20% gain in student performance in each of the instructional areas. Welch found that both schools used primarily the same type of team-teaching format, the lead-support model, or interactive teaching, and the student grouping most often used was large-group instruction. Overall, the teachers all expressed positive comments for team teaching; however, the only negative comment centered on the amount of time necessary to plan for team teaching. This comment continues to appear throughout the majority of the literature as a concern in regards to cc-teaching/collaboration (Walther-Thomas, 1997; Trent, 1998).

Welch's data does suggest that the use of team teaching or co-teaching helps students succeed academically. Unfortunately, Welch did not provide ample descriptions on the types of co-teaching models used. Although his study is stronger than the previous two, Welch acknowledges several limitations that weakened his findings. There was "no observation of the team teaching to validate the integrity of the team-teaching procedures or the information that was self-reported on the planning logs" (p. 375). This is a recurring problem in the current literature. It is unrealistic to expect individuals to devote the necessary amount of time needed to record or observe the "methods" used during co-teaching. As is obvious, time is a concern for all teachers. The expected duties

teachers are required to fulfill make it almost unrealistic for teachers to have the time to plan efficiently or to even record anecdotal information.

In the final study reviewed, Boudah, Schumacher, and Deshler (1997) provided the strongest description of a specific co-teaching model. They developed their own co-teaching model for this study called the Collaborative Instruction Model (CIM). CIM consisted of "two teachers, one general education teacher and one special education teacher, who work in the environment simultaneously to enable students to be more successful" (as cited in Boudah, Schumacher, & Deshler, 1997). Basically, the CIM relies on two primary roles, the presenter who presents the material or performs the main instruction, and the mediator who modifies the content and the instruction of the lesson to best meet the needs of the students within the classroom. In most instances, the presenter is usually the regular education teacher and the mediator is the special education teacher. Although this is primarily how the dual is initiated, it is does not have to remain this way. Throughout a lesson, the teachers may interchange roles depending on the needs of the student, and/or, the strengths of the individual teachers. The Collaborative Instruction Model in theory is very similar to interactive teaching. The CIM enables both the general education teacher and the special education teacher to interchange roles and responsibilities within their classrooms. Additionally, the researchers stressed the importance of understanding the roles of each teacher. This may in fact have been one of the main detractors in the previous three studies discussed. It is very important for the co-teachers to understand their roles within the classroom, otherwise the

dynamics of co-teaching may lead to dissatisfaction, and/or hostilities between the parties involved which directly impact the students within the classroom.

Boudah, Schumacher, & Deshler's focus was on secondary students in a large multicultural, Midwest metropolitan area. There were eight experimental teachers, four general education content teachers, and four special education teachers. Of the 32 students selected for the study, 16 were students with mild disabilities (MD) and 16 were identified as low-achieving (LA) students. The 16 students with MD were identified as students with learning disabilities, behavioral disorders, mild mental retardation, mild disabilities, and/or other health impairments. The LA students were students who had never been identified as needing special education services and had similar academic achievement as the students with mild disability.

A time-sampling observation system was used to measure the occurrence of the four teacher instructional actions: presenting content, mediating student learning, circulating to provide individual instruction, and engaging in noninstructional behaviors. Observers used recorders that chimed at 10-second intervals to record the different instructional actions. Student measures were also collected to analyze student classroom engagement, mastery of strategic skills, and content test performance. Student classroom engagement was coded into four different categories: the teacher they interacted with, the initiator of the interaction, type of academic engagement, and the correctness of the student response. The observers would code each one of these categories anytime a student was engaged on a protocol sheet similar to a seating chart.

Based upon student engagement, the researchers were able to identify other measures, such as: total number of engagements, number of teacher led engagements, number of engagements initiated by the student, number of times the student was asked to recall information, and the number of correct versus partial, or incorrect engagements. After implementing the CIM, the mediated instruction increased for the teams as well as the number of role exchanges. The amount of time the teacher teams presented content during a class period decreased, as did the amount of times the teacher teams circulated to work with the students. The amount of non-instructional time decreased as well after the implementation of the CIM.

The experimental group performed significantly better than the comparison group on the measures of strategic skill mastery; unfortunately, this was the only area in which the students with MD did perform better than the comparison group. The LA students performed better in both the experimental and comparison groups on paraphrasing. On test performance and quizzes, the students with MD's average scores decreased from 63.79% to 58.19%. Their average GPA also decreased from a 1.75 to a 0.75 based on a 4.0 scale. The GPA of the LA students also decreased from 2.07 to 1.83, but their overall test and quiz averages increased from a 66.60% to 71.96%. These results indicated that the students with MD actually did worse after the implementation of the CIM. The researchers suggest that these findings may have been influenced by the limited amount of time the teachers spent on instruction. Their results indicated that the teachers spent about 55% of their time on noninstructional activities.

Boudah, Schumacher, & Deshler suggested this might have been caused the dynamics of an inclusive classroom. The ratio of low achievers or special needs students may increase when co-teaching is implemented. This may directly influence the amount of time that is spent on dealing with behavior management issues that detracts from the amount of time for academic instructions. Research in this topic--specifically focusing on students with emotional or behavioral disorders (EBD)--does suggest that there is a relationship between the behavior of students and their academic success (Sutherland & Wehby, 2001).

Although the CIM did not increase the academic outcomes for the students identified with mild disabilities, Boudah, Schumacher, and Deshler raise a valid concern in which more empirical data is needed. "If there are limited classroom opportunities for academic engagement, and student mastery of strategic skills is marginal at best, then one cannot necessarily expect content test scores to improve" (p. 313). Furthermore, the research indicates that if "rates of effective instruction are increased, then rates of problem behavior may decrease" (Sutherland & Wehby, 2001). The best way to tackle this problem is to give students the opportunity to respond to academic problems or to be actively engaged.

Overall, these studies, except for Boudah, Schumacher, and Deshler's (1997), found relatively positive results for students with disabilities when educated in a co-teaching environment. Unfortunately only Boudah, Schumacher, and Deshler's study gave specific details into what co-teaching looked like. As Murawski and Swanson state in their research article, "for co-

teaching to be considered a valid service delivery option for students with disabilities in the general education or least restrictive placement, more experimental research must be conducted" (p. 265). Furthermore, the effects student engagement has on the overall learning process needs to be explored as well. These concerns lead to the necessity of conducting further research into the effects of co-teaching and the overall effects it has on student participation and academic success.

CHAPTER 3

Method

Research Design

The research design for this study was a multiple baseline across subjects. The duration of the study lasted eight weeks. The multiple baseline design was selected due to the limitations that may occur when using other designs. For instance, it is necessary to collect baseline data prior to each subject's implementation of co-teaching, which shows the effects of the independent variable on the dependent variable. The single-subject multiple baseline design eliminates any concerns regarding removal of the independent variable. Specifically, due to the continuous educational needs of the subjects as stated within their Individual Education Plan (IEP), the removal of services during the implementation stage would raise ethical concerns.

