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THE IMPACTS OF CO-TEACHING ON THE GENERAL EDUCATION STUDENT

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
in the Department of Educational Research, Technology and Leadership
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ABSTRACT

The purpose of this study was to investigate four research questions concerning the impact of co-teaching on general education students educated within a classroom inclusion model. General education students who received instruction during their 10th-grade year in a co-taught language arts or mathematics class were compared with other 10th-grade students receiving instruction from the same teacher but without the additional co-teacher. Achievement data from the Florida Comprehensive Achievement Test (FCAT) were gathered on these students. The state of Florida calculates and reports developmental scale scores (DSS) for students taking the FCAT. These scores are calculated to track student progress over time in relationship to the FCAT at each grade level. This study compared the difference in DSS from 9th-grade to 10th-grade of general education students in co-taught classes.

It was determined in this study that there was no statistically significant difference for general education students in co-taught language arts classes but there was a significant difference for those in mathematics classes as compared to their peers not in co-taught classes. When below proficient general education students were compared there was a significant difference for students in mathematics co-taught classes compared to those not in co-taught classes, but not for those in language arts classes. Additional analyses were conducted to determine if co-teaching was a factor in the overall learning gain calculation used by the state of Florida. It was determined that there was no

significant difference in learning gains of general education co-taught students as compared to peers not in co-taught classes.

Information for school and district leaders was provided to guide decision making regarding the use of co-teaching as an inclusion model. Further research is necessary to fully understand the implications of co-teaching on general education students.

This dissertation is dedicated to my husband Clai and my two sons Pierce and Ethan. I love you all more than life itself. You are my joy and my inspiration. Your support means the world to me.

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CHAPTER ONE: PROBLEM STATEMENT AND DESIGN COMPONENTS

Introduction

In the last several decades there has been an emphasis on equity through inclusion in American education for all students. Inclusion is a civil rights issue based on the principle of desegregation for students with disabilities. Prior to inclusion laws educators sorted and selected students based on abilities. General education students were unaffected by students with disabilities because they were physically separated in their educational environments. However, this model of sorting and selecting has changed due to the passing of Public Law 94-142 and several other key pieces of legislation. As a result of these legal changes, educators have made it a recent practice to put students with disabilities in classrooms with non-disabled peers (Dieker & Murawski, 2003).

There have been a variety of different strategies and techniques used in American schools to accommodate the implications of inclusion. One method schools have employed to deal with inclusion is co-teaching (Dieker, 2003). Co-teaching involves multiple educators collaborating in the efforts of educating each individual student. Content specialists collaborate with special education experts in an effort to successfully include students with disabilities in general education classrooms. There is an African proverb that says “it takes a whole village to raise a child.” Likewise, it can be argued it takes a whole school to educate a student.

Purpose of the Study

The purpose of this study was to examine the impact of the co-teaching model on general education students in an inclusion model classroom, specifically a co-taught classroom. Learning gains and Achievement Level scores on the 10th-grade reading and mathematics Florida Comprehensive Achievement Test (FCAT) were used as data indicators. The results can be used by educators in determining how to implement co-teaching as a method of inclusion.

Statement of the Problem

The following question guided this investigation: “What are the impacts on learning gains on the 10th-grade FCAT for general education students in co-taught classrooms under an inclusion model?”

Definition of Terms

Co-teaching: Two teachers share a classroom of students in which some are learning disabled but the majority are not. One teacher is a certified content specialist. The other teacher is certified in special education. Both teachers collaborate together in the planning, executing, and evaluating of the daily lessons (Cook & Friend, 1995; Bauwens & Hourcade, 1991).

Content certified teacher: Any teacher who has earned Florida certification in a content area and is considered qualified for teaching that content. In this study content certified teachers are certified in either secondary education English language arts or mathematics.

Education for All Handicapped Act: According to the Statement of Findings and Purpose of this law, the purpose of this act is to assure that the rights of handicapped children and their parents were protected along with a free and appropriate education provided and assessed for effectiveness. This law was passed by the United States Congress in 1975.

Exceptional Student Education (ESE): This is a Florida term for students with indentified disabilities. These students are legally protected to receive a free and appropriate education.

Exceptional Student Education services: ESE services are all the strategies used by the public school system to provide an individualized and appropriate education to such students.

ESE certified teacher: In this study this term refers to any teacher who has earned the certification in the state of Florida to teach ESE students. These teachers might hold other content certificates as well, but they have successfully earned ESE certification and are qualified to instruct at all levels of ESE.

General education student: Any student who does not qualify for ESE services is considered a general education student. There is no documented evidence of a disability warranting such ESE services for these students.

Florida Comprehensive Achievement Test (FCAT): A criterion referenced test mandated in the state of Florida to be administered to students grades 3 through 10 in the areas of reading, writing, mathematics, and science. This test is the primary measure of students' achievement of the Sunshine State Standards.

FCAT Achievement Levels: Students can score in one of five Achievement Levels with a score of 1 being the lowest and 5 being the highest. Level 3 is identified as proficient (Florida Department of Education, 2005).

FCAT Developmental Scale Score (DSS): This score is calculated by converting the students' scale scores to a number between 0 and 3000. This allows student progress and growth to be tracked from grade level to grade level (Florida Department of Education, 2005).

FCAT Learning Gains: A measure of student progress from year to year on the FCAT. Students can make a learning gain in any one of three ways: improving Achievement Levels, maintaining a level 3, 4, or 5, or demonstrating a year's growth within Achievement Levels 1 or 2 (Florida Department of Education, 2005).

Inclusion: This refers to the attendance of students with identified learning disabilities in the same schools as students without any identified disabilities including the participation of disabled students in general education classrooms with age-appropriate peers (Lovette, 1996).

Individuals with Disabilities Education Act: This law is the reenacted version of the Education for All Handicapped Act. This law now requires schools to provide whatever

resources necessary for students with disabilities to complete necessary functions of the job.

Learning Disabilities: These represent the range of characteristics displayed by students who do not achieve on level as compared to peers in areas of communicating, reading, writing, spelling, reasoning or organizing.

Special Education: Services that are uniquely designed to meet the identified disabilities of qualified students.

Assumptions

The following assumptions are made for this study:

1. The assessments used in this study were a valid measure of achievement.
2. The methodology proposed and described offers the most logical and appropriate design for this particular research project.
3. The selected co-teachers worked together throughout the year in a true co-taught model.
4. The methods and procedures used by the co-teachers were similar.

Delimitations

The following delimitations apply to this study:

1. Only central Florida school districts were considered for the study.
2. Only schools within the defined parameters of 1,200 to 2,500 students were selected for the study

3. Of the schools meeting the size requirement only schools with less than a 40% free and reduced lunch and a population of non-whites between 10% and 40% were sampled.

Limitations

1. The FCAT is the only measure of achievement in this study.
2. Students in the 10th-grade were the only students studied.
3. Mathematics and language arts classes are the only subjects from which the student data was gathered.

Significance of the Study

There are several choices in high schools for including special education in general education classrooms. Co-teaching is one option, but consultation, pull-out resources, and support facilitation also exist as models in Florida to meet the needs of students with learning disabilities. Administrators must determine which model fits the budget, culture, resources, and needs of their school in designing a program of study that reflects the least restrictive environment for special education students in accordance with state and federal regulations. Whatever choice is made, there will be an impact on the special education and the general education student. Ideally, a high school program of study should be designed for the best academic environment for all students. The results of this study will assist teachers and administrators in better understanding the impact, if

any, of co-teaching inclusion model on general education students. Schools and school districts considering using the co-teaching inclusion model may research the impacts on the special education students, and may also be concerned with the impact on their general education students. This study contributes to the body of knowledge which educators rely on to make decisions on how best to meet the needs of all students in the classroom setting.

Research Questions

This research study will strive to answer the following research questions:

1. To what extent do general education students in 10th-grade English language arts general education classes demonstrate statistically significant different learning gains on the FCAT Reading compared to general education students in co-taught 10th-grade English language arts classes?
2. To what extent do general education students in 10th-grade general education mathematics classes demonstrate statistically significant different learning gains on the FCAT mathematics compared to general education students in 10th-grade mathematics co-taught classes?
3. To what extent do general education students in 10th-grade English language arts co-taught classes who scored at level 1 or 2 on the 2008 FCAT experience significantly different learning gains on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

4. To what extent do general education students in 10th-grade mathematics co-taught classes who scored at level 1 or 2 on the 2008 FCAT experience significantly different learning gains on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

Design of the Study

This study used FCAT scores and learning gains of general education students from identified co-teachers' classrooms for the 2008-2009 school year. Teachers were selected from seven identified central Florida school districts. Data from these identified teachers' classes which were not co-taught served as comparison data.

Organization of the Dissertation

This dissertation is divided into five chapters. Chapter 1 offers the reader an overview of co-teaching and the problem to be researched. Chapter 2 provides a synopsis of the relevant research on the topic of co-teaching. A balanced view of the topic was stressed. However it should be noted that the researcher despite intense efforts did not yield much research that showed co-teaching to be a negative strategy. Chapter 3 focuses on the design of the study and offers a description of the methodology. Additionally relevant statistical operations are discussed along with the procedures used to analyze and collect the data. A detailed analysis of the results is the subject of Chapter 4. Chapter 5

focuses on an interpretation of the data collected. Conclusions are linked to relevant literature and research in the field, and recommendations are made for further research in this area.

CHAPTER TWO: LITERATURE REVIEW

Historical Context of Inclusion

Several landmark court cases and legislative actions have marked the long road America has traveled in the effort to provide a free and appropriate education to all students. Inclusion began as a civil rights issue. Along with the focus on inclusion of people with disabilities in education, America was dealing with the issues of racial inequities in the educational setting in the 1950s. A landmark case was *Brown v. Board of Education in 1954* which ruled that segregation in public schools was unconstitutional. This court decision led to changes in American law, politics, social policy and education (Osgood, 2005). American history reveals that racial inclusion was not easily accomplished. The journey was marred by violence, hatred, and tremendous courage for those committed to opening the educational opportunities for all types of students.

Throughout the next two decades progress was made toward making educational settings inclusive of those students with disabilities. Several more laws expanded the services and funding for special education. However throughout the 1960s students with disabilities remained largely segregated from the general education population (Osgood, 2005). It was in 1975 that Congress passed Public Law 94-142. This law, also known as the Education of All Handicapped Children Act, was another major stride toward equalizing educational opportunities. The stated purpose in this law is

to assure that all handicapped children have available to them...a free appropriate public education which emphasizes special education and related services designed to meet their unique needs, to assure that the rights of handicapped children and their parents or guardians are protected, to assist States and localities to provide for the education of all handicapped children and to assess and assure the effectiveness of efforts to educate handicapped children. (p. 1)

This law fundamentally changed education for students with disabilities as well as students without disabilities and all educators. Students with disabilities now had the legal right to be educated in the Least Restrictive Environment (LRE). This meant that general education students who had never shared a classroom or a teacher with a special education student found themselves adjusting to new faces in their educational experiences. Teachers who had formerly focused only on students in the general education program were now faced with learning how to educate students with disabilities as well as complying with the legal requirements. This law also required unbiased evaluations to be conducted in the child's normal mode of communication or native language, if appropriate. It also required Individualized Education Plans (IEPs) to be written on every student with a disability. The purpose of the IEP is to document the student's disabilities and the accommodations and services provided by the school to ensure the student receives a free and appropriate education in the least restrictive environment. This law also required schools and parents to become partners in planning the education of the disabled students. PL 94-142 radically altered the standard for educating students with disabilities.

Litigation followed as parents, teachers, and administrators attempted to sort out what an appropriate education in the least restrictive environment looked like for students

on a continuum of disabilities. In *Board of Education v. Rowley* (1982) the Supreme Court defined appropriate education as providing the same basic education opportunities as nondisabled peers, not as providing maximum opportunity for the student to develop their full potential (Raines, 1996). Defining the least restrictive environment is a challenge for educators.

Offering an education to students with disabilities in the least restrictive environment polarized educators and stakeholders on two sides of the debate. Advocates of inclusion touted increased benefits for students with disabilities as well as those without. Opponents claimed too little research existed to validate the claims of the inclusion supporters (Hallahan, Kauffman, Lloyd & McKinney, 1988). Those in favor of inclusion argued that without it students with disabilities were denied the opportunities to learn social and academic skills necessary to lead a functioning life in society (Shanker, 1994). The debate continued through the 1980s and 1990s while inclusionary practices grew and research was conducted on behalf of educators, students and parents impacted by inclusion.

Historically, special education programs were separate entities in schools. They served all types of special education students in separated classes from the general population. Hockenbury, Kauffman and Hallahan (1999) contended that there is no replacement for some of the services provided in a special education environment. They argued that no matter how a general education program is restructured it cannot replace the benefits a special education program can provide for students with disabilities. They

agreed with full inclusion advocates that providing some services to special education students through the general education program is possible but dissented in that it should not fully replace a special education program. According to Kaufman and Hallahan's (1990) research there is an overgeneralization in educational research that claims integration is a single solution that is good for all students. Kaufman and Hallahan supported the idea of providing services where appropriate in the general education curriculum.

We agree that children with disabilities and the special services we provide them should be as much an integral part of general or mainstream education as possible, so long as we are able to meet individual needs... We disagree on other points, however, including what research says about special education, the relationship between research and value judgments, and the probable outcomes of specific policy choices....we question the veracity of some of the statements of REI [Regular Education Initiative] advocates. (p. 340)

Gallagher (1994) concurred with the ideology of Kaufman and Hallahan. He claimed that the issues surrounding full inclusion had multiple layers. On a surface level inclusion was a scheduling issue related to structure and organizational management. On a deeper level inclusion was about power and influence. He claimed that

If special education becomes merely a minor part of the general education system, then special education loses its voice in the power circles of the educational system and loses much of its ability to influence policy in that system at the local, state and federal levels. (p. 528)

Gallagher also argued that full inclusion was not the fairest alternative to the students with disabilities.

There is something amiss in the full inclusion plan-that fairness does not consist of educating all children in the same place at the same time (and with the same

curriculum?) but in ensuring that the student has basic needs met and is traveling a well-thought-out road to a career and a satisfying life style. (p. 528)

The main concern among those opposing full inclusion seemed to be that the students with disabilities would not receive the same full benefits they had received in a separated special education program. Supporters concluded that full inclusion was fair or equitable to the students who had previously had access to a special education service.

Shanker (1994) pointed to wider implications for inclusion. He raised the question of how inclusion might impact general education students. Those students might not receive the extra time and support needed to accelerate their learning if the teacher had to spend more time with the special education students in helping to accommodate their disabilities. He also raised the concern regarding behavior problems of special education students which could evolve into safety and security hazards for general education students. His concern reached out to the special education students as well. In his words full inclusion is unjust.

Full inclusion is often justified by an analogy with racial segregation. But the analogy is faulty. African-American children have the same range of abilities and needs as white children...In calling for all disabled children to be placed in regular classrooms regardless of the severity and nature of their difficulty, full inclusion is replacing one injustice with another. (p. 20)

While these might be harsh words, it is the reality of the depth to which this heated and emotional debate has gone.