Subjects

Consent and video release forms were collected for all subjects and parents/guardians before the implementation of the study (Appendix A). Two subjects were selected for this study. Subject 1 was a Hispanic male student 11 years, 9 months old. He was enrolled in the 6th grade, and received all of his classes in the regular classroom with Content Mastery Center (CMC) support for

the four academic core classes (English/Language Arts, math, science, and social studies). The amount of CMC time he received was 45 minutes per week in any academic class. Subject 2 had received special education services as a student with a learning disability for the past 4 years. He was identified as a limited English proficient (LEP) student. His intelligence quotient (IQ) on the Test of Nonverbal Intelligence-3 (TONI-3) was 102, and is in the average range. On the Woodcock Johnson Psychoeducational Test-Revised (WJPT-R), he received a grade equivalent score of 3.8 and 3.3 for math calculation and applied problems; the standard scores were 76 and 84, respectively. Due to the discrepancy between his IQ and his achievement, he qualified as a student with a learning disability in both math calculation and math reasoning.

Subject 1 was a Hispanic female student 11 years, 8 months old. She was also enrolled in the 6th grade, and had received Special Education services as a student with a learning disability for the past three years. Based on the TONI-3, her IQ was 98 placing her in the average range. On the WJPT-R, she scored a grade equivalent of 4.3 in math calculation, and a standard score of 82. Due to the discrepancy between her intelligence quotient and her achievement scores, she qualified as a student with a learning disability in math calculation. Subject 1 was also identified as a LEP student. Subject 1 was enrolled in all regular education classes with CMC support. Additionally, she was able to go to CMC for her four academic core classes and was to receive a minimum of 30 minutes per week in CMC for any core subject.

Subjects 1 and 2 exhibited some of the following attributes that may interfere with their task performance: lower achievement scores, lack of motivation, lower reading and math abilities, and "learned helplessness," or apathy. It is these characteristics that the researcher was interested in observing to determine whether co-teaching would make an educational difference for these selected subjects. The amount of time the subjects had been identified as needing special education services may have played a factor in their overall educational abilities as well. This may have led to placement in a pullout program--as was the situation for Subject 1 during her 5th grade year--which exposes the students to a modified curriculum, or Texas Essential Knowledge Skills (TEKS) in previous grade levels. This exposure may have weakened their overall math abilities, which may have played a role in their current academic levels.

Setting

The location of the study took place in the South Texas, Rio Grande Valley area. The research setting was a general education math classroom in a local middle school.

Materials

No new curriculum was introduced during the implementation of this study. The math curriculum that is currently being used by the school district, Connected Math Program (CMP), was the basis of all the math lessons. The CMP believes in a constructivist approach to learning; it incorporates cooperative learning ideally with heterogeneous groups. CMP encourages its students to

formulate their own ideas and strategies to solve math problems. Teachers are discouraged from giving formulas to students, and instead, try to ask leading questions and guide students to discover different approaches that fit their individual learning styles. The textbook, *Connected Math*, was used during the duration of this study. All supplies in conjunction with the CMP will be used. There was minimal use of technology during this study. The use of calculators and overhead transparencies was the main source of technology used.

Dependent Variable

Student Participation

The dependent variable in this study was student participation. Student participation is defined as follows:

(1) A student develops plans with other students in order to solve math activities/problems assigned during the class period. This includes active participation of the subject such as sharing ideas, asking questions, and using manipulatives if appropriate to help solve the problem.

(2) The student engages in task-related verbal and written communication with peers and special education teachers to solve mathematical problems. Examples of communication were not limited to, but may have included, strategies to solve math problems, asking clarifying questions, and asking for help on reading or mathematical operations. Non-examples consisted of any conversations not related to math, especially personal discussions.

(3) The student had eyes on paper/book/teacher, or pencil to paper, during direct instructional periods and independent seatwork. Direct instructional

periods are described as teacher(s) modeling ways to solve problems, teaching a new math strategy, or reviewing homework assignments. Independent seatwork is described as students working on assigned problems either independently, or in cooperative groups, in which they solved assigned problems.

Data on student participation was collected via videotape. The researcher, along with a second observer viewed the videotapes on a later date. The researcher and second observer recorded the subject, setting, date and time of each session. A tally system was used to record the subjects' participation during the math period using frequency recording every five-minutes. The goal was for the subjects to exhibit the target behavior at least 78% of the time during the 45-minute period. The checklist that was developed had three columns, consisting of the operational definition for student participation, frequency of behavior, and total number of occurrences. The target behavior, student participation, was defined as the student develops a plan with other students in order to solve activities; the student communicates with other students and teachers by verbalizing ideas and writing down strategies; and the student has eyes on paper/teacher/book, and has pencil to paper during independent class time. Each class session was recorded for 45-minutes and then the researcher and the second observer viewed these tapes. Frequency recording was used to measure the occurrences of student participation every five-minutes. Every five-minutes, the researcher and second observer would observe the student to determine whether any one of the three criteria had been met by the student at that specific time. If the student had exhibited the targeted behavior a tally mark was recorded

in the column named frequency of behavior. At the conclusion of the 45-minute session, the total number of occurrences was computed by adding all the tally marks together. This number was then divided by 9 and multiplied by 100 to find the percent value of each subject's student participation.

Math Success

An incidental benefit that occurred during the intervention was math success. This was monitored informally by comparing the students' overall progress during the previous six weeks grades to the last six weeks grade. Monitoring of the subjects' grades was based on their performance on class work, quizzes, and tests.

Interobserver Agreement

The researcher trained a second observer prior to the implementation of the study. The second observer was trained to identify the targeted behaviors using the operational definition for student participation, and by viewing videotapes of a random subject not selected for the study. A minimum of two trial sessions was conducted in which the second observer and the researcher obtained an 86% interobserver accuracy. The interobserver agreement for the research study was 88%.

Independent Variable

The independent variable in this study was co-teaching. Co-teaching was defined as the collaboration of two teachers in one environmental setting working together to educate the needs of all students. There were two main models of co-teaching used throughout this study. Interactive teaching consists of one teacher

leading instruction (direct instruction), while a second teacher uses a variety of teaching strategies such as asking clarifying questions, rephrasing concepts or directions, redirecting students, and supervising instructional activities. During interactive teaching, the special education teacher monitored the identified students and circulated around the classroom. This teacher, usually the special education teacher or co-teacher, used a variety of strategies to check for comprehension of the material being introduced by the general education teacher by using some of the strategies listed above. Although only one student's performance per classroom was selected for the study, there were other identified special education students in the classroom that received the benefits of the co-teaching model. Due to the nature of each student's ability, the amount of time spent with each subject varied.

A second model of co-teaching that was used is alternative teaching. Alternative teaching consists of one teacher, usually the special education teacher, working with a smaller group of students and focusing on specific skills, concepts, and activities within the regular classroom. While the special education teacher is working with the smaller group, the general education teacher is monitoring and teaching the remaining students. Generally, the special education teacher is the one who teaches the smaller group, but the teachers may switch roles at any time. The special education teacher determines the focus of each session dependent on the current objectives being covered by the general education teacher. Depending on the ability levels of each student, the mini-lessons used during alternative teaching may vary each day. It is possible for

both co-teaching models to be used within a 45-minute period. The co-teaching models were recorded on videotape and then viewed by the researcher and second observer at a later date to gather the data.

In this study there was no need to train the students on the co-teaching models. The models were implemented by the teachers and did not require any additional training for the students. The students may improve in certain areas such as organization and study skills, but these will be considered secondary benefits of the co-teaching models and will not be directly assessed during this study. These behaviors may influence the overall effects of student participation as a result of co-teaching.

Several procedures were used to decrease the influence of extraneous variables on the independent variable. First, the teachers used in this study were consistent in their use of CT as indicated by treatment fidelity data. Second, the co-teaching dichotomy consisted of the same two teachers covering the same subject matter and the same grade level for all the subjects selected in this study.