Although there were two sides to the issue, most could agree that some degree of inclusion was appropriate. The divergence in opinion stemmed from deciding at what

point was a student's disabilities too severe for full inclusion (Shanker, 1994; Hockenbury, Kauffman, Hallahan, 1999; Hallahan, Keller, McKinney, Lloyd, & Bryan, 1988). A student's degree of disability and success in a full inclusion program was dependent on the skill set of the general education teacher in the classroom. One of the biggest complaints of teachers involved in initial inclusion efforts was lack of training to deal appropriately with the addition of special education students in the general education classroom setting (Chiang, 1999; Friend, 2007; Grider, 1995; and LoVette, 1996). More recently, in an article about using co-teaching as a method of inclusion Friend (2007), suggested that

Professionals should keep in mind that co-teaching is only one of several beneficial options for supporting students in an inclusive school. Some students with disabilities need the structure and intensity of small-group settings to raise achievement. Nothing about co-teaching implies that schools should eliminate such approaches. (p. 49)

The general agreement here is that a continuum of services is more appropriate than an all or nothing approach to special education.

Some educational institutions chose to deal with the inclusion mandate through pull-out programs. In these incidences students who had formerly been in self-contained special education classes were placed in general education classrooms and then pulled out as needed for services and accommodations (Will, 1986). The students still participated in the general education curriculum and socialization but received extra support as needed throughout the day. Will claimed that these pull-out programs had failed in a number of cases to meet the needs of the students with disabilities. She even went as far

as to say that for students with disabilities pull-out programs had “created, however unwittingly, barriers to their successful education” (p. 412). Wang, Reynolds, and Walberg (1986) suggested that the pull-out programs missed the bigger picture.

Although well intentioned, the pull-out approach neglects the larger problem: regular classroom learning environments have failed to accommodate the educational needs of many students. The pull-out approach is driven by the fallacy that poor school adjustment and performance are attributable solely to characteristics of the student rather than to the quality of the learning environment. (p. 26)

Pull-outs were just one strategy used by educators in grappling with the implications of inclusion.

In 1988 Hallahan et al. published a series of seven articles in response to the Regular Education Initiative (REI). The REI was an offshoot of inclusion which claimed that general education teachers should take primary responsibility for educating mildly handicapped children (Hallahan et al., 1988). In these articles Hallahan et al. offered several reasons why inclusion should not have been so hastily accepted. The efficacy studies that were at the time being used to support full inclusion initiatives were picked apart and found to be lacking in sound research by Hallahan et al. Additionally, the model that was being used in the research ALEM (Adaptive Learning Environment Model) was found by Hallahan et al. to be a poor choice for research basis. The basis for their complaint was that ALEM was a prototype being used to shape policy and there were no solid research studies to support its effectiveness. “Looking at the ALEM research as a whole, one finds a multitude of problems, spread out over a minimal number of studies” (Hallahan et al., 1988, p. 32). This conflict among the researchers and

policy makers created an atmosphere of disharmony even though educators pushed on to make inclusion a common practice.

In 1990 the Education of All Handicapped Children Act was renamed to the Individuals with Disabilities Act (IDEA). This same year America took another step forward with the passing of the Americans with Disabilities Act (ADA). Expanding on the progress made with PL 94-142, the law now required schools to provide whatever resources necessary for students with disabilities to complete necessary functions of the job. Schools were now legally bound to provide the means for students to learn in the best possible environment. Again, this step forward had rippling effects on the students with disabilities, those without disabilities, and the educators who served them.

According to the United States Department of Education's website, over six million students were served in American public schools in 2004 under the protection of this law.

In the last two decades notable amendments have been made to IDEA. In 1997 IDEA was expanded to include services to children from age three to nine for developmental delays. In 2004 IDEA was reauthorized and renamed to Individuals with Disabilities Education Improvement Act of 2004 (IDEIA). These changes address Individual Education Plan (IEP) timelines, the requirements for evaluating children with learning disabilities and provisions relating to the discipline of students served under IDEIA. According to Wilson and Michaels (2006),

The most recent amendments to the Individuals with Disabilities Education Act (IDEA; Individuals with Disabilities Education Improvement Act, 2004) are clearly designed to better align special education programs and policies with the larger national school improvement effort. Both the 1997 and 2004 amendments

to IDEA presume that the vast majority of special education students should develop the literacy skills necessary to access the general education curriculum and demonstrate success in state and local assessments. (p. 206)

Although the focus has been on students with disabilities the impact is far reaching.

Families of these students, educators, administrators, teachers and the students without disabilities have all been affected by these decisions.

The impact of inclusion necessitates an analysis of its effectiveness. Researchers have made attempts to study the impact of inclusion on the students and teachers in the classrooms. One example is a study done by Sharpe and York (1994) on the impact of inclusion on 143 students in kindergarten through sixth grade. Of those, 35 were in the inclusion classroom and 143 were in the comparison classrooms. Four measures of academic performance were used including standardized test scores, reading series, report card grades and report card indicators of conduct and effort. The researchers found no significant effect on the general education students in the inclusive classroom. Another example is the work done by Cawley, Hayden, and Cade (2002) on the impact of inclusion in science classrooms. The social implications were positive. "According to teacher observations, the SE [special education] students enjoyed a much higher level of social acceptance than when they remained in a self-contained class all day" (p. 431). The study also found the included special education students had the same passing rate on the district exam as general education students. These are positive indicators for the impact of inclusion. However, there is still much work to be done.

Inclusion in Florida

This research study will focus on students in the state of Florida, particularly in central Florida. Florida serves thousands of students through inclusion practices. According to Florida's department of education website Florida graduated 136,075 students with a standard diploma in 2008. Of the students with identified learning disabilities and an active IEP less than half, 45.2%, of those students earned a standard diploma in 2008. The state made efforts to have students with disabilities participate in general education classrooms as much as possible. Sixty-two percent of the students aged 6-21 with IEPs spent less than 21% of their day in self-contained classrooms. The state Department of Education also tried to prepare the teachers for inclusion by training 3,721 individuals statewide in collaborative planning and teaching, collaborative teaching models, inclusion and positive teaming. While these are all good efforts only 31.6% of the students with disabilities in grades 3 through 10 demonstrated proficiency in reading and 35.5% of these same students demonstrated proficiency in mathematics as measured by the state test, the Florida Comprehensive Achievement Test (FCAT). These numbers indicate that Florida still has work to do in the effort to provide the skills necessary for students with disabilities to access the general education curriculum and be successful on state tests.

Florida also has a deficit in reaching high standards with the general education student. The graduation rate for the state in 2008 was 75.4%. Tenth grade students are required to pass both the reading and mathematics test in order to earn a standard

diploma. In 2008, 38% of 10th-graders in Florida passed the reading test, 68% of 10th-graders passed the mathematics test. While the mathematics scores have steadily increased by 10 points since 2001, the reading scores have fluctuated between 32% and 38% passing since 2001. There is certainly a need for solutions to the issue of preparing all Florida students to be successful on the state assessments regardless of their participation in special education, general education or inclusive classrooms.

Definitions of Co-teaching

The practical classroom applications of laws regarding inclusion abound. For example, in Florida high schools some special education students are in general education classes all day and receive consultation services as needed during non-academic times. Other Florida high school special education students are scheduled in general education classes and a support teacher is assigned to assist in the class two or three days a week. This model is called support facilitation and allows the special education teacher to be in more classrooms throughout the day. Another strategy for meeting inclusion requirements is to schedule special education students in general education classes with two teachers. The No Child Left Behind legislation uses the language “highly qualified” in describing teachers suited for particular classrooms. As a result of this phrase pairing two teachers in a single classroom that has a mix of general education and special education students has increased in popularity (Jung, 1998; Murawski & Dieker, 2004).

This particular scheduling practice is called co-teaching. Cook and Friend (1995) defined co-teaching as

Co-teaching involves two educators, and occasionally, more. For purposes of the discussion here, one of the professionals is a general education teacher and the other is a special educator--either a special education teacher or a specialist in one of the related services such as a speech/language therapist. (p 2)

They qualified this by further stating “the second part of our co-teaching definition specifies that the educators deliver substantive instruction” (p. 2). Another definition as stated by Fennick and Liddy (2001) is “in collaborating teaching teams, general education teachers and special education teachers share responsibility for planning and teaching in a general education class” (p. 229). Essentially co-teaching is designed to create a partnership between two specialists, a content specialist and a learning specialist, so that all the students in an inclusive classroom can benefit. The focus is on providing services to students with disabilities in order to enable them to be successful in the least restrictive environment. However, in doing so the other implication is the effect of this arrangement on the general education students in those classrooms.

Simply scheduling students with disabilities into general education classrooms and assigning two teachers does not accomplish the purpose of co-teaching. Deshler et al. (2001) warned against equating placement with success.

Namely, *placement in the general education classroom* is mistakenly equated with *access to and success in the general education curriculum*. The confusion between *place* (that is the general education classroom) and *instructional conditions* (that is the conditions necessary to enable students to be successful in responding to the requirements of the general education curriculum) has led to a

dramatic narrowing of how services are conceptualized on behalf of students with LD [learning disability]. (p. 105)

Feldman (1998) also cautioned educators about simply placing students in a co-taught classroom and hoping for the best turn out. “Simply using co-teaching to have LD [learning disabled] students included in general education should not be confused [with] meeting the individual *learning* needs of these difficult to teach students” (p. 116). Co-teaching must go beyond the master schedule and should be a beneficial scenario for all the students as well as the teachers involved in the co-taught classroom.

Co-teaching can look different in different classrooms or even within the same classroom but in different aspects of the lesson. Cook and Friend (1995) identified several variations of co-teaching which may actually be a progression experienced by co-teachers throughout the development of their relationship. Co-teaching may look like the one-teach, one-assist model where “both educators are present, but one takes a clear lead in the classroom while the other observes students or drifts around the room, assisting them as needed” (p. 3). Another option is the station teaching method where “teachers divide instructional content into two, three, or more segments and present the content at separate locations within the classroom” (p. 6). Parallel teaching is a strategy in which “the teachers plan the instruction jointly, but each delivers it to a heterogeneous group consisting of half the class” (p. 7). Co-teaching may also be demonstrated as alternative teaching where “one teacher works with the small group (e.g., 3-8 students) while the

other instructs the large group” (p. 7). Finally, Cook and Friend used co-teaching and team teaching interchangeably and identified team teaching in which

both teachers share the instruction of students. The teachers might take turns leading a discussion, or one may speak while the other demonstrates a concept, or one might speak while the other models note taking on a projection system. The teachers who are teaming also role play and model appropriate ways to ask questions. This approach requires a high level of mutual trust and commitment. (p. 7)

This is similar to the definition given by Bauwens and Hourcade (1991). “In a team-teaching arrangement, a common body of subject content is a shared instructional responsibility between the two cooperative teachers. That is, the general and the special educators jointly plan and teach the targeted academic subject content to all students” (p. 19). Co-teaching may take on various forms throughout a lesson or as compared between classrooms, but the essential components are that two teachers are present in an inclusive classroom, one specializing in content and the other specializing in students with learning disabilities. From that foundation the reality implies that there is a host of variations in how the teachers function as cooperative partners in co-teaching classrooms.

Factors Required for Successful Co-teaching

Surveying the variety of methods that co-teaching can be accomplished leads naturally to an inquiry as to the successful factors in a co-teaching environment. Bauwens and Hourcade (1991) stated that “at the foundation of effective cooperative teaching systems is philosophical unity between the general and special educators regarding basic beliefs about students and the role of schools” (p. 19). Not only must educators share a

philosophy, but they also much share a space, time, responsibilities, and students. One of the most consistent findings in the research is that co-teachers need and want common planning time in order to make the co-teaching arrangement successful (Dieker & Murawski, 2003; Fennick & Liddy, 2001; Kohler-Evans, 2006; Minke, Bear, Deemer, & Griffin, 1996; Murawski, 2008; Walther-Thomas & Bryant, 1996; Villa, Thousand, & Nevin, 2004). Other factors include time for collaboration, communication, relationship building, the pairing of co-teachers, and administrative support (Austin, 2001; Dieker, & Murawski, 2003; Dynak, Whitten, & Dynak, 1997; Hourcade & Bauwens, 1995; Mastropieri et al., 2005; McMurrer, 2006; Minke, et al., 1996; Walther-Thomas & Bryant, 1996). Case studies and surveys in all types and levels of co-teaching arrangements led to the emergence of these items as essentials for successful co-teaching.

In analyzing several case studies Mastropieri et al. (2005) found the “availability of common planning time also impacts effective co-teaching, but could improve with administrative support” (p. 269). In a survey of co-teachers by Minke, Bear, Deemer, and Griffin (1996) time for collaborative planning was one of the main concerns of co-teachers. Dieker and Murawski (2003) noted that co-teachers that are fully prepared to work often face a critical dilemma of not having adequate time to plan for the variety of needs in the classroom. Interestingly in a survey done of co-teachers by Austin (2001) co-teachers who ranked common planning time as very important differed significantly than the percentage of teachers who experienced mutual planning and reported that it was highly important. It seemed that those who had common planning did not value it as

much as co-teachers who did not have common planning. In another study, Fennick and Liddy (2001) found that co-teachers did not utilize collaboration as much as they could have. The teachers reported this was because there was not enough time for common planning, but that common planning was an essential feature of co-teaching. In this same study Fennick and Liddy found that general educators at the secondary level do more of the curriculum planning, but it was important for both of the co-teachers to take part in joint planning for the arrangement to be successful. Teachers reported that “collaborative teaching is worth the effort, even though planning without regularly scheduled time is difficult” (p. 237). Walther-Thomas and Bryant (1996) recommended that common planning be provided at the very minimum on a weekly basis for co-teachers. When provided it should be used effectively and efficiently (Villa, Thousand, & Nevin, 2004). While common planning might not always be possible, it is evident that co-teachers find it an important feature of success.

A second factor that emerged as a necessary component of co-teaching success is good communication between the two teachers. Dieker and Murawski (2003) noted that the critical areas of curricular concerns, IEP needs, and assessments demand communication between co-teachers but sadly are often not addressed in a proactive manner. Time constraints often allow for only the most crucial communication needs to surface in a reactive manner. In a district where full inclusion had been in place for 20 years Mink et al. (1996) found that co-teachers reported their classrooms were most successful when there was collaboration, communication, and cooperation between the

teachers. “Teachers in this sample indicated emphatically that the co-teaching model requires successful collaboration, communication, and cooperation among teachers (p. 181). Good communication between teachers can breed a host of other benefits. According to Walther-Thomas (1997) it “fosters on-going support, collaborative problem solving, and professional development for both teachers” (p. 396). Communication is undoubtedly tied to the first successful factor, time for collaboration. The two go hand in hand and are both highly regarded as key components in co-teaching effectiveness.

The third factor necessary for co-teaching as discovered in the research is a harmonious relationship between the two co-teachers. Dieker and Murawski (2003) stated “at the core of coteaching is relationship building” (p. 8). She also commented that co-teachers should be with consistent people all day and should not be spread out among more than three different teaching partners. Keefe and Moore (2004) cautioned school administrators to thoughtfully pair co-teachers and prepare a plan of long-term support for their co-teaching roles. She claimed “the importance of establishing appropriate roles cannot be overstated” (p. 87). In the survey by Minke et al. (1996) one of the main concerns which surfaced among co-teachers was pairing of the right people into co-teaching situations. Although teachers were very positive in their reports on co-teaching experiences this was a thematic concern for many of the co-teachers. This same study found that teachers who volunteered for co-teaching had a higher rate of satisfaction regarding the experience. Walther-Thomas and Bryan (1996) recommend selecting capable volunteers for co-teaching and providing them both with on-going staff

development. It is intuitive to think that having the right people in a harmonious co-teaching relationship will also lead to good communication. Jung (1998) found that even when co-teaching partnerships seemed to be ideal, there were still some challenges in managing issues such as determining who presented content and who managed the classroom environment at various intervals. Mastropieri and McDuffie (2007) found the needs of co-teachers included administrative support, volunteerism, planning time, training and compatibility. Both the relationship and the communication can be fostered by common planning time, which is just one way administrators can support co-teaching.

There are several things administrators can do to support co-teaching and foster a successful environment for all involved. Dieker (2003) suggested not using proficiency testing as a barometer to the effectiveness of co-teaching. Teachers fear that this is the only measure and that it can be an invalid and unreliable measure of how well the co-teaching is actually working. Kohler-Evans (2006) gave the following advice to administrators and co-teachers, “start small and ask for volunteers...place value on co-teaching as one of many inclusive practices...find time for mutual planning...practice parity...have fun...don’t overlook the small stuff...communicate, communicate, communicate...measure student progress over time...one size does not fit all” (p. 262-3). Administrators have the ability to organize, support, and coach co-teachers in these aspects. Dynak, Whitten, and Dynack (1997) also advised “in order to flourish, co-teaching needs an organizational structure that entails a great deal of personal, administrative, and strategic commitment, time and coordination (p. 73). These things

cannot be accomplished without purposeful orchestration by the administration. Austin (2001) recommended that “school administrators should develop and promote a model of collaborative teaching that is supported by quality research and practice” (p. 252).

It might be tempting to use co-teaching for purposes other than to benefit special education students. Cook (1995) noted that “attempting to use co-teaching as a remedy or substitute for a poor teacher would be a serious misuse of the approach” (p. 5). A commitment to co-teaching must be evident in the master schedule, staffing assignments, staff development opportunities, and everyday conversation of the administration to truly lead to success in the co-taught classroom. This includes appropriate scheduling of students into co-taught classrooms. “The number of students with special needs assigned to any single classroom should not be so high that the teachers find it impossible to maintain the pace and rigor of the required curriculum” (Friend, 2007, p. 50). Friend went on to specifically suggest that in secondary classrooms the number of special education students in a co-taught classroom should be no more than one-third of the class and in elementary classrooms no more than one-fourth. In this way the teachers will be able to effectively meet the needs of both the general education and the special education students.

Wilson (2005) described a series of interactive workshops designed to help both special and general education supervisors evaluate the co-taught room consistently and fairly. This resulted in a guided format for observing co-teachers. The following four phases were experienced in the development of this tool:

Phase 1: What makes a good lesson?

Phase 2: Does the evaluation of a co-taught lesson require a unique perspective?

Phase 3: What are the essential components needed in an observation tool for co-taught lessons?

Phase 4: How useful is the observation tool that was developed? (p. 272)

The supervisors involved in this process used collaboration techniques as they generated questions that needed to be answered, viewed videotapes of lessons taught by co-teachers, and finessed an instrument both evaluators could use in evaluating a co-taught classroom. The supervisors who later used the instrument were pleased with the practicality of the observation tool. They recognized the fluidity of the instrument and the need for continuous improvement. This is the type of administrative collaboration that has the power to help shape co-teaching relationships into valuable, professional development experiences.

Perceptions of Co-teaching

Discovering the perceptions of the co-teachers and the students on the effectiveness, benefits and drawbacks to co-teaching is informative and stimulates further areas of needed research. Much research supports the claim that teachers and students both perceive co-teaching as a positive and beneficial strategy. Burstein, Sears, Wilcoxon, Cabello, and Spagna (2004) found that school climate improved in two California school districts that fully embraced inclusion. Principals, teachers and parents were surveyed and reported overall satisfaction with the change to full inclusion. This

study included several classrooms using the co-teach model. It was a three year project and the researchers collected interview data from all stakeholders.

In a study conducted by Bergen (1997) respondents were positive about co-teaching. The survey revealed 60% of the respondents agreed co-teaching benefits non disabled students. The teachers' only reservation was regarding their ability to meet the instructional needs of the special education students. Teachers in this study who were less experienced saw co-teaching as means to improving their teaching style. An overwhelming 83% agreed that professional development is necessary for co-teaching to work. This study sampled 150 teachers at the elementary, middle, and high school level. McMurrer (2006) had similar findings. Teachers reported co-teaching enabled them to increase their instructional strategies because of the exposure to another teacher's style and perspective. They also felt that students benefited from the variety of styles and strengths in both teachers. "Some co-teachers encounter problems due to differing teaching styles. However, it is also important to remember these differences in style and personality can be a benefit for students who also have a variety of styles and personalities" (McMurrer, 2006, p. 8). Ultimately much of the success of co-teaching may rest on the personality mix of the two teachers in the classroom.

Austin (2001) conducted a survey of 139 teachers and followed it up with 12 interviews to explore teacher perceptions of co-teaching. He found that the teachers felt co-teaching was socially beneficial for both types of students because it promoted tolerance and acceptance. It also provided a model for special education students. The

reservations noted by the teachers were placing students in a co-taught environment for the social benefit even when that classroom could be detrimental for the student academically. A significant academic disparity for special education students in a mainstream classroom was a concern of these teachers. Teachers also felt “that they were satisfied with their present co-teaching assignment but not with the level of support received from the school, noting that they needed more planning time” (p. 251). Teachers said “schools should strive to be responsive to the express needs of their co-teachers with respect to logistical and administrative support” (p. 253). Despite these concerns, teachers felt that all students benefited from co-teaching. The students had the advantages of multiple perspectives and areas of expertise, strategies for review and remediation, and the opportunity for general education students to become aware of the learning disabilities of other students. Although no actual artifacts were collected the teachers also indicated that the grades, test scores, and student work were improved as a result of the co-teaching. These results from teachers in kindergarten through twelfth grade classrooms support the use of co-teaching based on teacher perceptions and experiences.

In a study done by Minke et al. (1996) 329 teachers provided responses to a survey regarding their attitudes toward using co-teaching as a strategy for full inclusion. The model in this district studied had existed for over 20 years. Teachers in the district seemed to have a higher sense of self efficacy due to co-teaching. In this study co-teaching was referred to as TAM (Team Approach to Mastery).

That is both regular and special educators in the inclusive classrooms reported higher levels of personal efficacy than regular teachers in traditional classrooms.

This finding is interesting given that more “difficult-to-teach” students would be expected in the inclusive setting. Another intriguing finding was the higher level of personal efficacy among teachers in traditional classrooms who had at least some prior experience teaching in TAM. (Minke, et al. 1996, p. 179)

Another perception that emerged from this study was that students who are placed in TAM classes should have a certain level of expected behavior so they are not a management problem. Teachers did not want to have the distraction of behavior management disrupt the learning of the disabled or the general education students. Also Minke, et al found that general educators without access to specific protected resources, such as a co-teacher or a teacher’s aide, were less favorable about inclusion and far more likely to perceive special education students as too much to ask of them in a traditional setting. Walther-Thomas (1997) also found that participants in a survey about co-teaching experiences “reported many benefits for students with disabilities, their general education classmates, and the participants themselves” (p. 399). Mastropieri and McDuffie (2007) also found “administrators, teachers, and students perceive the model of co-teaching to be generally beneficial, to general education and to (at least some) special education students in both social and academic domains, and to the professional development of teachers” (p. 411). Friend (2007) suggested that educators are hesitant to use co-teaching because either the special education teacher is uncomfortable with the content or the general education teacher does not know what to do with the special education teacher. Murawski and Dieker (2004) offered the following explanation as to why there is hesitance on the part of some teachers. “The actual process of teaching in the same

classroom to the same students at the same time is often the component that is most disconcerting. Giving up total control of the classroom can be daunting” (p. 56). In general this research continues to support the position that co-teaching is positively regarded by the stakeholders involved.

Bear, Clever, and Proctor (1991) also studied TAM classes. Their study, while limited to third graders focused on the self-perceptions of the integrated handicapped and nonhandicapped students. They found in a literature review that integrated students with learning disabilities had a lower self-perception than non integrated disabled peers and regular education peers. They hypothesized the opposite would be true for general education students who spent their day with learning disabled students. However, what they found was that while nondisabled boys did score significantly higher on self-perceptions, nondisabled girls did not.

Contrary to our predictions, significant differences in self-perceptions between NH [Non-Handicapped] Integrated children and NH Nonintegrated children were not found, except self-worth among boys, however a notable trend emerged that is largely consistent with our hypothesis. On all six measures of self-perception, NH Integrated boys scored higher than NH Nonintegrated boys. (p. 423)

They also studied the self-perceptions of the integrated disabled students and found, as expected, significantly lower self-perceptions in the areas of scholastic competence and behavioral conduct than those of their same classroom nondisabled peers. For these students, integrated, nondisabled boys had a significantly higher self-perception than any of the other groups. Although this study was limited to a select group of third graders it

adds to the body of understanding on how co-teaching classrooms impact general education students.

Campbell (2007) studied 52 classrooms in two central Florida school districts including parents, students and teachers involved in co-taught arrangements. He looked at the impact of co-teaching on the general education students. The students in his study reported overwhelmingly that they were willing to embrace students with disabilities into the mainstream classroom. The parents and teachers reported a much lower level of agreement about co-teaching. He found it interesting that the difference in the student perception from the adult perception was so significantly different and that the students were so positive about the co-teach model. Although the parents and teachers were less supportive than the students, they were still highly positive about students with disabilities joining general education classrooms.

Juvonen and Bear (1992) considered the social adjustment of students in co-taught, also known as TAM, third grade classrooms as compared to general education students in nonintegrated classrooms.

The results of this study suggest that children with learning disabilities, particularly boys, are well socially integrated in TAM classrooms. That is, they are likely to be accepted by classmates, to have friends, and to perceive themselves as socially accepted in classrooms that contain a mixture of children with and without learning and behavior problems. (p. 326)

These results are encouraging. Students with and without disabilities show high rates of social acceptance toward one another at a young age.

Wilson and Michaels (2001) surveyed general and special education students about their co-teaching perceptions. This was conducted in a large suburban school district consisting of two middle schools and three high schools. The district had been using co-teaching as a model for five years. The 346 students who completed the survey were all in co-taught English classes. This study found that “both GE [general education] and SE [special education] students rated co-teaching favorably” (p. 213). It also found that special education students tended to rate choosing co-teaching again and co-teaching was favorable at a higher level than general education students. They also reported using the extra help from one or both of the teachers outside of class with more frequency than general education students. Five themes emerged from this survey about the general benefits of co-teaching; availability of help, structural supports, multiple perspectives and styles, skills and grades and generic statements that couldn’t be categorized but claimed a benefit. These types of perception studies give an indication of how various stakeholders feel about co-teaching. However, an analysis of actual impacts on student learning further develops the knowledge base of co-teaching as an inclusion strategy.

Benefits of Co-teaching

There have been a variety of attempts at studying the effects of co-teaching. Researchers have looked at the impact on the special education students, the effects on the general education students and the effects on the adults in the co-teach relationship. Various grades and types of schools have been studied. The evidence is largely positive,

indicating that overall co-teaching benefits all groups of people involved at all levels.

Murawski and Dieker (2004) argued that

one of the major benefits of co-teaching is that teachers bring different areas of expertise. These diverse skills are helpful during the planning stage, as both educators can find ways to use their strengths to ensure that the lesson is appropriately differentiated for a heterogeneous class. (p. 55)

The researchers are not limiting their studies of the impact of inclusion and specifically co-teaching to a study of the students. Inquiries into the impacts on the teachers, as well as both types of students in the classroom have been conducted. In a review of relevant literature Salend and Duhaney (199) found

The results of these studies also indicate that students without disabilities possess a positive view of inclusion and believe that inclusion benefits them in terms of an increased acceptance, understanding and tolerance of individual differences; a greater awareness and sensitivity to the needs of others; greater opportunities to have friendships with students with disabilities; and an improved ability to deal with disability in their own lives. (p. 120)

Although the research is diverse in methodology and aspects of co-teaching studied, some generalizations as to the benefits of co-teaching can be made. Villa et al. (2004) identified the following six benefits of co-teaching:

1. Students develop better attitudes about themselves, academic improvement, and social skills.
2. Teacher-student ratio is increased, leading to better teaching and learning conditions.
3. Teachers are able to use research-proven teaching strategies effectively.
4. A greater sense of community is fostered in the classroom.
5. Co-teachers report professional growth, personal support, and enhanced motivation.
6. Increased job satisfaction can be experienced because needs for survival, power, freedom or choice, a sense of belonging, and fun are met. (p. xv)

These benefits seem to indicate how co-teaching is advantageous for both the students and the teachers in the classroom.

Belmarez (1998) studied co-taught seventh grade mathematics classes to determine if there was an impact on the general education student. He concluded “although critics of co-teaching have voiced concerns that students without learning disabilities are academically penalized in co-teaching arrangements, based on this research, those claims were proven false” (p. 131). A co-taught mathematics classroom was compared to a general education classroom and to a resource classroom taught independently by the two co-teachers. The students’ state standardized test scores and final grade average revealed that general education students are not impacted by the co-teaching arrangement. Neugebauer (2008) compared co-taught classrooms to general education classrooms in high schools located in the same Texas district. She found general education students in general science and social studies classes performed better on the state science and social studies assessment than general education students in co-taught science classrooms. However, these are just snapshots of co-teaching. A wider lens of analysis can lead to better generalizations and deeper understanding of the co-teaching impacts.

In a meta-synthesis of 32 qualitative investigations of co-teaching Murawski and Swanson (2001) found that quantitative data on the effectiveness of co-teaching is in short supply. There were only 6 out of 89 articles reviewed that provided sufficient quantitative information for effective size calculation. The average effect size for these

studies was 0.40, which suggests that co-teaching is a moderately effective strategy for impacting student outcomes. Unfortunately according to Murawksi and Swanson

None of the studies reported explicit measures of treatment integrity. Without a measure of treatment integrity, it is difficult to determine whether the studies genuinely adhered to their reported interventions as described. If, in the course of the academic year, treatment agents determined that it is easiest to have the special services provider work with the students with special needs in the back of the room as the general educator continues to work with the rest of the class, the study has been invalidated because co-teaching is no longer truly occurring. (p. 265)

The lack of in depth studies on this topic is a challenge for educators seeking answers on the ripple effects of co-teaching. While there are pockets of good analysis yielding interpretable and useable results, there is a need for a continued effort to uncover the domino effects of co-teaching.