Treatment Fidelity

The two models of co-teaching were recorded during the 45-minute periods. The researcher and the second observer viewed the tapes to determine the frequency and type of co-teaching models being used in the interactions with the subjects. In each of the two models of co-teaching, interactive teaching and alternative teaching, there were three main subcategories: group or individual instruction, changes in methodology, and use of different strategies or modifications. Every five minutes, the researcher and the second observer

recorded what type of co-teaching model was being used for each subject on the appropriate checklist (Appendix B).

Experimental Procedures

The use of a multiple baseline across subjects design requires baseline data to be collected prior to the implementation of the co-teaching models. For the purpose of this study, Subject 1 was chosen to begin the implementation of co-teaching first, which is explained in the Research and Findings section. Once Subject 1 showed a constant trend or achieved the stated mastery level (78%), the independent variable was introduced. The following section describes the steps conducted during this study.

Phase A: Baseline

In the baseline phase, Subjects 1 and 2 were videotaped for four consecutive days in their math classroom. During this phase of the study, Subjects 1 and 2 were taught in the regular math classroom without any assistance from the researcher or any other special education teacher. Subjects 1 and 2 were not removed from the general education setting to receive any additional modifications or services during the baseline phase of the study. All modifications or strategies used during this period were those developed by the ARD committee. The regular education teacher was solely responsible for carrying out the necessary modifications or strategies. The researcher did recognize the need to offer additional assistance to the subjects during this baseline period. It would be ethically immoral to eliminate additional modifications that may be necessary due to the nature of this study. Therefore, tutoring was

offered and provided to the subjects outside of the class period either before or after school hours. This tutoring offered the subjects the opportunity to help them maintain a passing grade by adding any modifications or further assistance that may have been denied during the study.

The baseline data was collected over four consecutive days, for 45-minutes in Subjects 1 and 2's regular education classroom environment. Each session was videotaped to collect data on student participation. The duration of Subject 1's baseline was four days; Subject 2's baseline lasted 14 days.

Phase B: Intervention

In the second phase of the study, the intervention, co-teaching, was introduced to Subject 1 on the fifth day, and introduced to Subject 2 on the 15th day. Each session was 45 minutes in length, except for early release days, which shortened the periods to 30 minutes. During the intervention phase, the co-teaching model was implemented to Subject 1 first, and to Subject 2 second. This intervention included the two types of co-teaching described earlier: interactive and alternative teaching. All sessions were videotaped and viewed by the researcher and the second observer to gather the co-teaching data.

Method of Analysis

The data was analyzed using visual analysis to compare the baseline data to the intervention phase for Subjects 1 and 2 in order to determine their level of student participation. Three different checklists were developed by the researcher to collect and analyze the data. The student participation checklist consisted of the three target behaviors defined earlier (Appendix B). The

researcher and second observer used frequency recording to collect the data every 5-minutes. The total number of targeted behaviors was counted and divided by nine, which is the maximum number of occurrences within the 45-minute period, to calculate the percentage of student participation. The other checklists developed by the researcher were used to measure the occurrences and types of co-teaching (Appendix B). The first checklist, Co-teaching Model A, measured interactive teaching. The co-teacher was recorded for the 45-minute period and then the videotape was reviewed. A frequency count was used to observe the different types of co-teaching intervention that were used every 5-minutes. The different types of interventions consisted of one-to-one instruction per student, changes in methodology—visual, auditory, or tactile, and the use of additional modifications that ranged from extra-time to help with written work. The second checklist, Co-teaching Model B, measured alternative teaching (Appendix B). The same types of interactions were used as in Model A.

Once the data was collected and recorded, the researcher compared the baseline results to the results collected during the intervention phase of the study. A consistent trend, or, an obvicus increase in percentage for each subject's participation was considered to show the subjects' overall improvement. A consistent or constant trend occurs when the subject retains the same level of participation for two or more days. If the subject's level of participation does not show a lot of fluctuation, the researcher could make the assumption that co-teaching was having a positive effect on the students' participation levels. Or, if

the trend indicates an increase, or a rise in student participation, this was considered to show the positive effects co-teaching had on student participation. If the trend indicates numerous fluctuations or a consistent decrease in student participation, then the effects of co-teaching are questionable. There may be other extraneous factors that are influencing the students' participation, or, co-teaching could be determined to have negative effects on their overall participation levels.

CHAPTER 4

Research Findings

During the baseline collection of four days, student participation for Subjects 1 and 2 were 63.5% and 66.75%, respectively.

Table 1
Daily Percentages of Student Participation for Subjects 1 and 2

Day	Percent	Day	Percent
Subject 1		**Subject 2**	
1	44%	1	67%
2	56%	2	56%
3	78%	3	78%
4	89%	4	78%
Average	Baseline 66.75%	5	33%
5	55%	6	78%
6	55%	7	44%
7	67%	8	44%
8	22%	9	44%
9	33%	10	33%
10	55%	11	78%
11	78%	12	67%
12	100%	13	100%
13	78%	14	89%
14	78%	Average	Baseline 63.5%
15	89%	15	78%
16	78%	16	89%
17	67%	17	100%
18	78%	18	78%
19	100%	19	89%
20	78%	20	100%
21	100%	21	78%
22	78%	22	100%
23	67%	23	100%
24	78%	24	89%
25	89%	25	89%
Average	Intervention 72.5%	Average	Intervention 90%

After the independent variable, co-teaching, was introduced to Subject 1, her participation increased to 72.5%. Likewise, student participation for Subject 2 increased to 90%.

Daily Percentages of Student Participation for Subject 1

During the baseline phase, Subject 1's participation fluctuated from 44% to 89%, with an average of 66.75% for the four days. The intervention was introduced on the 5th day and Subject 1's participation dropped to 22%, and then leveled out to 67% for the first 6 days. Subject 1's participation began to improve on the 12th day as the students were finding the area and perimeter of triangles. Her student participation remained at 78% or higher for the next 6 days. The lowest her participation fell was to 67%. Subject 1's average participation during the twenty-one days of intervention was 72.5%. Subject 1's overall math grades had remained steady during the year. Her six weeks grades were 67%, 81%, 88%, 85%, 88%, and 87% with the intervention. Overall, Subject 1's participation improved and her grades did not lower.

Daily Percentages of Student Participation for Subject 2

During the collection of baseline data, which lasted for a total of 14 days, Subject 2's participation averaged out to 63.5%. During the baseline phase, Subject 2's lowest participation percentage was 33%. During the intervention phase of the study, Subject 2's participation increased to 90% with his lowest percentage being 78%. During the intervention phase of the study, Subject 2's grades improved for an average six weeks grade of 83%. His previous six weeks grades were 79%, 71%, 85%, 60%, and 76%.