Boudah, Schumacher, and Deshler (1997) studied the impact of collaborative teaching on teacher performance and on student engagement and academic outcomes. They used four experimental and four comparison classes in secondary schools. Grades 6, 7, 8 and 10 were studied in history, science and English. The results indicated that students with disabilities were not affected by the implementation of the collaborative teaching model. However, the teachers reported perceiving significant benefits to learning by the students with disabilities and the students without disabilities as a result of the collaborative teaching efforts. Their perceptions and the test scores did not indicate similar results. The researchers found that before the intervention, which was teacher training on the Collaborative Instruction (CI) model, the ESE teacher typically spent the

vast majority of time in noninstructional activities. Following the training, time spent in some specific instructional activities increased. For example, the mean percentage of time teacher teams spent involved in mediated instruction prior to the training was 8.37% (SD=5.25; range = 0.59%-19.15%). Following the training the mean time spent on mediated instruction was 22.43% (SD=9.44; range=5.43%-40.20%). After the training the overall time spent on noninstructional activities decreased to 55%. What the researchers concluded was “while a higher percentage of instructional time was devoted to mediating student learning, other teacher behaviors decreased” (p. 312). They found that teachers did not circulate to work with individual students as much or spend as much time presenting the content. As for student performance Boudah et al. found that there was very little change in academic performance of the students. In fact in some cases the performance decreased.

A similar study conducted by Harbort et al. (2007) found a significant difference in activities performed in co-taught science classrooms performed by special education teachers versus the content teacher. In this study special educators responded to students more often than regular education teachers (30% versus 20%). Special education teachers monitored behavior in 45% of observed time and presented material less than 1% of the time. Regular education, content teachers monitored students 5% of the time and presented content 30% of the time. Harbort et al. concluded

although monitoring the classroom is important, it is not the most effective use of highly-trained special educators. Further, in this study general education teachers spent more time managing behavior than the special educators. Finally, a large percentage of instructional opportunities in this study seemed to be devoted to

non-interaction instructional tasks (28.33%) for the general education teachers rather than the special educators (3.96%). (p. 21)

These studies lead to an inquiry in what types of trainings are necessary for co-teaching to be successful. Variables such as training content, grade level, time spent training, time spent implementing, and the composition of the class are all important to consider. Nevertheless, teacher training is a significant factor in understanding the impact of co-teaching. The following table summarizes the research studies presented and their findings.

Teacher Preservice Needs

As co-teaching continues to become more prevalent in general education classrooms, it will be important to consider the impact of preservice education for new teachers. “Teachers need to be better prepared for the demands of co-teaching through their teacher preparation programs” (Keefe & Moore, 2004, p.86). Many students graduate from teacher education programs without having ever been exposed to adults modeling collaboration across areas of expertise (Villa, Thousand, & Chapple, 1996). Preparing our future educators for the realities of the collaborative classroom involves both modeling collaboration and instructing them in the best practices of co-teaching. Duchardt, Marlow, Inman, Christensen, and Reeves (1999) advocated for the entire school to be involved in promoting collaboration. “Therefore, preservice teacher education must model, demonstrate, and promote the collaborative effort that is required

in today's schools – among classroom teachers, counselors, speech therapists, physical therapists, occupational therapists, and other school professionals” (p. 189). There is a definite need to have qualified general and special educators trained and enthusiastic about co-teaching.

Pugach and Sidel (1995) advocated for viewing education from an ecological perspective, which in their words is making the best decisions for the student based on academic and social factors. This perspective naturally leads to seeing diversity as normal and something all educators should be dealing with.

If teacher education programs are to prepare prospective teachers successfully for working with diverse learners, and specifically those who are having trouble achieving, then they must do so in holistic contexts where the more complex notions of teaching and learning required to work with diverse learners can be supported. (Pugach & Siedl, 1995, p. 391)

These researchers support the movement away from seeing inclusion as only a civil rights issue to more of an issue of providing services that are in the best interest of all students. According to Pugach and Siedl this has “the potential to move both general and special education toward a diversity model of education and away from a deficit model” (p. 381).

In studies on the experience and education of co-teachers usually co-teachers have had more training prior to and during their teaching experience. Fennick and Liddy (2001) found that “special education teachers were more likely to experience student teaching in a collaborative class than were general education teachers” (p. 237). They called for a reexamination of preservice and inservice preparation to help teachers be more effective in collaborative teaching assignments. Austin (2001) found that special

education teachers considered preservice courses and training in collaborative teaching significantly more useful than general education co-teachers. Dynack et al. (1997) went as far as to claim that all teachers should be more involved in collaborative teaching experiences, particularly in preservice experiences. Wilson (2008) suggested 20 different activities for co-teachers to use while the other is presenting to the class. These simple strategies can be helpful to brand new teachers, seasoned teachers, special education co-teachers and general education teachers. As co-teaching becomes more popular, all teachers must be trained and take ownership in the learning of general as well as special education students (Friend, 2007).

Table 1
A Summary of Co-teaching Studies

Year	Author	Method	Key Findings
1991	Bear, Clever, & Proctor	Four hundred third graders in Delaware were surveyed. Self-perceptions were measured by the Teacher-Child Rating Scale. General and special education students in general and in co-taught classes were studied.	No differences in integrated versus nonintegrated general education students were found. One exception was general education white males had higher senses of self worth if they were not in co-taught (integrated) classes.
1992	Juvonen & Bear	Social adjustment of 46 students in third grade with learning disabilities and 199 students without learning disabilities was studied using positive and negative peer nominations, the Social	Children with learning disabilities were socially adjusted based on 83% receiving positive peer nominations compared to 87% of the general education students. 67% received reciprocal

Year	Author	Method	Key Findings
		Acceptance Subscale of the Self-Perception Profile for Children, and the Teacher-Child Rating Scale	nominations compared to 78% of the general education students 57% had at least one reciprocal nomination from a general education peer
1996	Minke, Bear, Deemer, & Griffin	A survey questionnaire regarding teacher attitudes about co-teaching was given to teachers in the same school district in the mid-Atlantic region. The survey was distributed to 493 teachers and usable responses were obtained from 320 respondents.	Teachers involved in co-taught environments reported a higher sense of self-efficacy than those who were not in co-taught
1997	Bergen	A questionnaire titled the Teacher Attitudes Survey was given to 150 general and special educators at an elementary, junior high and high school. Respondents could choose agree, disagree or no opinion.	Sixty percent agreed that co-teaching benefited non-disabled students. Eighty-three percent agreed that professional development is necessary for co-teaching to work.
1997	Boudah, Schumacher & Deshler	A four part experimental design to determine the effects of co-teaching in secondary classes. Instructional actions of teachers, teacher satisfaction, student engagement, student use of four strategic skills and student performance on content tests.	Teacher mediation of student learning and their involvement in instructional roles increased. There were mixed results on the student measures suggesting there were little changes in academic achievement for the students.

Year	Author	Method	Key Findings
1997	Walther-Thomas	Twenty-three school based teams in eight Virginia school districts were studied through classroom observations, semistructured individual interviews and school-developed documents.	Participants reported that special education students benefited by showing increased self-confidence, self-worth, academic achievement, and social skills as compared to before co-teaching. Teachers felt general education students who were low achievers benefited academically due to increased teacher time and explicit instruction of study skills. Teachers felt co-teaching provided professional growth, support and increased opportunities for collaboration. Problems experienced by participants in co-teaching included not having enough planning time, the time required to hand schedule co-taught classes, unequal ratios of special and general students in one class, and need for more staff development.
1998	Belmarez	Students in a seventh grade co-taught mathematics who were general education were studied using state standardized tests and final grade averages	Students with learning disabilities did not achieve greater gains in mathematics instruction in co-taught versus resource classrooms. No significant difference existed for students without learning disabilities in the co-taught classrooms versus the

Year	Author	Method	Key Findings
			general classrooms.
2001	Austin	Survey questionnaire to 139 teachers followed by 12 interviews to explore teacher perceptions of co-teaching.	Teachers reported that they felt co-teaching was socially and academically beneficial for special and general education students. They were concerned about the level of support given by the school administration.
2001	Wilson & Michaels	Survey questionnaire to general and special education students regarding their co-teaching experience. In a district with 5 years of experience, 346 students were surveyed.	Both general and special education students rated co-teaching favorably. Special education students rated co-teaching higher than general education students.
2001	Murawski & Swanson	A meta-synthesis of 32 investigations of co-teaching arrangements was completed.	Out of 89 articles studied only 6 articles provided sufficient quantitative information for effect size calculations. The average effect size was 0.40, suggesting that co-teaching is moderately effective
2004	Burstein, Sears, Wilcoxon, Cabello, & Spagna	Interviews of principals, parents, and teachers in two California school districts. Interview protocols focused on questions related to changes in students' services, satisfaction with changes, factors that	Data indicated that all schools made progress toward changing inclusive practices. Approaches to inclusion differed which resulted in variety among schools in services provided. Stakeholders interviewed were pleased with student benefits

Year	Author	Method	Key Findings
		influenced school change, and participants' concerns.	resulting from the change. Concerns were focused on sustaining the change effort
2007	Campbell	General education students in 52 classrooms were studied through a survey questionnaire.	Teachers, students, parents, and administrators all rated co-teaching positively Students were significantly higher on their favoritism toward co-teaching.
2007	Harbort, Gunter, Hull, Brown, Venn, Wiley, L, & Wiley E	Two high school science teachers were videotaped while co-teaching. Teacher behavior was the focus.	Teacher behavior of the content teacher versus the special educator varied significantly. A large percentage of the instructional time for the special educator was devoted to noninstructional activities.
2007	Mastropieri & McDuffie	A metasythesis of qualitative research on co-teaching was conducted to examine themes and synthesize results while preserving the individual integrity of the studies.	Benefits of co-teaching for general and some special education students included social and academic areas as well as noted benefits to professional development of teachers.
2008	Neugebauer	Students in co-taught classrooms were compared to students in general education classrooms in Social Studies and Science in one Texas school district	General education students in general education classes performed better on state assessments than general education students in co-taught classes.

Summary

In summary co-teaching has a long history embedded in the culture of American education. There are specific characteristics that define co-teaching and features that are

necessary for co-teaching to be a successful strategy for inclusion. Surveyed teachers in various states generally support co-teaching as a beneficial strategy for both special and general education students. In the studies summarized above most educators surveyed agreed to some extent that all students were positively impacted by co-teaching. The impact may have been social, emotional, academic or a combination of those. Teachers even reported benefits for the adults involved in the co-taught classrooms. These perception surveys are valuable as they provide insight into how the students and teachers perceive various aspects of the co-teaching experience. However, they were not typically accompanied by quantitative results exploring the impact on student achievement. There were also quantitative research studies explored in this literature review. Of those very few offered much in answering the question of how co-teaching impacts general education students in academic achievement. Those that did explicitly study this impact were varied in their results with either no impact or less achievement compared to general education classes. Although significant efforts were made by the researcher to uncover an unbiased summary of co-teaching studies little could be found that provided an evidence of negative impacts as a result of co-teaching.

As evidenced by the studies reviewed there are several scenarios in which co-teaching might be studied. It occurs at every level from elementary to post-secondary. It is not limited by subject or content area. Therefore, a wide variety of studies which could be conducted to determine how co-teaching specifically impacts students exists. This is multiplied by the impact of teaching experience, teacher training, administrative support

and demographic factors of the school. Although many of the surveys cited in this review document teachers' support of co-teaching, these educators often agree that to be successful co-teaching requires support in administrative scheduling of students, staff development, and building the co-teaching relationship. Students, both general education and special education, as well as teachers deserve to have the best practices in education become common practices.

CHAPTER THREE: METHODOLOGY

Introduction

The purpose of this chapter is to describe the general methodological approach used in this research study. This study examined the impact of the co-teaching model on general education students. The first section of this study defines the problem. The second section describes the process and result of selecting a population and a sample. The third section describes the Florida Comprehensive Achievement Test (FCAT) as the instrument used to measure the impact of co-teaching. The final section addresses the issues relating to data collection and data analysis, followed by a summary.

Statement of the Problem

In an attempt to follow through with the legal implications of inclusion, educators have used a variety of strategies including co-teaching. These strategies attempted to satisfy the legal requirements of including students with disabilities in a general education setting as part of providing the least restrictive environment. This research sought to determine what impacts, if any, this option had on the achievement of general education students who were in the co-taught classrooms. The following question guided this investigation: “What are the impacts on achievement as measured by the FCAT for 10th-grade, general education students in co-taught classrooms?”

Population and Sample

This study focused on school districts located in central Florida. School districts in Florida are defined by county; each county comprises one school district. Originally, nine school districts were selected for study including Brevard, Flagler, Lake, Orange, Osceola, Polk, Seminole, Sumter, and Volusia. High schools in these districts were chosen based on the following criteria. First, the high schools with 1,200 and 2,500 students attending during the 2008-2009 school year were chosen. Of the schools meeting the enrollment parameters only those with less than a 40% free and reduced lunch status and a non-white population between 10% and 45% were selected for this study. These criteria helped to eliminate variables due to school demographics. Schools were chosen that were not too small or too large to have data that could be impacted by size as a factor. Schools with less than 40% of the students on free and reduced lunch status do not receive Title I funding; this study did not include any Title I schools. The delimitation of the non-white population to between 10% and 45% allowed for representation of diverse schools, yet gave a parameter of comparability for racial diversity. Eliminating schools based on the demographic criteria narrowed the number of potential schools for data collection, but also reduced the impact of demographic factors on the data analysis. When these criteria were applied, no high schools in Orange County or Sumter County were eligible for the study. Therefore, seven counties were included in the next phase of research. Of those 7 school districts, there were a total of 27 schools that fell within the defined parameters of this study. The 10th-grade students in those 27 schools were the

population for this study. A detailed listing of those schools and their eligibility numbers can be found in Appendix A.

After identifying eligible school districts, securing Institutional Review Board (IRB) approval, and obtaining the permission of individual districts, the schools were contacted to determine if they had used co-teaching for 10th-grade language arts or mathematics classes during the 2008-2009 school year. In two of the school districts no eligible school had used the co-teaching model, which removed those school districts from the study. In another school district two high schools had used co-teaching but not in the 10th-grade so no data could be collected. The high school from one county that met the criteria had just started co-teaching in the 9th-grade, therefore, no data from previous years were available. One county denied permission to conduct research based on the reasons that the high schools would not be able to provide the data and the research request would put too much of a burden on school personnel to collect data. Therefore, the data were collected from Volusia and Seminole Counties. The following table describes the districts in the population and the sample from which data were collected.

Table 2
Demographics of Schools in the Sample

District	Demographically eligible schools using co-teaching	Enrollment	Free and Reduced Lunch Percent	Non-White Percent
Seminole	School A	2282	28.53	34.27
Volusia	School B	1281	38.20	29.02
	School C	1940	30.93	13.40
	School D	1827	18.66	16.42

Instrumentation

Data for this study were gathered using the Florida Comprehensive Achievement Test (FCAT) for 10th-grade reading and mathematics. The Department of Education (DOE) for the state of Florida oversees the development of this test each year. The test questions are written by committees of people including educators, university professors, Florida citizens, and local and national psychometrics experts (Florida Department of Education, 2005). According to the Florida Department of Education (2007), several committees work in conjunction with the Florida DOE for the final development of the test. The Reading Content Advisory Committee meets once or twice a year and makes recommendations for which benchmarks should be assessed, the type of items to be used per benchmark, the difficulty levels for the reading passages, and the number of items and reading passages per grade level. A similar committee for mathematics called the Mathematics Content Advisory Committee carries out similar functions. The Technical

Advisory Committee advises the Florida DOE in relation to psychometrics assisting the Florida DOE in technical decisions. Other committees such as the Community Sensitivity Committee and the Bias Review Committee ensure that questions and passages are not offensive or exclusionary and are appropriate for Florida public school students. Further committees including the Item Content Review Committee, Rangefinder Committee, Rangefinder Review Committed, Gridded-Response Adjudication Committee and Standards Setting Committee collaborate in an effort to fine tune test questions, review field tested items, and establish guidelines for hand scoring of written responses. These participants are an integral part in establishing the items on the FCAT and ensuring validity and reliability of the test item questions.

Reliability of a test is the certainty of receiving the similar score by the same individual if they were to take the test multiple times. According to the Florida Department of Education (2007) the four types of reliability coefficients that can be used in describing the FCAT are internal consistency, test-retest reliability, inter-rater reliability, and reliability of classifications. Cronbach's Alpha was used as a measure of internal consistency in 2005 and 2006. The 10th-grade Reading FCAT was .89 in 2005 and .85 in 2006. The 10th-grade mathematics FCAT was .94 in 2005 and .88 in 2006. A reliability coefficient of 1.0 would indicate a perfect reliability score. These measures indicate a high level of reliability for the 10th-grade FCAT. Item Response Theory (IRT) is used every year to measure the reliability of the test as well. The IRT reliability in 2005 for reading was .91 and in 2006 it was .92. In 6 years this measure has never been lower

than .87. For mathematics the IRT reliability in 2005 was .95 and in 2006 it was .88, which is the lowest it has been in 6 years. These statistics give test makers, lawmakers, educators, students, and parents the confidence in the reliability of FCAT scores from year to year.

Validity is a measure of how accurate the interpretations are of the test results as compared to the reality of what was tested. “The FCAT is intended to measure a student’s achievement of the skills and content described in the Sunshine State Standards” (Florida Department of Education, 2007, p. 40). In regards to the FCAT, one measure of validity is the content validity evidence. As reported by the Florida Department of Education (2007) the following steps ensure content validity:

- Educators and citizens judged the standards and skills acceptable
- Item specifications were written.
- Test items were written according to the guidelines provided by the item specifications.
- The items were pilot tested using randomly selected groups of students at appropriate grade levels.
- All items were reviewed for cultural, ethnic, language, and gender bias and for issues of general concern to Florida citizens.
- Instructional specialists and practicing teachers reviewed the items.
- The items were field tested to determine their psychometric properties.
- The tests were carefully constructed with items that met specific psychometric standards.
- The constructed tests were equated to the base test to match both content coverage and test statistics. (p. 40)

The second aspect of validity analysis is the criterion-related validity. The FCAT, which measures student achievement of the Sunshine State Standards, has been compared to the criterion-referenced FCAT (also referred to as the Norm Referenced Test). Students have been given this norm referenced FCAT, which is the Stanford 9 (Florida Department of

Education, 2007). Both tests were given at the same time. The validity coefficients do confirm validity of the FCAT test results (Florida Department of Education, 2007).

This study compared student performance as measured by comparing developmental scale scores (DSS) from the 2008 FCAT to the 2009 FCAT. The DSS in this study reflected how students performed as 9th-graders on the 2008 FCAT with their performance as 10th-graders on the 2009 FCAT. The DSS reported were generated by the Florida Department of Education and reported to the schools. Developmental scale scores are calculated using FCAT scores from two consecutive years. The DSS take into account the differences in test items, test construction, and student performance expectations for each grade level.

Student scores are reported in three different ways on the FCAT reading and mathematics including the scale score, developmental scale score, and Achievement Level. The Achievement Level is based on the scale score. To arrive at a scale score the students' responses are calculated using Item Response Theory which converts the scores to a z-score. These scores are transformed to scale scores through the use of repeating anchor items used in previous FCAT administrations as well as the Stocking/Lord procedure (Human Resources Research Organization & Harcourt Assessment, Inc., 2007). This procedure is coupled with item-level reviews. Items can be dropped from the anchor set or the scoring process if they are found to be statistically different from what is expected. In the end, the student receives a scale score which is correlated to an Achievement Level score. Achievement Level scores are on a 1 to 5 scale. Achievement

Levels 1 and 2 are considered below proficient, whereas Achievement Level 3 is proficient and 4 and 5 are above proficient (Florida Department of Education, 2005).

A third score is also given for the FCAT reading and mathematics. This is the Developmental scale score (DSS). DSS range from 0 to 3000 from grades 3 through 10 in reading and mathematics. This score is a vertical score used to compare growth of a student from year to year (Florida Department of Education, 2007). The DSS is also based on the linking items, or items that appear identically on the tests of adjacent grade levels so a relationship between years can be established (Florida Department of Education, 2005). According to the Florida Department of Education (2005) these linking scores are verified and refined periodically and do not contribute to the score of the students if the items are not on grade level.

The three reported scores; the mean scale score, the Achievement Level, and the developmental scale score are all used in determining if a student has made a learning gain when two consecutive years' scores are available. A learning gain can be achieved in three different ways. If a student scored an Achievement Level 3, 4, or 5 on the FCAT the previous year and maintains that level, the state of Florida considers that a learning gain. A second way to make a learning gain is if a student improves their Achievement Level score, such as from a 1 to a 2 or a 2 to a 3, the student is credited with a learning gain. The third type of learning gain has to do with developmental scale score (DSS) improvement. If a student improves by 77 DSS points from 9th-grade to 10th-grade reading or 48 DSS points from 9th-grade to 10th-grade mathematics regardless of

Achievement Level that is considered a learning gain (Florida Department of Education, 2009). For low achieving students who are making progress this third option is a way for schools to earn points in the accountability formula as they work towards bringing the student to proficiency.

Each year the FCAT consists of a different set of items to which students respond. On the 9th-grade FCAT students respond to multiple choice items only. On the 10th-grade FCAT students respond to multiple choice items as well as free response questions. Each question has been through the rigorous analysis of the committees employed by the Florida DOE to ensure test reliability and result validity. This test is the basis for the data analysis of this study. Table 3 describes the number of questions asked in each content focus area of these two testing years as reported on the Florida Department of Education website.

Table 3
Content Focus Comparison

Reading Clusters	Number of Items Asked	
	2008	2009
Words and Phrases in Context	7	6
Main Idea, Plot and Purpose	18	17
Comparison and Cause/Effect	11	16
Reference and Research	9	12
Mathematics Clusters	2008	2009
Number Sense, Concepts, and Operations	8	11
Measurement	7	10
Geometry and Spatial Sense	11	14
Algebraic Thinking	10	14
Data Analysis and Probability	8	11

Research Questions

This research study attempted to answer the following research questions:

1. To what extent do general education students in 10th-grade English language arts general education classes demonstrate statistically significant different developmental scale scores on the FCAT Reading compared to general education students in co-taught 10th-grade English language arts classes?
2. To what extent do general education students in 10th-grade general education mathematics classes demonstrate statistically significant different developmental scale scores on the FCAT mathematics compared to general education students in 10th-grade mathematics co-taught classes?

3. To what extent do general education students in 10th-grade English language arts co-taught classes who scored at level 1 or 2 on the 2008 FCAT demonstrate significantly different developmental scale scores on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?
4. To what extent do general education students in 10th-grade mathematics co-taught classes who scored at level 1 or 2 on the 2008 FCAT demonstrate significantly different developmental scale scores on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

Data Analysis

After obtaining approval from the University of Central Florida's Institutional Review Board, the researcher contacted each district involved for permission to collect data. Brevard, Seminole, Osceola, and Volusia Counties granted permission. Polk County did not. The researcher then contacted each principal for the schools fitting the demographic profile. These schools are listed in Appendix A. Schools that did not use co-teaching as an inclusion strategy for 10th-grade students during the 2008 school year were eliminated. Those schools that were left worked with the researcher to provide the data according to the IRB guidelines.

The data collected were entered into the Statistical Package for Social Sciences (SPSS) software. Developmental scale scores (DSS) for 2008 and 2009, Achievement

Level scores, learning gain notations, and the designation of co-taught or general education were entered and analyzed.

Data Analysis for Question 1

The first research question addressed the effect of co-teaching in language arts classes on general education students. The intent was to determine if the general education students in co-taught classes had a significant difference in developmental scale scores on the reading portion of the FCAT as compared to their general education peers in language arts classes that were not co-taught. An independent t-test was conducted to determine if there was a statistically significant difference in the two groups.

Data Analysis for Question 2

The second research question addressed the effect of co-teaching in mathematics classes on general education students. The intent was to determine if the general education students in co-taught classes had a significant difference in developmental scale scores on the mathematics portion of the FCAT as compared to their general education peers in mathematics classes. An independent t-test was conducted to determine if there was a statistically significant difference in the two groups.

Data Analysis for Question 3

The third research question addressed the co-taught general education students who began the 2008-2009 school year as a level 1 or 2 and how they compared to their peers who were level 3, 4, or 5 and were also co-taught. Students scoring level 1 or 2 on the Reading FCAT are considered below proficient. Levels 3, 4 and 5 are considered proficient and above. This question specifically targeted the language arts classes. The intent was to determine if students who were low achievers had significantly different developmental scale scores from students who were proficient achievers. An independent t-test was conducted to determine if any statistically significant difference existed between the two groups.

Data Analysis for Question 4

The fourth research question addressed the co-taught general education students who began the 2008-2009 school year as a level 1 or 2 and how they compared to their peers who were level 3, 4, and 5 and were also co-taught. Students scoring level 1 or 2 on the Mathematics FCAT are considered below proficient. Levels 3, 4, and 5 are considered proficient and above. This question specifically targeted the mathematics classes. The intent was to determine if students who were low achievers had significantly different developmental scale scores from students who were proficient achievers. An independent t-test was conducted to determine if any statistically significant difference existed between the two groups.

Summary

This chapter has described the methodology and procedures used to answer the research questions. Determining the impact of co-teaching on the achievement of general education students was the purpose of this study. The study focused on specific demographics chosen. The sample was narrowed by the pervasiveness of co-teaching as an implementation strategy of inclusion. The FCAT was the instrument chosen by the researcher to measure student achievement. The reliability and validity of this test are described and therefore the FCAT was considered a worthy measurement tool for the purposes of this study.

Chapter 4 will offer analysis of the data in the form of tables and accompanying narratives organized around the four research questions. This will be followed by Chapter 5 which will provide conclusions, recommendations and implications of this study based on the findings.

CHAPTER FOUR: ANALYSIS OF THE DATA

Introduction

This study was designed to determine the impact of co-teaching on general education students measured in terms of developmental scale scores on the Florida Comprehensive Achievement Test (FCAT). Student data were gathered from 235 10th-grade students, attending schools in two central Florida school districts, who took the FCAT in 2008 and 2009. A comparison of general education students in co-taught classes with general education students who were not placed in co-taught classes was conducted. This research contributed to the body of knowledge about the impact of co-teaching as an inclusion strategy at the high school level.

Population and Demographic Characteristics

The population of this study included 27 public high schools across central Florida. This population was defined by a set of criteria. The school had to have an enrollment between 1,200 and 2,500, a free and reduced lunch rate of less than 40%, and a non-white population between 10% and 45%. The target area was central Florida, which included seven original school districts. The demographic requirements combined with the criteria of co-teaching in 10th-grade language arts or mathematics classes during the 2008-2009 school year narrowed the sample used to four schools in two school

districts. The sample for this study was comprised of 231 total students. The student data that were available for analysis is summarized in Table 4.

Table 4
Student Data Summary

	Number of general education students not co-taught	Percentage of general education students not co-taught	Number of co-taught general education students	Percentage of co-taught general education students	Total
Reading	89	71.2	36	28.8	125
Mathematics	53	48.2	57	51.8	110
					235

Since the groups were unequal in size, Levene’s test for homogeneity was conducted and data were analyzed according to the results of Levene’s test. The following section was arranged according to the four research questions that guided this study. The research questions are each stated and followed by an analysis of the data.

Research Question 1

To what extent do general education students in 10th-grade English language arts general education classes demonstrate statistically significant different developmental scale scores on the FCAT Reading compared to general education students in co-taught 10th-grade English language arts classes?

In order to answer Research Question 1, it was necessary to statistically analyze the reading data with an independent *t*-test. The test was conducted using an alpha level

of .05. The null hypothesis is there is no statistically significant difference in the mean developmental scale score on the FCAT reading for students in language arts co-taught classes as compared to those not in a co-taught class during the 2008-2009 school year. The independent variable is the classroom setting and the developmental scale score on the FCAT reading were used as the dependent variable. Table 5 summarizes the descriptive statistics of the original data set.

Table 5
Descriptive Statistics of the Reading Developmental Scale Scores

Group	<i>N</i>	Mean DSS	Std. Deviation	Range	Minimum	Maximum
Not co-taught	89	-42.93	163.27	1001	-791	210
Co-taught	36	-44.61	246.09	1401	-1117	287

The assumption of normality was tested and not met for the distributional shape of the dependent variable for the co-taught group. Review of the Shapiro-Wilk's test for normality ($W = 0.803, p = .000$), as well as the skewness (-2.449) and kurtosis (9.533) statistics indicated non-normality for the co-taught group. Review of the box plot indicated evidence of one outlier. The outlier was removed. After removal of the outlier, normality indicators improved. The skewness (-0.413) and kurtosis (-0.306) statistics indicated that normality was a reasonable assumption for the distributional shape of the dependent variable for the co-taught group. The Shapiro-Wilk's test for normality

($W = 0.888, p = .685$) was not statistically significant, which was further evidence of the assumption of normality having been met.

The assumption of normality was tested for the distributional shape of the dependent variable, the developmental scale scores, for the group of students not in co-taught classes. Skewness (-1.666), kurtosis (5.681), and Shapiro-Wilk's ($W = 0.888, p = .000$) suggested the assumptions of normality were not met. The Q-Q plot and box plot both indicated two outliers. After removing both outliers the normality results improved. The skewness (-0.202) and kurtosis (-0.490) indicated normality to be a reasonable assumption for the distributional shape of the dependent variable for the group not co-taught. The Shapiro-Wilk's test for normality ($W = 0.984, p = .386$) was not significant which was further evidence of the normality assumptions having been met by removing the two outliers. Levene's test, summarized in Table 7, indicated that the assumption of homogeneity of variance was not met ($F = 4.146, p = .044$). The statistics reported reflect the heterogeneity of the data. Table 6 summarizes the descriptive statistics for the data with the outliers removed.

Table 6
Descriptive Data of Reading Developmental Scale Scores without Outliers

Group	<i>N</i>	Mean DSS	Std. Deviation	Range	Minimum	Maximum
Not co-taught	87	-27.23	126.81	532	-322	210
Co-taught	35	-13.97	165.98	687	-400	287

Table 7
Levene's Test for Reading Developmental Scale Scores

F	Sig
4.15	.044

Table 8 indicates that the test was not statistically significant, $t(50.74) = -0.476$, $p = .635$. Students in the co-taught class ($n = 35$, $M = -13.97$, $SD = 165.98$) did not have significant differences in average developmental scale scores compared to students not in co-taught classes ($n = 87$, $M = -27.23$, $SD = 126.81$).

Table 8
Independent *t*-test of Reading Data

<i>t</i> score	Degrees of freedom	Significance
-0.43	50.75	.672

Since this test was conducted at an alpha level of .05 and the p value was greater than .05 the decision was made to fail to reject the null hypothesis.