Figure 1
Daily Percentages of Student Participation

Subject 1

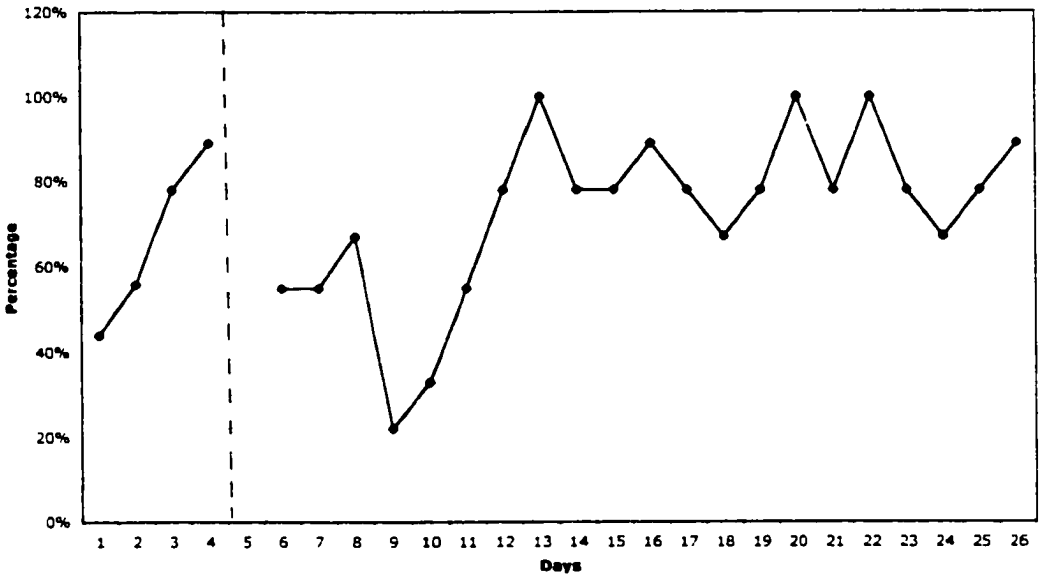
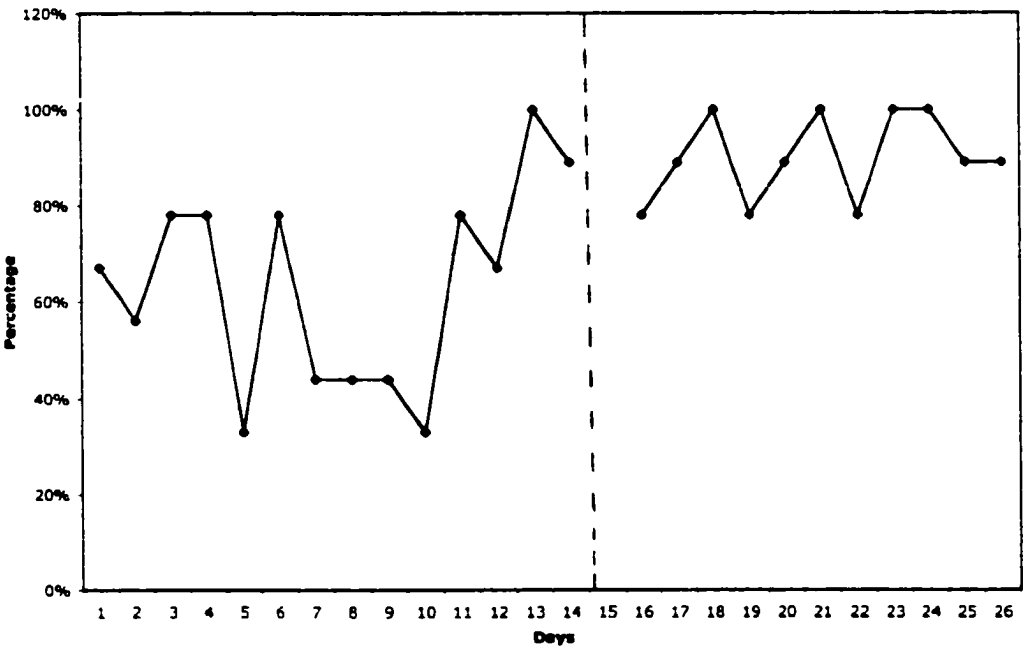


Figure 2
Daily Percentages of Student Participation

Subject 2



Co-teaching Results for Subjects 1 and 2

Interactive teaching was used 100% of the time for Subject 2, and 96% of the time with Subject 1. During the interactive model, one-to-one instruction was used 47 times for Subject 1, and 40 times for Subject 2. Change in methodology was used 3 times for Subject 1, and 0 times for Subject 2. Use of modifications was used 32 times for Subject 1, and 20 times for Subject 2.

Table 2
Number of Interactive Co-teaching Interventions for Subject 1

Day	One-to-one	Methodology Type	Modifications Type
5	2	0	2-help with written work
6	1	0	1-help with written work
7	1	1-tactile	1-help with written work; 1-show examples
8	0	0	0
9	0	0	0
10	3	0	1-show examples
11	0	0	0
12	4	0	2-help with written work
13	4	0	2-help with written work
14	0	2-auditory	0
15	0	0	0
16	3	0	2-help with written work
17	4	0	1-help with written work; 1-show examples
18	3	0	0
19	3	0	2-help with written work; 1-show examples
20	5	0	2-help with written work; 1-show examples
21	2	0	0
22	0	0	0
23	3	0	2-help with written work
24	0	0	0
25	3	0	2-help with written work; 1-show examples
Total	44	1	25

Table 3
Number of Alternative Co-teaching Interventions for Subject 1

Day	One-to-one	Methodology Type	Modifications Type
22	3	0	1-help with written work; 1-show examples
Total	3	0	2

Table 4
Number of Interactive Co-teaching Interventions for Subject 2

Day	One-to-one	Methodology Type	Modifications Type
15	4	0	2-help with written work
16	4	0	2-help with written work
17	4	0	2-help with written work
18	4	0	0
19	4	0	2-help with written work
20	5	0	2-help with written work; 1-show examples
21	3	0	0
22	3	0	2-help with written work; 2-show examples
23	2	0	0
24	3	0	2-help with written work
25	4	0	2-help with written work; 1-show examples
Total	40	0	20