Research Question 2

To what extent do general education students in 10th-grade general education mathematics classes demonstrate statistically significant different developmental scale score on the FCAT mathematics compared to general education students in 10th-grade mathematics co-taught classes?

In order to answer Research Question 2 it was necessary to statistically analyze the mathematics data with an independent *t*-test. The test was conducted using an alpha level of .05. The null hypothesis is that there is no statistically significant difference in the mean developmental scale score on the FCAT mathematics for students in co-taught as compared to those not in a co-taught class during the 2008-2009 school year. The independent variable is the classroom setting and the developmental scale scores on the FCAT mathematics were used as the dependent variable. Table 9 summarizes the descriptive statistics of the original data set.

Table 9
Descriptive Statistics of the Mathematics Developmental Scale Scores

Group	<i>N</i>	Mean DSS	Std. Deviation	Range	Minimum	Maximum
Not co-taught	51	33.51	73.81	411	-158	253
Co-taught	55	-29.75	83.76	487	-236	251

The assumption of normality was tested and not met for the distributional shape of the dependent variable for the co-taught group. Review of the Shapiro-Wilk's test for

normality ($W = 0.977, p = 0.377$), skewness (0.425), and kurtosis (1.485) statistics indicated slight non-normality for the co-taught group. Review of the box plot indicated evidence of two outliers. The outliers were removed. After removal of the outliers, normality indicators improved. The skewness (0.043) and kurtosis (-0.486) statistics indicated that normality was a reasonable assumption for the distributional shape of the dependent variable for the co-taught group. The Shapiro-Wilk's test for normality ($W = 0.987, p = .838$) was not statistically significant, which was further evidence of the assumption of normality being met.

The assumption of normality was tested for the distributional shape of the dependent variable for the group students not in co-taught classes. Skewness (0.202), kurtosis (0.786), and Shapiro-Wilk's ($W = 0.986, p = .793$) suggested the assumptions of normality were met but that kurtosis was slightly high. The Q-Q plot and box plot both indicated one outlier. After removing the outlier the normality results improved. The skewness (-0.258) and kurtosis (-0.061) indicated that normality was a reasonable assumption for the distributional shape of the dependent variable for the group not co-taught. The Shapiro-Wilk's test for normality ($W = 0.985, p = .788$) was not significant which was further evidence of normality assumptions having been met by removing the outlier. Levene's test, summarized in Table 11, indicated that the assumption of homogeneity of variance was met ($F = 0.211, p = .647$). Table 10 summarizes the descriptive statistics of the data set after the outliers were removed.

Table 10
Descriptive Statistics of Mathematics Developmental Scale Scores without Outliers

Group	<i>N</i>	Mean DSS	Std. Deviation	Range	Minimum	Maximum
Not co- taught	50	29.12	67.50	331	-158	173
Co- taught	53	-31.15	70.35	487	-172	142

Table 11
Levene's Test for Mathematics Developmental Scale Scores

F	Sig
0.211	.647

Table 12 indicates that the test was statistically significant, $t(101) = 4.432$, $p = .000$. Students in the co-taught classes ($n = 53$, $M = -31.15$, $SD = 70.35$) did have significant differences in average developmental scale scores than students not in co-taught classes ($n = 50$, $M = 29.12$, $SD = 67.50$).

Table 12
Independent *t*-test of Mathematics Developmental Scale Scores

<i>t</i> -score	Degrees of Freedom	Significance
4.112	104	.000

Since this test was conducted at an alpha level of .05 and the p value was less than .05 the decision was made to reject the null hypothesis.

Research Question 3

To what extent do general education students in 10th-grade English language arts co-taught classes who scored at Achievement Level 1 or 2 on the 2008 FCAT earn significantly different developmental scale scores on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

In order to answer Research Question 3, it was necessary to statistically analyze the reading data of the co-taught classrooms with an independent *t*-test. The test was conducted using an alpha level of .05. The null hypothesis is that there is no statistically significant difference in the mean developmental scale scores of students in co-taught classes who began the year as a level 1 or 2 (not meeting proficiency) and the students who began the year as level 3, 4, or 5 (proficient). Table 13 summarizes the descriptive statistics for original data set of the co-taught students in language arts classes.

Table 13
Descriptive Statistics for Co-Taught Reading Data (Grade 10)

2008 FCAT Levels*	<i>N</i>	Mean DSS**	Std. Deviation	Range	Minimum	Maximum
Achievement Levels 1 or 2 (below proficient)	22	-92.32	288.57	1404	-1117	287
Achievement Levels 3, 4, or 5 (proficient and above)	14	30.36	136.45	471	-219	252

*These categories separated the 10th-grade students in this study into groups based on their 9th-grade Achievement Levels.

**This change in DSS is a measure of achievement growth from 9th-grade to 10th-grade.

The assumption of normality was tested and not met for the distributional shape of the dependent variable for the group of students at Achievement Levels 1 or 2 (below proficient). The skewness (-2.199), kurtosis (7.055), and Shapiro Wilk's test ($W = 0.811$, $p = .001$) statistics indicated non-normality. A review of the box plot and Q-Q plot showed evidence of one outlier. The outlier was removed. After removal of the outlier, normality improved. Skewness (-0.289), kurtosis (-0.527), and the Shapiro-Wilk's test ($W = 0.96876$, $p = .856$) statistics indicated the assumptions for normality had been met.

The assumption of normality was tested for the distributional shape of the dependent variable for the group of students at Achievement Levels 3, 4, or 5 (proficient and above). The skewness (-0.187), kurtosis (-.680) and Shapiro-Wilk's test ($W = 0.978$, $p = .962$) indicated the assumptions of normality were met. The box plot and Q-Q plot did not indicate the presence of any outliers. Levene's test, summarized in Table 15, indicated the assumption of homogeneity was met ($F = 1.201$, $p = .281$). Table 14 summarizes the descriptive statistics for the data set without the outliers.

Table 14

Descriptive Statistics for Co-Taught Reading without Outlier Data

2008 FCAT Levels*	<i>N</i>	Mean DSS**	Std. Deviation	Range	Minimum	Maximum
Achievement Levels 1 or 2 (below proficient)	21	-43.52	180.11	687	-400	287
Achievement Levels 3, 4, or 5 (proficient and above)	14	30.36	136.45	471	-219	252

*These categories separated the 10th-grade students in this study into groups based on their 9th-grade Achievement Level.

**This change in DSS is a measure of achievement growth from 9th-grade to 10th-grade.

Table 15

Levene's Test for Co-Taught Reading Scores

F	Sig
1.20	.281

Table 16 indicates that the test of mean differences was not statistically significant, $t(32.36) = -1.378, p = .178$). Students in co-taught classes who were below proficiency (Achievement Level 1 or 2) on the 2008 FCAT ($n = 21, M = -43.52, SD = 180.11$) did not have significant differences in developmental scale scores reported on the 2009 FCAT than students in co-taught classes who were proficient or above (Achievement Levels 3, 4 or 5) on the 2008 FCAT ($n = 14, M = 30.36, SD = 136.45$).

Table 16
Independent *t*-test for Co-Taught Reading Data

<i>t</i> score	Degrees of Freedom	Significance
-1.378	32.36	.178

Since this test was conducted at an alpha level of .05 and the *p* value was greater than .05 the decision was made to fail to reject the null hypothesis.

Research Question 4

To what extent do general education students in 10th-grade mathematics co-taught classes who scored at level 1 or 2 on the 2008 FCAT demonstrate significantly different developmental scale scores on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

In order to answer Research Question 4, it was necessary to statistically analyze the mathematics data of co-taught students with and independent *t*-test. The test was conducted using an alpha level of .05. The null hypothesis is that there is no statistically significant difference in mean developmental scale scores of students in co-taught classes who began the year as a level 1 or 2 (not meeting proficiency) and the students who began the year as level 3, 4, or 5 (proficient and above). Table 17 summarizes the descriptive statistics for the original data set of the co-taught students in language arts classes.

Table 17
Descriptive Statistics for Mathematics Co-Taught Data

2008 FCAT Levels*	<i>N</i>	Mean DSS**	Std. Deviation	Range	Minimum	Maximum
Achievement Levels 1 or 2	13	60.62	75.81	317	-66	251
Achievement Levels 3, 4, or 5	42	-57.71	64.56	288	-236	52

*These categories separated the 10th-grade students in this study into groups based on their 9th-grade Achievement Level

**This change in DSS is a measure of achievement growth from 9th-grade to 10th-grade.

The assumptions for normality were tested and were not met for the distributional shape of the dependent variable for students below proficiency (Achievement Levels 1 and 2). Skewness (1.112), kurtosis (2.925), and the Shapiro-Wilk's test ($W = 0.895$, $p = .114$) statistics indicated slight non-normality. Review of the box plot and Q-Q plot revealed evidence of one data point that could be considered an outlier. This data point was removed. This was the same data point removed in the analysis of Research Question 2. After removal of the outlier the skewness (-.403) and kurtosis (1.361) improved. Shapiro-Wilk's ($W = 0.939$, $p = .486$) all indicated the assumptions of normality were met.

The assumptions for normality were also tested for the distributional shape of the dependent variable for students scoring at Achievement Levels 3, 4, and 5. The skewness (-0.470), kurtosis (0.073), and Shapiro-Wilk's test ($W = .978$, $p = .569$) statistics indicated that the assumptions of normality were met. Levene's test, summarized in Table 19,

indicated that the assumption of homogeneity of variance was met ($F = 1.165, p = .285$).

Table 18 summarizes the descriptive statistics for the data with the outlier removed.

Table 18

Descriptive Statistics for Mathematics Co-Taught Data Without Outliers

2008 FCAT Levels*	<i>N</i>	Mean DSS**	Std. Deviation	Range	Minimum	Maximum
Achievement Levels 1 or 2	12	44.75	52.00	208	-66	142
Achievement Levels 3, 4, or 5	42	-57.71	64.60	224	-172	52

*These categories separated the 10th-grade students in this study into groups based on their 9th-grade achievement.

**This change in DSS is a measure of achievement growth from 9th-grade to 10th-grade.

Table 19

Levene's Test for Co-Taught Scores

F	Sig
1.165	.285

Table 20 indicates that the test was statistically significant, $t(52) = 5.040, p = .000$. Co-taught students who scored below proficiency (Achievement Levels 1 and 2) on the 2008 FCAT ($n = 12, M = 44.75, SD = 52.00$) had significant differences in mean developmental scale scores on the 2009 FCAT mathematics as compared to the co-taught students who had scored proficient or above (Achievement Levels 3, 4, or 5) on the 2008 FCAT ($n = 42, M = -57.51, SD = 64.56$).

Table 20
 Independent *t*-test for Co-Taught Mathematics Data

<i>t</i> score	Degrees of Freedom	Significance
5.040	52	.000

Since this test was conducted at an alpha level of .05 and the *p* value was less than .05 the decision was made to reject the null hypothesis.

Ancillary Analyses

The focus of the data analyses centered on the achievement of the students as measured by the developmental scale score (DSS) change from the 9th-grade to 10th-grade year. This is one measurement used by the state of Florida in determining whether a student has made a sufficient year's growth, or learning gain. There are three ways Florida students can be credited with a learning gain. If a student increases 77 points in their DSS of reading from 9th-grade to 10th-grade or 48 points in their DSS of mathematics this is considered a learning gain. A student who maintains an Achievement Level 3, 4, or 5 from 9th-grade to 10th-grade is also credited with a learning gain. The third option for earning a learning gain is to increase from one Achievement Level to the next. Therefore, as an ancillary analysis a review of the general education students and whether they achieved a learning gain, by any of the three methods, was conducted.

A Mann-Whitney test was conducted on the general education students in co-taught classes and the general education students in classes not co-taught. The same

outliers that were removed in the analysis of Research Question 1 were removed for this analysis. There is no statistically significant difference ($z = -1.4443$, $p > .05$) in the distribution of the scores between the co-taught group ($M_{\text{rank}} = 67.16$) and the group not co-taught ($M_{\text{rank}} = 59.22$). Table 21 and 22 summarize the data from this test.

Table 21
Ranks of Reading Data

	N	Mean Rank	Sum of Ranks
Not co-taught	87	59.22	5152.50
Co-taught	35	67.16	2350.50

Table 22
Test Statistics for Reading Data

	Learning Gain
Mann-Whitney U	1324.50
Wilcoxon W	5152.50
Z	-1.44
Asymp. Sig. (2-tailed)	.150

A second test was performed on the mathematics data. The outliers that were removed for Research Question 2 were also removed in this analysis. A Mann Whitney was conducted to determine if there was a significant difference in the earning of learning gains by general education students in co-taught classes as compared to the students not in co-taught classes. The results indicate there is no statistically significant ($z = -1.729$, $p > .05$) difference in the distribution of the score rankings between the co-taught group

($M_{\text{rank}} = 47.76$) and the group not co-taught ($M_{\text{rank}} = 56.49$). Table 23 and Table 24 summarize the results of this data.

Table 23
Ranks of Mathematics Data

	N	Mean Rank	Sum of Ranks
Not co-taught	50	56.49	2824.50
Co-taught	53	47.76	2531.50

Table 24
Test Statistics for Mathematics Data

	Learning Gains
Mann-Whitney U	1100.500
Wilcoxon W	2531.500
Z	-1.729
Asymp. Sig. (2-tailed)	.084

A third test was performed on the reading data. This test was to determine whether there were significant differences in learning gains earned by general education students in co-taught classes who were below proficiency in reading (Achievement Levels 1 and 2) compared to those earned by general education co-taught students at proficiency and above (Achievement Levels 3, 4, and 5). A Mann Whitney test was conducted. The results indicate there is no statistically significant ($z = -1.267, p > .05$) difference in the distribution of the score rankings between the below proficient group

($M_{\text{rank}} = 16.50$) and the group proficient and above ($M_{\text{rank}} = 20.25$). Table 25 and Table 26 summarize the results of this data.

Table 25
Ranks of Reading Data

2008 FCAT Level	N	Mean Rank	Sum of Ranks
Ach Level 1 or 2 (below proficient)	21	16.50	346.50
Ach Level 3, 4, or 5 (proficient and above)	14	20.25	283.50

Table 26
Test Statistics for Reading Data

	Learning Gains
Mann-Whitney U	115.50
Wilcoxon W	346.50
Z	-1.27
Asymp. Sig. (2-tailed)	.21

A fourth test was performed on the mathematics data. This test was to determine whether there were significant differences in learning gains earned by general education co-taught students below proficiency in reading (Achievement Levels 1 and 2) from those earned by general education co-taught students at proficiency and above (Achievement Levels 3, 4, and 5). A Mann Whitney test was conducted. The results indicate there is no statistically significant ($z = -.724, p > .05$) difference in the distribution of the score

rankings between the below proficient group ($M_{\text{rank}} = 29.46$) and the group proficient and above ($M_{\text{rank}} = 26.28$). Table 27 and Table 28 summarize the results of this data.