Figure 3
Number of Interactive Co-teaching Interventions for Subjects 1 and 2

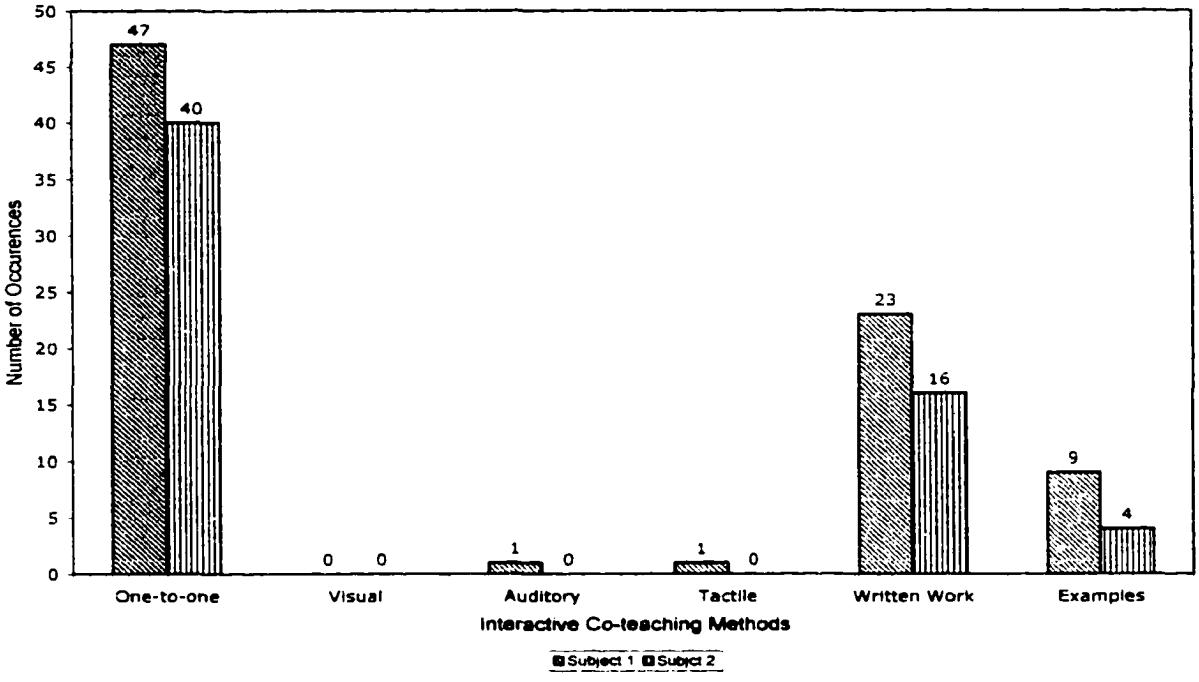
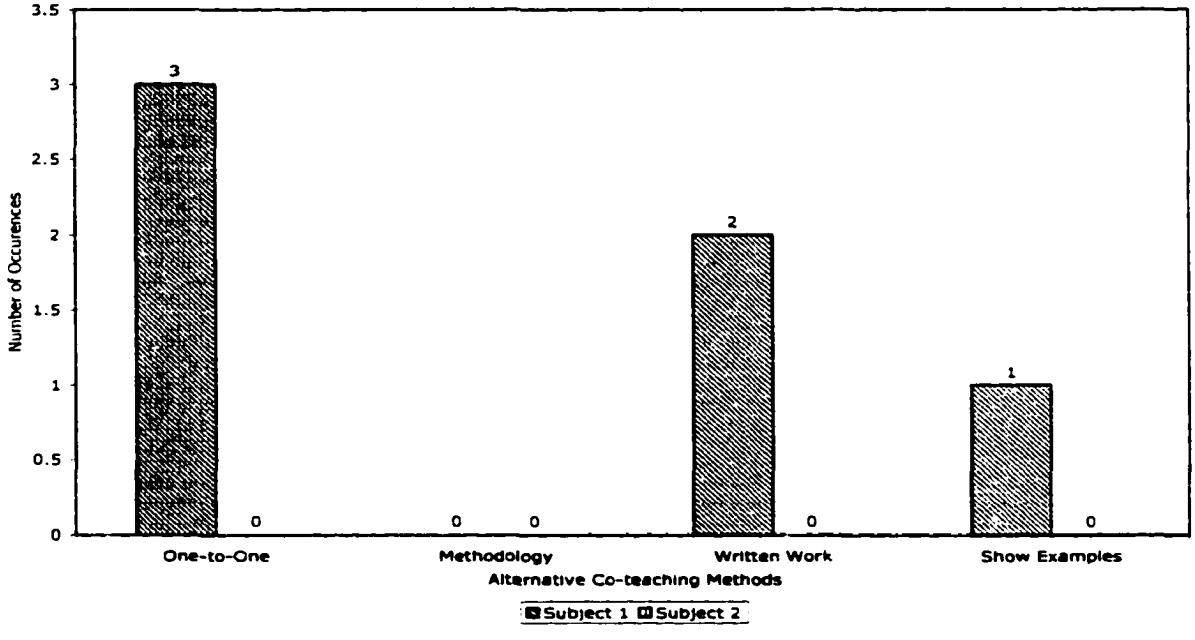


Figure 4
Number of Alternative Co-teaching Interventions for Subjects 1 and 2



CHAPTER V

Conclusions and Discussions

Principal Research Question

What are the effects of co-teaching on student participation and math success on students with learning disabilities in the general education classroom?

In answer to the research question, the results of this study indicate that co-teaching has positive effects on student participation. The researcher anticipated the dependent variable, student participation, would increase when co-teaching was introduced to subjects 1 and 2. This proved to be the case as both subjects' participation improved, or maintained similar percentages, once the intervention was introduced.

Implications of the Results

The researcher had hypothesized that co-teaching would indeed have positive effects on student participation for subjects 1 and 2. As discussed above, this proved to be true. The results of this study, although positive, left room for improvements within the structure and implementation of the research study. The researcher discovered that only one type of co-teaching model was actually used consistently during the study. The use of the interactive co-teaching

model limits the findings of the study and leaves room for further research to be conducted. Despite this drawback, the results of the percentages of student participation for subjects 1 and 2, and, the different interventions used by the co-teacher to assist the subjects during the study can relay useful information to others interested in the co-teaching models.

The researcher found that the interactive co-teaching model was used 96% for subject 1 and 100% for subject 2. The specific types of intervention used within the interactive model consisted mostly of one-to-one assistance. This was not surprising since the addition of the co-teacher lowers the teacher-to-student ratio, and helps decrease the number of off-task behaviors in which the students were engaged. It also decreases the amount of wait time the students have since there is a second teacher present. Additionally, other students benefited from the co-teachers presence because their wait time for answering questions was also lessened. The co-teacher had the ability to provide and apply different teaching styles to assist all students whom were experiencing difficulty with the content of the math lessons.

Anecdotal Information for Subject 1

Subject 1's fourth period class consisted of a larger number of students than Subject 2's setting. Her class consisted of 26 students with three other special education students included. The class was composed of 14 boys and 12 girls. The regular education teacher had expressed some concerns regarding this class to the co-teacher prior to the implementation of the research study. She discussed the overwhelming number of behavior issues that arose on a regular

basis with the co-teacher. While collecting baseline data in this class, the researcher observed several male students that contributing to the disruption of class. These disruptions consisted of minor behavior concerns such as talking loudly across the room, blurting out answers, walking around the room, and engaging in attention gathering antics, arguing with the teacher and other students, to name a few. Another factor that may have contributed to the disruptions in Subject 1's class was the fact that the block period (4^{th} and 5^{th}) occurred before and after lunch, which may have resulted in some of the disruptive behaviors. In addition to these concerns, there was another student with a learning disability that needed special attention due to his lower math and reading abilities as well as his attention-hyperactivity—which was going untreated during this time. The co-teacher and teacher had discussed the possibility of using this student as a subject, but due to the amount of support he needed, the co-teacher felt that it would be unfair for him to not receive services during the baseline period.

Subject 1 was a relatively shy, quiet student. She worked well on her assignments, but the co-teacher noticed a change in her demeanor after she had been chosen for the study. Subject 1 did not appear to like being videotaped, and she appeared to dislike the additional attention she received from the co-teacher. This additional attention prevented her from remaining off-task and decreased the amount of time she talked with her peers. Despite this, subject 1's daily student participation percentages fluctuated over the 8 weeks. There were several factors that may have contributed to this. First of all, the co-teacher had

to work with other students in this class and could not devote all of her time to Subject 1. As mentioned earlier, the three other students with learning disabilities and other non-disabled students attracted a significant amount of the co-teacher's time. Secondly, subject 1' s participation was influenced by the content of each day's lesson. Subject 1's personal interest in the day's lesson appeared to greatly influence her student participation. Thirdly, although *Connected Math* encouraged the discovery process to be generated by the students rather than the teacher, the regular education teacher did not take this approach on a daily basis. The majority of the lessons taught by the regular education teacher consisted of direct teaching, which limited the amount of discovery time, cooperative learning, and discussion with other students. These factors may have contributed to subject 1's fluctuation in student participation during the 8 weeks. Additionally, subject 1's level of participation rose significantly when tests or quizzes were given. This also accounts for some of the variance in her percentages. For instance, Day 4 of the baseline a test was given. The following day, Day 5, new material was being introduced to the class. This trend was also observed on Day 7, when a quiz was administered, and on Day 8, when the class reviewed the results. Another test was administered on Day 13 and reviewed on Day 14.