Table 27
Ranks of Mathematics Data

2008 FCAT Level	N	Mean Rank	Sum of Ranks
Ach Level 1 or 2 (below proficient)	12	29.46	353.50
Ach Level 3, 4, or 5 (proficient and above)	41	26.28	1077.50

Table 28
Test Statistics for Mathematics Data

	Learning Gains
Mann-Whitney U	216.50
Wilcoxon W	1077.50
Z	-.72
Asymp. Sig. (2-tailed)	.47

Summary

This chapter has presented a summary of the analysis of data gathered. Student data from the 10th-grade FCAT was collected from two different central Florida school districts. The dependent variable was the developmental scale score calculated and reported by the Florida Department of Education after comparing the students' 2008 and 2009 FCAT scores on both the reading and mathematics portions. The independent variable for Research Questions 1 and 2 was whether the student had been in a co-taught

environment or not. The independent variable for Research Questions 3 and 4 was whether the co-taught general education students had scored below proficiency or at a proficient level on the 2008 test.

The ancillary analysis expanded the four research questions to include considering all three calculations of learning gains used by the state of Florida. Since a student either makes a gain, or does not make a gain, this ordinal data was analyzed using the non-parametric, Mann-Whitney U test statistic. Four tests were conducted to parallel the four research questions yet considered the three different measures of learning gains.

The statistical analysis used for each research question was used to arrive at conclusions regarding the null hypotheses. Each research question required the use of an independent *t*-test. Some statistical significance was found. A summary and discussion of the findings is presented in Chapter 5. Discussion has been linked to a review of relevant research and literature. Conclusions and recommendations are also offered and presented.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

Co-teaching is one strategy educators have used to meet the legal requirements of inclusion. In a co-taught class, students receiving exceptional student education (ESE) services are mixed into classes with general education students and two teachers are present to help all students achieve mastery of the content. This study examined the general education students placed in co-taught classes and compared those students with general education students who were in the same course with the same content teacher but not a co-taught setting. Tenth grade students in language arts and mathematics courses were selected for this study. The question of whether a co-taught environment impacts the achievement of general education students as measured by the developmental scale scores on the Florida Comprehensive Achievement Test (FCAT) was examined. A parallel analysis to each of the four research questions was conducted to include all three learning gain calculations as a measure of achievement.

Chapter 5 provides the results and conclusions of this study and contains a discussion of how the data presented in Chapter 4 relate to each of the four research questions as well as the parallel ancillary analysis. The chapter concludes with recommendations for future research.

Purpose of the Study

The purpose of this study was to provide insight into the impact of a co-teaching environment on 10th-grade general education students. Both the reading and mathematics portion of the Florida Comprehensive Achievement Test (FCAT) were used in this study. Developmental scale scores, a measure of growth from year to year on the FCAT, were used as the dependent variable for the study. The first two research questions addressed the question of whether general education students in co-taught classes differed in mean developmental scale scores from general education students not placed in co-taught classes. The second two research questions examined co-taught students and compared students below proficiency to those proficient above by analyzing their mean developmental scale scores. The ancillary analysis paralleled the four research questions but looked at the broader measurement of learning gains as the dependent variable. These analyses were designed to contribute to the body of knowledge about the impact of co-teaching at the high school level.

Data and Demographics

Data were collected from schools in two central Florida school districts that met the three demographic criteria of this study. The schools had student populations between 1,200 and 2,500, a free and reduced lunch participation percentage less than 40%, and a non-white racial diversity between 10% and 45% for the 2008-2009 school year. Four high schools met these criteria and participated in the study.

Anonymous student data were collected which included the FCAT developmental scale score (DSS) from 2008 and 2009 on both the reading and mathematics portion and whether the student was in a co-taught class or not during the 10th-grade, which is the year they participated in the 2009 test. Students who were in a co-taught class with particular content teachers were compared to students who were not in a co-taught class but had the same teachers.

After the outliers were removed the available data for the FCAT reading analysis included 87 students in co-taught classes and 35 students not in co-taught classes. The available data for the FCAT mathematics analysis included 50 students in co-taught classes and 53 students not in co-taught classes after the outliers were removed. These data were used to address Research Questions 1 and 2.

For Research Questions 3 and 4 the data were then narrowed to only the co-taught students and resorted to separate out students who had scored below proficiency in 2008 as ninth graders from the students who had scored at a proficient level or above that same year. There were 21 co-taught general education students who had scored below proficiency (Achievement Levels 1 or 2) and 14 co-taught, general education students who were proficient or above (Achievement Levels 3, 4, or 5) on the FCAT reading. There were 12 general education co-taught students who had scored below proficiency and 42 students who were proficient or above on the FCAT mathematics.

Data Analysis

The goal of this research was to contribute to the knowledge base regarding achievement in co-taught classes for general education students. The mean developmental scale scores, Achievement Levels, learning gains for the 2008 and 2009 FCAT, and an indication of whether the students studied were in a co-taught class or not was entered into the Statistical Package for the Social Sciences (SPSS) software program. The four research questions were analyzed using an independent *t*-test, a comparison of means. The ancillary analysis was conducted using a Mann-Whitney.

Summary and Discussion of the Findings

The following section contains a summary and discussion of the results of the data analysis as presented in Chapter 4. It is organized by the four research questions that guided this study. The statistical analyses conducted provided information on the difference in developmental scale scores for the student data used in this study. The findings pertain to the two central Florida school districts and the four high schools that were eligible to participate.

Research Question 1

To what extent do general education students in 10th-grade English language arts general education classes demonstrate statistically significant developmental scale scores on the FCAT Reading compared to general education students in co-taught 10th-grade English language arts classes?

Summary data of the FCAT reading scores regarding the impact of co-teaching on general education students in the 10th-grade language arts classes are displayed in Tables 5, 6, 7, and 8. Tables 5 and 6 describe the mean developmental scale scores and standard deviations of developmental scale scores with and without the outliers respectively. Table 8 describes the results of the independent *t*-test. The results were not statistically significant; therefore the decision was made to fail to reject the null hypothesis. The students in co-taught classes did not perform differently enough to be statistically significant as measured by developmental scale scores on the FCAT reading compared to their peers with the same teachers in classes not co-taught.

It should be noted that both mean reading development scale scores are negative. The state of Florida defines 77 developmental scale score (DSS) points as one year's growth on the FCAT. It is interesting that this data set had a developmental scale score mean that was negative. According to the Florida Department of Education website the mean DSS change from 2008 to 2009 in Seminole County for 10th-grade reading was 13 points. In Volusia County the mean DSS was zero points. This mean includes all 10th-grade students in these districts who had 9th-grade scores from 2008. On average both groups of these students in this sample for this study displayed negative growth and the students not in co-taught had a more negative mean than the co-taught, although not statistically significant. According to the results of this analysis, it seems that performance on the FCAT for 10th-grade general education students taking the reading portion is not impacted by whether or not they are in a co-taught environment. However,

due to the unexpected negative means it would be prudent to judiciously generalize this data.

Research Question 2

To what extent do general education students in 10th-grade general education mathematics classes demonstrate statistically significant different developmental scale scores on the FCAT mathematics compared to general education students in 10th-grade mathematics co-taught classes?

Summary data regarding the impact of co-teaching on general education students in the 10th-grade mathematics classes are displayed in Tables 9, 10, 11 and 12. Tables 9 and 10 describe the mean developmental scale scores and standard deviations with and without the outliers. Table 12 describes the results of the independent *t*-test. The results were statistically significant; therefore the decision was made to reject the null hypothesis. The students in co-taught classes performed worse as measured by developmental scale scores on the FCAT mathematics compared to their peers with the same teachers in classes not co-taught. It should be noted that the students in co-taught classes had a mean developmental scale score (DSS) that was negative. The state of Florida defines 48 DSS points as one year's growth on the FCAT mathematics between 9th-grade and 10th-grade. According to the Florida Department of Education website, the mean DSS change for all Seminole County students in the 10th-grade who also had scores in the 9th-grade was 37 points. The mean for Volusia County was 42 points. In this study the mean DSS change for the students who did not participate in co-taught mathematics

was 29.12 points which is 18.88 points below the expectation of the state, 12.88 points below the Volusia mean and 20.76 points below the Seminole mean. This mean was significantly different than the mean DSS earned by the general education students in the co-taught classes which was -31.15. According to the results of this analysis, performance on the FCAT for 10th-grade general education students taking the mathematics portion is impacted by whether or not they are in a co-taught environment.

Research Question 3

To what extent do general education students in 10th-grade English language arts co-taught classes who scored at level 1 or 2 on the 2008 FCAT experience significantly different developmental scale scores on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

Summary data regarding the impact of the Achievement Levels of co-taught students is summarized in Tables 13, 14, 15 and 16. Tables 13 and 14 describe the mean developmental scale scores and standard deviations with and without the outliers. Table 16 describes the results of the independent *t*-test. The results were not statistically significant. Therefore, the decision was made to fail to reject the null hypothesis. The students who had scored below proficiency (Achievement Levels 1 or 2) on the 2008 FCAT did not perform differently as measured by developmental scale scores on the 2009 FCAT reading compared to their peers who had scored at levels proficient or above in 2008. It should be noted that the mean scores for the below proficient students are negative. This is below the defined level of 77 DSS points equating to year's growth on the FCAT reading in 10th-grade. The general education students in co-taught classes who

were proficient or above had a mean DSS of 30.36. This is still not at the state expectancy level of 77 DSS point. However, according to the *t*-test the mean is not statistically significant from the group below proficiency. At first glance the mean scores seem to have a great disparity. However, the standard deviations are large (180 for the below proficient group and 136 for the proficient group) and the sample sizes are small. These factors likely impacted the outcome of this statistical test. The study was designed to be narrow in what types of schools were considered in order to control for demographic factors. This study also only considered teachers who had co-taught classes and classes not co-taught for comparison. The unanticipated outcome was that very few schools in those parameters were using co-teaching in the 10th-grade. Although the researcher collected all available data from the participating counties, when only the co-taught general education students were considered in the analysis of this research question the sample size was reduced greatly. As a result, 21 below proficient student scores and 14 proficient student scores on the FCAT reading were available for this study. These limitations should be considered when generalizing the findings of this study. It should also be a consideration of school personnel when determining which general education students to place in co-taught what ratio of general education students are already showing signs of being below proficiency. In this sample there is an uneven representation of students below proficient as opposed to proficient and above. For every three struggling learners who are below proficiency but not qualified to receive exceptional education services there are only two students who are proficient and above.

This skewed proportion is then mixed with students qualifying for exceptional education services, through the co-teacher. Although a comparison of means was statistically insignificant it is important to note that the struggling, below proficient general education students had a negative mean developmental scale score and the small sample size and disproportionate number of below proficient general education students may be an important factor to consider.

Research Question 4

To what extent do general education students in 10th-grade mathematics co-taught classes who scored at level 1 or 2 on the 2008 FCAT experience significantly different on the 2009 FCAT than general education students in those same co-taught classrooms who scored a 3, 4, or 5 in 2008?

Summary data regarding the impact of the Achievement Levels of co-taught students is summarized in Tables 17, 18, 19, and 20. Tables 17 and 18 describe the mean developmental scale scores and standard deviations with and without the outliers respectively. Table 20 describes the results of the independent *t*-test. The results were statistically significant. Therefore, the decision was made to reject the null hypothesis. The students who had scored below proficiency on the 2008 FCAT did perform differently as measured by developmental scale scores on the 2009 FCAT mathematics compared to their peers who had scored at proficient levels in 2008. The students who were below proficiency had a mean score of 44.75 which was higher than the proficient group. This mean score was just slightly below the state defined baseline learning gain of 48 DSS points to demonstrate a year's growth in mathematics from 9th to 10th-grade. The

students who were proficient and above had a negative mean developmental scale score. This group had a mean of -57.71 DSS points. According to the results of this analysis, it seems that performance on the FCAT reading for co-taught 10th-grade general education students is impacted by whether or not they begin the 10th-grade year as below proficient or proficient. This sample size was limited by the parameters of demographics defined by the study. When the available student data for general education students in co-taught classes was collected there were 12 students who were below proficient and 42 students who were at proficiency and above. This sample is disproportionate in the numbers of struggling learners considered below proficient compared to those proficient and above. However, this ratio is opposite from the reading data. In the co-taught mathematics classes available for this study for every two general education students not qualified for exception education services but below proficiency on the FCAT there were seven general education students proficient and above mixed with students who were receiving exceptional education services through co-teaching. The students who were proficient and above had a negative mean DSS change. Therefore the ancillary analysis was conducted which included all measures of learning gains used by the state of Florida.

Ancillary Analysis

The ancillary analysis broadened the four research questions to include all three measures of learning gains which include maintaining an Achievement Level 3, 4, or 5, improving an Achievement Level, or earning 77 DSS points in reading or 48 DSS points

in mathematics. The Mann-Whitney analysis of each of the four questions indicated that there was no statistical difference in any of the four situations. The co-taught general education students did not have significantly different learning gains from the students not in co-taught for reading or mathematics. The below proficient general education co-taught students did not have significantly different learning gains from the proficient and above co-taught general education students. The results regarding statistical significance of the ancillary analysis matched up with the results of Research Questions 1 and 3. For the language arts data there was no significance found when examining mean DSS scores and no significance found when examining all three measures of learning gains. However, for Research Question 2 and 4, which dealt with the mathematics students the ancillary analysis revealed no significance, unlike the means comparison test.

Conclusions

This research study sought to investigate the impact of co-teaching on general education achievement as measured by the FCAT. Tenth grade students were selected for the study from schools that met the demographic criteria and offered co-teaching during the 2008-2009 school year. The definition of co-teaching used was from Cook and Friend (1995):

Co-teaching involves two educators, and occasionally, more. For purposes of the discussion here, one of the professionals is a general education teacher and the other is a special educator--either a special education teacher or a specialist in one of the related services such as a speech/language therapist. (p 2)

The student data also had matching core teacher data. The data gathered from the students in co-taught classes had the same teachers as the students' whose data were gathered for the general education student data. Two central Florida school districts were eligible and willing to participate in the study. Based on the results of the data analysis, the following conclusions are offered.

1. It was concluded that the average developmental scale scores for general education 10th-graders was not impacted by whether students were in co-taught language arts classes or in classes not co-taught. However, both groups had mean negative developmental scale scores, which is not expected by the state of Florida, considering the Florida DOE sets the baseline for one year's growth between 9th and 10th-grade in reading at 77 DSS points. The 10th- grade students in both not co-taught classes and co-taught classes show lack of positive change in reading achievement using the state's accountability assessment. Further study of the data show that students have a negative change when compared to the previous year's assessment. While it might be concluded that the students did not progress in reading from 9th to 10th-grade, another consideration is that the level of difficulty of the test (vocabulary, reading passages, level of thinking, and inclusion of open ended response items) increased from the 9th-grade FCAT to the 10th-grade FCAT and impacted the students' achievement. The level of difficulty of the assessments was not part of the study, but maybe a variable that the future researchers would want to study.