Subject 1 did not show a vast improvement in her six-weeks grade over the intervention period of the study. This may have been a result of her receiving tutoring after school for the first five six-weeks periods. In the tutoring sessions, subject 1 would finish assignments, or homework, and also re-test on math tests

that she had failed. Subject 1 did not come to tutoring once the co-teaching intervention began. The fact that she received tutoring in the previous six-weeks may have contributed to her overall steady math averages.

The researcher did notice, both by observing and talking with subject 1 that she did enjoy remaining in her regular education classroom instead of being removed to CMC. The co-teaching model enabled her to remain in the class and to receive the services she needed in order to be successful in the general education classroom without singling her out and making her appear "different".

Anecdotal Information for Subject 2

Subject 2's class was during the morning 1st and 2nd periods. The class consisted of 20 students, 11 girls and 9 boys. There were also two other students with learning disabilities in this class. This environment was quite different than Subject 1's. This may have been a result of the time of day the class was held, the lower number of students, and the lower ratio of boys to girls. Subject 2 was a quiet student. He rarely volunteered answers or interacted with his teachers, yet he appeared to enjoy the relationship with the co-teacher. Subject 2 was a respectful student, but he was not sufficiently motivated to complete assignments outside of the classroom. He did not attend after school tutoring unless the co-teacher specifically told him that he needed to come. Subject 2 was also late to his first period class on a daily basis. This tardiness may have been influenced by the attention an older sibling required at home. Subject 2 has an older brother with some severe disabilities that required a lot of his parents' time. In addition to this, Subject 2's parents spoke and read primarily Spanish at home. This may

have affected their ability to communicate concerns to the co-teacher. The inability of the co-teacher to speak Spanish did limit the amount of direct interaction with Subject 2's parents; translators were used when calls to his home were made.

During the baseline phase of the study for subject 2, the co-teacher instructed the regular education teacher to provide support for subject 2. Due to the design of a multiple baseline across subjects, the co-teacher could not assist subject 2. This may account for the great variance in subject 2's daily student participation percentages. The regular education teacher had to assume the responsibility of providing modifications and assistance for subject 2 on a daily basis. Due to the responsibilities that occur in a natural classroom environment, it was very difficult for the regular education teacher to assist subject 2. In addition to this, the regular education teacher did not have the training or the background that a special education teacher has to help her make modifications to assist subject 2. As was noticed for subject1, the content of the daily lesson also may have contributed to subject 2's participation. As was discussed earlier, on days that tests or quizzes were given, subject 2's participation increased and on days when these tests and quizzes were reviewed, or, new material was introduced, his level of participation decreased. This is observed on his line graph for days 4 and 5, and days 13 and day 14. Also, depending on his personal interest in a lesson, his participation levels increased dramatically. For instance, during the lessons on 4-quardrant graphs, his levels of participation increased to 100% during these activities, day 23 and 24.

Subject 2's grades showed improvement when co-teaching was implemented. As discussed earlier, subject 2 did not attend tutoring on a regular basis and this was reflected in his overall six-weeks grades for the first five grading periods. When the intervention phase of the study was introduced, the methods used within co-teaching helped subject 2's grades to increase to an 83% for the final six-weeks.

The researcher also noticed a change in subject 2's self-esteem during the co-teaching intervention phase of the study. He liked receiving the additional attention, and, his peers noticed that he was receiving more attention as well. This seemed to help raise his class standing with his peers. Subject 2 became more animated and participated more in social behaviors during the break times between the block periods. This was an unexpected positive finding that was observed during the study.

Anecdotal Information on the Co-teachers

The co-teachers in this study were both female. The regular education teacher was Caucasian and had sixteen years of experience. The co-teacher was Asian and had seven years of experience in special education, and four years of co-teaching experience. The special education teacher did not have a degree in mathematics, but she had attended over eighty hours of math in-service that was provided by the district to help support the CMP. Additionally, the co-teacher had worked with another 6th grade math teacher the previous year and was familiar with the program and content.

The co-teacher and the regular education teacher did not plan on a regular basis. There were daily interacts, but set planning times to formally debrief and discuss concerns or lessons did not occur. This may have accounted for the lack of observed alternative co-teaching instruction. Despite this, neither the teacher nor the co-teacher experienced any negative effects because of this arrangement.

The regular education teacher did express her pleasure in working with the co-teacher. Both the teachers had minimal interactions with each other prior to the implementation of this study. One factor that may have encouraged the regular education teacher to accept the co-teacher into her classroom was the praise another math teacher had for co-teaching and for the researcher herself. The co-teacher was pleased with the overall findings for subjects 1 and 2, but there were many limitations that she wished could have been avoided.

Implications for Practice

As our educational system continues to undergo rapid changes and fiscal challenges, co-teaching may be too expensive for some districts to consider; however, if the research can prove that co-teaching has tremendous benefits, then perhaps more districts would be willing to investigate the possibility of including such programs in their schools. Perhaps more teachers would be willing to develop the unique relationships that co-teaching can provide. The results of this study were positive for increasing student participation when co-teaching was used to educate students with learning disabilities. These results are similar to other research studies (Schulte, Osborne, & McKinney, 1990; Self,

Benning, Marston, & Magnusson, 1991; Welch, 2000). The one area for which this study provides more information is the specific type of co-teaching models and the different types of methods that are used by the co-teacher. This Information would help both special education teachers and regular education teachers to have a better understanding of the dynamics of co-teaching, and, what to expect.

Implications for Future Research

Although the results of this study were encouraging, future research is recommended. Numerous limitations make this study difficult to accurately pinpoint the main effects of increased student participation. Future researchers can take this study and build upon it to continue to gather empirical data to help assist schools, teachers, and parents to make informed decisions regarding co-teaching. Additionally, future research can focus on certain areas that were questionable in this study. There is a continued need for research studies on the effects of co-teaching. Schools, teachers, parents, and lawmakers are continuously questioning different approaches to educating students with disabilities. This research study focuses just on one aspect of co-teaching. As mentioned earlier there were numerous factors that may have contributed to the fluctuation in student participation. These variables need to be analyzed and further discussions need to be held.

Recommendations for Future Research

The researcher feels that continued research and studies are needed in order to truly understand the global benefits of co-teaching. The researcher discovered numerous research questions upon the completion of this study. Would the duration of the co-teaching partnership make a difference between the effectiveness of co-teaching? It would be interesting to discover whether the duration of the co-teaching partners has any effects on the overall outcome of student participation as well as academic success. One would assume that it does, but the duration of partners may in fact have little to contribute to the success of students, and instead, students' success and participation may be influenced more by the personalities, professionalism and teaching styles of the teachers involved. Another research question could focus on the amount of actual plan time between the co-teachers. What is the minimal amount of planning needed to facilitate positive effects on student success for students in a co-teaching environment? Additionally the researcher observed differences in students' self esteem when co-teaching was used. What are the contributing factors that accounts for self-esteem when students with disabilities are included in the general education classroom? And lastly, does the amount of training prior to the implementation of co-teaching have an effect on student's participation and success within the general education classroom? Obviously there is a need for further research in the area of co-teaching to explore the many different possibilities that might influence students' success.