2. In contrast, the average developmental scale scores for general education 10th-graders on the FCAT mathematics was impacted based on student participation in co-taught classes. The students who were not in a co-taught environment had greater, statistically significant, average gains on the 2009 FCAT than the students who were in co-taught. This indicates that the achievement of general education students in co-taught mathematics was negatively impacted by the co-taught environment. The 10th-grade students in co-taught classes showed a lack of positive change in mathematics achievement using the state's accountability assessment. The data indicated a negative change compared to the previous year's assessment. Again, the level of difficulty was not assessed in this study. The inclusion of open ended response items and a greater coverage of state standards may have increased the level of difficulty on the 10th-grade test. Although the developmental scale score was designed to help vertically track student growth from year to year, the types of questions and increased coverage of standards is likely a factor in student achievement from year to year. The data from this research question does indicate that the co-taught environment is associated with negative growth for general education students.
3. When examining 10th-grade co-taught general education students in language arts and separating by those who began the co-taught year below proficiency from those who were at proficiency and above there is no statistically significant difference in average developmental scale scores for the students on the FCAT

reading. The students who were below proficient had a negative mean developmental scale score and the students who were at proficiency and above had a positive mean DSS. However, according to the results of this study, this difference was due to chance and was not statistically significant. It is still important to note that the struggling students who were not proficient as ninth graders, in the co-taught setting had negative gains from 9th to 10th-grade. There was also a disproportionate ratio of struggling students to proficient students in these classes. Neither the method used to place general education students into co-taught classes or the level of difficulty of the two assessments were factors in this study but are considerations in drawing conclusions from this data.

4. When examining 10th-grade co-taught general education students in mathematics and separating by those who began the year below proficiency from those who were at proficiency or above there was a significant difference in mean developmental scale scores. The students who were below proficient in 2008, prior to the year in a co-taught class, had greater learning gains than those proficient and above. This was statistically significant for the data available for study. It is notable that these students who began as struggling mathematics students benefited from the co-taught class environment in that the mean developmental scale score was nearly equivalent to the state definition of a year's learning gain in mathematics. The DSS is a useful way to track yearly progress of individual students. The data presented in this study is evidence of significant

improvement for general education students below proficiency in mathematics on the FCAT when in a co-taught mathematics class.

5. When all three measures of learning gain calculations were considered for the language arts students, the conclusion was the same as when just the developmental scale scores were considered. The number of general education co-taught students achieving learning gains was not significantly different than the number of general education students not in co-taught language arts. The learning gain calculation accounts for three different ways students can show growth. Proficient students that maintain a proficient level (3, 4 or 5) make a learning gain. Struggling students who are below proficiency but increase a level earn a learning gain. Also any student who increases 77 DSS points is considered to have made a learning gain. The general education students in the co-taught classes were able to make learning gains in a similar fashion as the students not in co-taught.
6. The analysis using all three measures of learning gain calculations yielded different results as the analysis comparing mean developmental scale scores in mathematics. When comparing students who made learning gains in co-taught mathematics classes versus students who made learning gains but not in co-taught classes it was not significant, whereas it was significant when comparing only the mean developmental scale scores. Co-teaching environments appear to not impact

general education student achievement on the 10th-grade FCAT mathematics if all three types of learning gains are considered.

7. The analysis of co-taught students separated by proficiency levels and accounting for all types of learning gains yielded the same conclusion as the analysis of just the developmental scale score in reading. Co-teaching did not impact the achievement of the general education students regardless of their Achievement Level in measured on the ninth grade FCAT reading.
8. The analysis of co-taught students separated by proficiency levels and accounting for all types of learning gains yielded a different conclusion as the analysis of just the developmental scale scores in mathematics. Co-teaching did not impact the achievement of the general education student regardless of their Achievement Level in mathematics when all three types of learning gains were considered. When only the DSS mean was considered, there was a significant difference. Broadening the ways in which students could show achievement reduced the impact co-teaching had for the general education students.
9. When all types of learning gains, as calculated by the state of Florida, are used as the dependent variable, co-teaching as an independent variable does not affect student achievement. Considering all three types of learning gains expands the opportunity for students to demonstrate achievement. Although students may not make the required 77 DSS point increase for the learning gain designation, they may be able to maintain a proficient level or increase their level. When

considering these two options along with the DSS increase, student achievement was not impacted by the co-taught environment.

10. When all types of learning gains as calculated by the state of Florida are used as the dependent variable, proficiency levels of co-taught students as the independent variable does not affect student achievement. Expanding the parameters for student achievement to include all three measures of learning gains reduces the impact of co-teaching on student achievement for general education students. When only the DSS calculation of a learning gain was considered this study found co-teaching to impact student achievement in mathematics. However, when the other two measures were considered this study found co-teaching to be a neutral factor in student achievement regardless of proficiency level.

Implications for Practice

The results of this study suggested that co-teaching may not negatively impact general education students on the 10th-grade FCAT reading. In a setting where students with disabilities are included alongside their nondisabled peers it is important to know if the presence of students with identified disabilities is impacting the achievement of the general population. From this study it appears that the inclusion of the students with disabilities into general education mathematics and language arts classes has no impact on the achievement of the general education students. There is no harm in educating both

populations together in a co-taught setting. Mean developmental scale score data from the FCAT reading indicated no impact on general education students. Data from the FCAT mathematics indicated a negative educational effect on the general education students in the co-taught environment when calculating mean developmental scale scores only. However, when all three measures of learning gain calculations were considered, there was no impact on the general education student in mathematics.

The results of this study also indicate that the general education students who were below proficient were not impacted by the co-taught language arts classes, but there was an impact on students in the mathematics classes as compared to the students scoring proficient and above. Co-teaching was associated with improvement for struggling, below proficient mathematics students who were general education yet co-taught. These students apparently benefited from the co-taught environment. The ratio in this instance was significantly skewed towards more proficient general education students. The small population of struggling general education students' average gains close to the state requirement for a year's worth of learning gain on the developmental scale score. When considering all three types of learning gains were analyzed co-teaching did not significantly impact students in either type of class, language arts or mathematics. Co-teaching also did not impact the below proficient student in a significant way from the proficient students in the language arts or mathematics classes. These results may be helpful to school administrators and district office personnel when deciding how to use co-teaching at the high school level. This model does little to harm the general education

student and in some cases, if the ratio of struggling students in general education is not overwhelming, it may also serve to benefit these students. However this model is not intended as an intervention for struggling general education benefit. The primary purpose is to serve the needs of the students with disabilities. If general education students benefit, that is a added bonus. The important factor that emerges from this study is that the general education students were not negatively impacted as measured by the FCAT learning gain calculations.

For school leaders to decide whether co-teaching is the right option they might consider the fiscal implications. Co-teaching is more expensive than pull-out, consultation, or support facilitation models. These hybrid versions of co-teaching are attempts by the state of Florida to minimize costs and still meet the needs of students with disabilities. In a co-taught classroom two teaching units are dedicated every day to the same number of students as typically found in general education classrooms. For school leaders considering this as an option the teacher unit as a resource is an important consideration. Another factor to consider is the effectiveness of co-teaching for all types of students. This study suggests there is no benefit for the general education student in terms of academic achievement when placed in a co-taught class. Although the general education students were not negatively impacted by the co-teaching arrangement, school leaders should consider if the fiscal commitment is worth the impact on student achievement. Co-teaching is designed to meet the needs of students with disabilities, which this study did not address. However, upon choosing to implement co-teaching a

school or district should carefully monitor the achievement outcomes of all students involved in the co-taught environment. There are a variety of ways schools and districts could monitor the implementation of co-teaching. Frequent formative assessments are good indicator of student achievement. Also, other summative assessments such as the Scholastic Aptitude Test (SAT), course completion exams, or final grades could be used as measures of student achievement and indicators of co-teaching effectiveness. It is also critical to monitor the fidelity to which co-teaching is being implemented. The school or district ought to clearly outline the expectations and model design for co-taught classrooms and engage in fidelity checks to ensure that the ideal model is truly implemented in co-taught classrooms.

This study also revealed a disproportional amount of below proficient general education students scheduled into co-taught in language arts classes. The design of co-teaching is to provide support and accommodations for students with disabilities. If administrators are using the co-taught model to assist low performing general education students the unbalanced representation of student abilities in the classroom could be a significant factor in overall student achievement. School leaders would be wise to ensure that the general education students in co-taught classes are heterogeneous in their academic abilities.

Recommendations for Future Research

The review of literature revealed a wide variety of situations in which co-teaching is being used throughout the American public school system. The research documented cases of co-teaching used as a strategy in pre-kindergarten classes all the way through undergraduate courses taught in college (Jung, 1998; Chiang, 1999; Dieker & Murawski, 2003; Walter-Thomas, 1997; Mastropieri, et al., 2005; Belmarez, 1998; Cawley, Hayden, & Cade, 2002; and Wilson & Michaels, 2006). This study focused on a very specific co-teaching environment. The specificity of the study helped to control for different variables, yet at the same time diminishes the ability to over generalize the results. Based on the review of literature and the findings of this study, the following recommendations for future research are made.

1. Expanding the population to include all the school districts in Florida would increase the data available. This study was limited to central Florida. During the course of the study it became apparent that many central Florida schools were choosing to use other strategies to meet the inclusion requirements. As a result the number of schools able to participate was less than originally expected.
2. This study focused specifically on students in the 10th-grade because the 10th-grade FCAT is a requirement for graduation. However, students at every grade level between 3rd and 10th-grade take an FCAT reading and mathematics test. Expanding the study to include and investigate the impact of co-teaching

at other grade levels would contribute to the base of knowledge regarding the impact of co-teaching on general education students.

3. The FCAT is one assessment tool that is used as a summative assessment of student learning. There are other assessment measures that could be used to investigate the impact of co-teaching on general education students. As Florida and other states implement or continue to implement end of course exams this would be a viable option to use in investigating the impact of co-teaching on general education students. Future research that includes other measures of achievements, such as this, would also contribute to the knowledge about the impact of co-teaching on general education student achievement.
4. This study specifically focused on co-teaching even though there are other strategies being used to meet the needs of students with disabilities in general education classrooms. A recommendation for future research is to study the impact of those other strategies (i.e. consultation services, pull-out programs, support facilitation) on the achievement of general education students who are in the same classes as the students receiving those services.
5. This study was purely quantitative in nature. Only anonymous student data was considered in the analysis of the findings. A recommendation for future research is to include a qualitative component to the study. The teacher perspective on student achievement may help to contribute to a well rounded

understanding of the data. Also interview data from administrators could add to the understanding of why schools choose to or not to use co-teaching as an inclusion strategy.

6. This study focused specifically on 10th-grade general students. Building on the study to determine the influence on the performance of students with disabilities within a co-teaching classroom inclusion model, would add to the body of knowledge on the effectiveness of co-teaching for all students.
7. Further investigation to determine how co-teachers are selected for co-teaching assignments and if the method has an impact on student achievement would help provide further insight.
8. Fidelity studies on the implementation of professional development for co-teachers could also help describe some of the impacts on student achievement as a result of co-taught environments.
9. Researching the resources and materials used in co-taught classes compared to traditional one teacher classrooms and the impact of the instructional materials used on student achievement would add to the body of knowledge regarding co-teaching. If teachers use different or supplemental materials in co-taught classes that may be a factor in student achievement. This could be an additional area of research to help understand the relationship of co-teaching and student achievement.

10. Schools likely vary in their ratio of students with disabilities and general education students in co-taught classrooms. A research study to investigate the threshold number at which the presence of students with disabilities does impact the achievement of the general education students who help guide schools and school districts in creating policies and implementing practice that ensured the threshold was not breached.
11. A consideration this study exposed is the cost analysis factor of co-teaching. Future research to determine if true co-teaching models are more expensive than self-contained classrooms would help school districts and schools decide if co-teaching is a model to consider based on their fiscal resources.

Summary

Co-teaching is being used in a variety of different environments to meet the needs of students with disabilities in general education classrooms (Jung, 1998; Chiang, 1999; Dieker & Murawski, 2003; Walter-Thomas, 1997; Mastropieri, et al., 2005; Belmarez, 1998; Cawley, Hayden, & Cade, 2002; and Wilson & Michaels, 2006). Several factors should be considered when implementing co-teaching at the secondary level to ensure success (Dieker & Murawski, 2003). This study was quantitative in nature and focused specifically on student achievement on the test required by the state of Florida for graduation. Although this study attempted to control for the variety of factors that impact student achievement there is no guarantee that all factors were neutralized. These results

and implications add to what is already known about co-teaching. For general education students in co-taught classes their achievement is likely to not be impacted. This study indicated that general education student achievement is not negatively impacted by the presence of students with disabilities in co-taught classes. These implications may be important to administrators as they carefully consider inclusion strategy options. If general education students or students with disabilities are being negatively impacted as a result of co-teaching the administrative team needs to reconsider the other factors that Dieker and Murawski describe. The intention of inclusion was not to negatively impact students whether they are general education students or students with disabilities. For this reason, schools would be prudent to continue to seek research based best practices and determine if those practices are the right fit for their school at the right time.

APPENDIX A
DEMOGRAPHICALLY ELIGIBLE SCHOOLS INCLUDED IN THE POPULATION
OF THE STUDY

School	District	Total membership	Non white ethnicity %	% FR/RD Lunch
Atlantic High	Volusia	1281	29.02	38.20
Astronaut High	Brevard	1307	20.05	22.57
Bartow Senior High	Polk	1879	39.33	38.16
Eau Gallie High	Brevard	1735	19.54	22.07
Eustis High	Lake	1349	33.58	34.03
Hagerty High	Seminole	2253	30.89	12.43
Harmony High	Osceola	1897	26.41	33.42
Lake Howell High	Seminole	2342	43.08	29.63
Lake Mary High	Seminole	2442	40.83	26.25
Lakeland Senior High	Polk	2075	40.00	36.82
Leesburg High	Lake	1696	36.38	39.21
Lyman High	Seminole	2467	37.94	32.31
Matanzas High	Flagler	1443	27.93	37.01
Melbourne Senior High	Brevard	2190	23.11	16.89
Merritt Island High	Brevard	1545	16.57	13.2
New Smyrna Beach High	Volusia	1940	13.40	30.93

School	District	Total membership	Non white ethnicity %	% FR/RD Lunch
Oviedo High	Seminole	2018	24.43	16.35
Palm Bay Senior High	Brevard	2324	45.31	31.33
Rockledge Senior High	Brevard	1238	36.59	16.32
Satellite Senior High	Brevard	1260	10.56	8.33
Seabreeze High	Volusia	1827	16.42	18.66
South Lake High	Lake	2118	36.83	32.67
Space Coast Jr/Sr High	Brevard	1962	15.75	18.91
Tavares High School	Lake	1322	21.94	29.95
Titusville High	Brevard	1398	28.97	22.46
Viera High	Brevard	1941	22.00	7.47
Winter Springs High	Seminole	2282	34.27	28.53

APPENDIX B
INSTITUTIONAL REVIEW BOARD PERMISSION



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Not Human Subjects Research

From : UCF Institutional Review Board
FWA00000351, Exp. 10/8/11, IRB00001138

To : Alicia K. Parker

Date : August 17, 2009

IRB Number: SBE-09-06306

Study Title: THE IMPACTS OF CO-TEACHING AS A METHOD OF INCLUSION ON THE GENERAL EDUCATION STUDENT

Dear Researcher:

After reviewing the materials that you have submitted, the UCF Institutional Review Board has determined that your project involves secondary data that has been de-identified and does not appear to meet the definition of Human Subjects Research as defined by DHHS regulations. The researcher will still need to obtain permissions etc. but not under IRB over-sight.

Therefore, IRB review is not needed.

Thank you for your time in resolving this issue. Please continue to submit applications that involve human subject activities that could potentially involve human subjects as research participants.

On behalf of Joseph Bielitzki, M.S., DVM, UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 08/17/2009 10:04:24 AM EDT

A handwritten signature in cursive script that reads "Joanne Muratori".

IRB Coordinator

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