Limitations

There were many limitations in this study. The primary limitation was the number of subjects selected for the study. The researcher wanted to have at least three subjects for the study. Due to the inability to remove students to another class period, the number of qualified subjects was limited. One subject that was selected for the study by the researcher was eliminated when the parents declined to have their child involved in the study. Due to these factors, only two subjects were selected. The need to keep extraneous variables at a minimum also limited the number of subjects selected for this study.

Another limitation occurred in having the researcher and co-teacher as the same individual. This may have greatly affected the desired outcome since the researcher had specific goals and ideas that needed to be met. In addition to this, the researcher had other responsibilities to the school that had to be met that prevented her from being in the classes 100% of the time during the study. The timing of the study was also a limitation. The study was conducted during the last eight weeks of school in which there were numerous activities that took away from the amount of time spent on academic coursework. The Texas Assessment of Knowledge and Skills (TAKS) tests were administered in the last week of April, and this directly affected the amount of time the researcher had to conduct the study by limiting the actual number of weeks to seven. The lack of planning that was spent between the co-teacher and the teacher during the implementation stages limited the study as well. Although both professionals were able to continue with their job duties, the ebb and flow of working together was never

truly established. This may have been due to the lack of planning, but it may have also been influenced by the differences of the two teacher's personalities as well as their teaching styles and beliefs. Given more time, the dynamics of co-teaching may have shifted once trust and familiarity had been established. In addition to the lack of planning, the amount of training provided was a limiting factor. The regular education teacher did not receive any formal training on co-teaching. The researcher spoke with her and gave her some guidelines, but the regular education teacher did not have the opportunity to receive any in-services on co-teaching. This may have greatly affected the outcomes of this study since the results indicated that only one type of co-teaching model was actually used. Would training have made a difference in this outcome? And finally, the last limitation resulted from structure of the particular school. The school chosen for this study had not previously tried co-teaching and many of the teachers and administrators were not knowledgeable in co-teaching. This limiting factor may have influenced the overall philosophy of co-teaching and the understanding of the program. Although this ties in closely with lack of training, the researcher felt that this was a separate limiting factor to this study and needed to be addressed.

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APPENDICES

APPENDIX A

CONSENT FORMS ENGLISH AND SPANISH

Consent for Participation

Dear Parents/Guardians:

I am currently working on my Master's Degree at the University of Texas-Pan American in Special Education. In order to complete my degree I must conduct a research study.

I want to investigate the effects co-teaching has on student participation and math success in a general education classroom for students with a learning disability. I would like to work with your child _____, in his/her regular math classroom to collect my data. It will be necessary for some of these sessions to be videotaped for accurate data collection. All information will remain confidential. The study will last for at least 8 weeks

Due to the nature of the study, _____ will not be able to leave the regular classroom for any Content Mastery Support, but with the use of co-teaching, he/she should receive all the necessary modifications and support needed.

Please check one of the boxes below indicating your consent for your child to participate in this study.

If you have any questions, you may reach me at 632-8815. Please also read and sign the attached Consent Form and the Video Release Form for further information.

- ❑ I give consent for my child to participate in this study.
- ❑ I do not give consent for my child to participate in this study.

_____ _____

Parent/Guardian Signature Date

_____ _____

Mia Baldwin (Primary Investigator) Date

VIDEO/AUDIO TAPE RELEASE FORM

I voluntarily agree to have my child videotaped during the experiment being conducted by Mia Baldwin. I understand that the tapes will be used for the sole purpose of collecting data to record the results of student participation while the co-teaching intervention is being implemented in the general math classroom. Date, teacher's name, and class period will identify these tapes. The tapes will be kept for one year and will be stored in a locked file cabinet in the Content Mastery office. After the data is collected the tapes will be destroyed no later than May 2004.

_____ _____

Signature of the Guardian Date

_____ _____

Mia Baldwin Date

REFUSAL TO BE TAPED

I do not agree to have my child videotaped during the experiment conducted by Mia Baldwin. I understand my child will not be penalized or denied services by such a refusal. By refusing to be videotaped, I understand that my child may not continue to participate in the study.

_____ _____

Signature of the Guardian Date

_____ _____

Mia Baldwin Date

INFORMED CONSENT FORM

I, _____, have been informed by Mia Karen Baldwin that my child, _____, will be one of approximately 3 subjects that have been asked to volunteer for this study entitled, "The Effects of Co-teaching on Student Participation and Math Success in the General Education Classroom", [45 CRF 46.116(a)(1)]. This study is designed to investigate the effects co-teaching has on students' participation and math success within the classroom, [45 CRF 46.116(a)(1)]. The subjects will be videotaped during the baseline period and during the implementation of the co-teaching models. Student participation has been defined as (1) subject plans and develops a strategy with other students to answer questions, (2) subject communicates with other students and teachers by verbalizing their thoughts and recording answers on his/her paper, and (3) subject has eyes on paper/book, or teacher and has pencil to paper during independent instruction time.

There are no foreseeable risks associated with your participation in this research investigation, [45 CRF 46.116(a)(2)]. The benefits associated with this study include improvement in student participation, an increase in math success, improvement in organization skills, and possible increase in self-esteem, [45 CRF 46.116(a)(3)].

Participation in this study is voluntary and I may withdraw my child at any time without penalty or loss of special education services, [45 CRF 46.116(a)(8)].

This research has been reviewed and approved by the Institutional Review Board-Human Subject's In Research. For research related problems or questions regarding subject's rights, the Human Subject's Committee may be contacted through Dr. Bob Faraji, Chair, at 381-2287, [45 CRF 46.116(a)(7)].

I have read and understand the explanations provided to me and voluntarily agree to allow my child to participate in this study.

Signature of Guardian _____Date_____/_____/_____

Signature of Witness_____Date_____/_____/_____

Consentimiento Para Participación

Queridos Padres/Guardianes:

Actualmente estoy atendiendo la Universidad de Texas Pan-American para obtener mi maestría en educacion especial. Para poder obtener la maestría debo de conducir un estudio.

Quiero investigar los efectos que existen en la participacion de estudiantes con desabilidad de aprendisaje y su éxito en matemáticas cuando dos maestros enseñan en conjunto en una clase de educaión general. Me gustaría trabajar con su hijo/hija _____, en su clase de matemáticas para obtener mi información. Es necesario que algunas de las sesiones sean grabadas en video para que la información recopilada sea mas precisa. Toda la informacion será confidencial. El estudio durará por lo menos ocho semanas.

Dada la naturaleza del estudio, _____ no podrá recibir servicios en el cuarto de maestriàdel contenido, pero con los dos maestros enseñando en conjunto, el/ella recibiria las modificaciones y apoyos necesarios en el salón.

Por favor marque abajo indicando si da o no da permiso para que su hijo/hija participe en el estudio.

Si tiene alguana pregunta, me puede contactar al 632-8815. Por favor también lea y firma la Forma de Consentimiento y la Forma para Grabar Video para obtener mas información.

☐ Yo doy consentimiento para que mi hijo/hija participe en el studio.

☐ Yo no doy consentimiento para que mi hijo/hija participe en el estudio.

_____ _____

Firma del Padre/Guardian Fecha

_____ _____

Mia Baldwin (Investigadora principal) Fecha

FORMA PARA GRABAR VIDEO/AUDIO CASSETES

Yo estoy de acuerdo en que mi hijo/hija sea grabado(a) en video durante el estudio que será conducido por Mia Baldwin. Yo entiendo que las videos serán usados para el solo proposito de obtener información para grabar los resultados de la participacion del estudiante mientras que la intervención de enseñar en conjunto es implementada en la clase de matemáticas. La fecha, el nombre del maestro, y periodo de clase serán utilisados para identificar los videos. Los videos serán guardados dentro de un archivero, con candado, por un año en el cuarto de maestría del contenido. Después de que la información haya sido obtenida los videos serán destruidos a no mas tardar de Mayo del 2004.

_____ _____

Firma del Padre/Guardian Fecha

_____ _____

Mia Baldwin Fecha

RECHAZO DE SER GRABADO(A) EN VIDEO

No estoy de acuerdo en que mi hijo/hija sea grabado(a) durante el estudio que será conducido por Mia Baldwin. Yo entiendo que mi hijo(a) no será castigado y que ningun servicio de educación especial será negado por rehusar. Yo entiendo que mi hijo(a) no participará en el estudio al rechasar que sea grabado(a).

_____ _____

Firma del Padre/Guardian Fecha

_____ _____

Mia Baldwin Fecha

FORMA DE CONSENTIMIENTO DE INFORMACIÓN

Yo, _____ he sido informada por Mia Karen Baldwin de que mi hijo(a) _____, será uno de aproximadamente tres estudiantes a los cuales se les a pedido que sean voluntarios para el estudio titulado "Efectos Que Existen en la Participacion de Estudiantes con Desabilidad de Aprendizaje y Su Éxito en Matemáticas Cuando Son Ensenados Por Dos Maestros en Conjunto, en un Salón de Educación Regular," [45 CRF 46.116(a)(1)]. Este estudio es diseñado para investigar los efectos que existen en la participación y éxito en matemáticas cuando dos maestros enseñan en conjunto en la misma clase, [45 CRF 46.116(a)(1)]. Los estudiantes seran grabados en video durante el periodo base y durante la implementación de enseñar en conjunto. La participación de los estudiantes ha sido definida como (1) el estudiante planea y desarrolla estrategias con otros estudiantes para resolver los problemas de matemáticas, (2) el estudiante se comunica con otros estudiantes y maestros por medio de verbalizar sus pensamientos e ideas y apuntar sus respuestas en su papel, y (3) el estudiante mantiene sus ojos en el papel, el libros, y el maestro o tiene lápiz y papel durante el tiempo de instrucción independiente.

No se anticipan riesgos asociados con su participación en esta investigacion, [45 CRF 46.116(a)(2)]. Los beneficiosde asociados con este estudio incluyen mejoramiento en las participación, y aumenta su éxito en matemáticas, mejoramiento en destrezas de organización, y posiblemente aumento en su auto estima, [45 CRF 46.116(a)(3)].

La participación en este estudio es volunario y puedo retirar a mi hijo/hija en cualquier momento sin ninguan castigo o perdida de servicios de educación especial, [45 CRF 46.116(a)(8)].

Este estudio a sido repasado por La Institucion Revisiva de Mesa Directiva de Sujetos Humanos en Estudios. Para problemas relaciondados con el estudio o preguntas acerca de los derechos del sujeto, el Comité de Sujetos Humanos puede ser contactado por medio del Dr. Bob Faraji, Director, al 381-2287, [45 CRF 46.116(1)(7)].

Entiendo las explicaviones proveidas y voluntariamente estoy de acuerdo en permitir que mi hijo/hija participe en este estudio.

Firma del padre/Guardian _____ Fecha ___/____/___

Firma del Investigador Principal _____ Fecha ___/___/___

INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECTS IN RESEARCH
THE UNIVERSITY OF TEXAS - PAN AMERICAN
1201 West University Drive • Edinburg, Texas 78539-2999 • (956) 381-2287 Office • Fax (956) 318-5265

MEMORANDUM

To: Mia Karen Baldwin, Graduate Student, Educational Psychology Department, College of Education, UTPA, Dr. Laura Saenz, Graduate Advisor

From: Dr. Bahram (Bob) Faraji, Chair, Institutional Review Board for Human Subjects in Research BF

Subject: Protocol for "The Effects of Co-teaching on Student Participation and Math Success in a General Education Math Classroom"

Date: February 21, 2003

The above referenced protocol has been:

____ Approved (committee review)
__X__ Approved (expedited review, IRB# 232)
____ Conditionally approved (see remarks below)
____ Tabled for future consideration-Re-submit with corrections
____ Disapproved (see remarks below)

by the Institutional Review Board Federal Wide Assurance Number (FWA 00000805).

As stipulated in the guidelines of the IRB, this protocol will be subject to annual review by the IRB and any deviations from the protocol or change in the title must be resubmitted to the Board.

For additional information you can contact the IRB University website at http://www.panam.edu/dept/sponpro/Policies/Policies.html

AT THE CONCLUSION OF THE STUDY, YOU MUST FILL OUT THE ENCLOSED REPORT FORM

cc: Dr. Wendy A. Lawrence-Fowler, AVPR

APPENDIX B

CHECKLISTS

Student Participation Checklist

Subject: _____ Date: _____

Teacher: _____ Setting: _____

Time begun: _____ Time ended: _____

Target Behavior	Frequency of behavior	Total #
Student develops a plan with other students in order to solve activities		
Student communicates with other students and teachers by verbalizing ideas and writing down strategies		
Student has eyes on paper/book/ teacher, and has pencil to paper during independent class time		

Observer: _____

Total # of scores _____ (out of 9)

Percent _____

Co-teaching Model A: Interactive Teaching

Subject: _____ Class:_____ Date: _____

Time Begun:_____ End Time: _____

Co-teaching Intervention	Tallies of occurrences during a 45 minute period
One-to-one instruction per student	
Change in methodology: • Visual • Auditory • Tactile	
Modifications: • extra time • reduced assignments • help with written work • oral reading • oral dictation • show examples • cooperative learning • peer assistance	

Co-teaching Model B: Alternative Teaching

Subject: _____ Class:_____ Date: _____

Time Begun:_____ End Time: _____

Co-teaching Intervention	Tallies of occurrences during a 45 minute period
One-to-one instruction per student	
Change in methodology: • Visual • Auditory • Tactile	
Modifications: • extra time • reduced assignments • help with written work • oral reading • oral dictation • show examples • cooperative learning • peer assistance	

VITA

Mia Karen Baldwin was adopted into a single parent American family and raised overseas. She received the best of two worlds and was given the opportunity to absorb her own Korean culture along with the American culture her mother provided her and her older sibling. Mia received her high school education in Korea and Turkey at Department of Defense Dependent Schools. She then went to the University of Texas at Austin and received her BA in Applied Learning and Development with a minor in Generic Special Education. Upon her graduation from UT, Mia worked in the public school system for five years as a special education teacher at the high school and middle school levels. She then returned to school herself to earn her master's degree in 2001 at the University of Texas Pan-American in Edinburg, Texas. She continued to work as a special education teacher while pursuing her master's degree in Special Education for the Culturally Linguistically Diverse Exceptional Learner. After her earning her master's degree, Mia is continuing to work as a special education teacher at a high school in South Bend, Indiana. She hopes to continue her own education and pursue her Ph.D. in the future. She may be reached at the forwarding address:

Mia Baldwin

307 Greycliff Drive

San Antonio, Texas 78233