ABSTRACT

ACADEMIC OUTCOMES FOR STUDENTS WITH DISABILITIES EDUCATED IN CO-TAUGHT SECONDARY MATHEMATICS COURSES

BY

Amy Ilene Gaines

Master in Arts in Special Education,

Mild/Moderate Disabilities

Given the necessity for vast improvements in secondary inclusive programs for students with mild to moderate disabilities, a study was conducted at a middle school site to specifically look at the quantitative results gleaned from co-teaching practices used as the primary service delivery model to support students with disabilities in inclusive math classes. General .findings suggest that there is a significant discrepancy seen between the improvements made by students with disabilities who are enrolled in general education co-taught classes versus students with disabilities who are enrolled in special education only classes. Overall, students in segregated special education classes make less progress on assessments of basic arithmetic computation as well as standards based standardized assessments when compared to students with disabilities who are enrolled in general education co-taught classes. Implications for instruction and future research are explored.

CHAPTER 1

INTRODUCTION

There is an abundance of literature currently suggesting the importance of developing and implementing inclusive practices which engage and embrace the complex needs and spirits of diverse learners on general education public school sites. Although the need to meet this challenge is real, there is little research indicating which practices have been quantitatively verified as being among the most effective in successfully meeting this challenge. Given the necessity for vast improvements in secondary inclusive programs for students with mild to moderate disabilities, a study was conducted at a middle school site to specifically look at the quantitative results gleaned from co-teaching practices used as the primary service delivery model to support students with mild/moderate disabilities in inclusive math classes.

The school at which this research was conducted had reached a critical point and sought to change the manner in which they were addressing the needs of their students with disabilities. Numerous factors contributed to this scenario. First, there were special education teachers who were interested in making positive change and were receptive to guidance from the research facilitator. These teachers were frustrated as they perceived their teaching responsibilities had become quite ambiguous while the amount of paperwork they were required to process continued to escalate. They were held more accountable for their students' success, particularly while their students were in general education classes, although the structure of the school did not provide for sufficient opportunities to enhance the support that their students were accessing. Teachers at this school felt severely limited in terms of the resources and supports they were able to offer

for students with disabilities. This was the case for students in special education classes as well as those who were being educated in general education classes. At this school, the resource specialists were required to teach a full load of academic classes as well as monitor the students on their caseloads in all of their general education classes, test students for upcoming IEP's, and conduct IEP meetings for a caseload of 28 students in a typical school year. Due to scheduling needs in the master schedule, resource teachers often did not teach all of the students on their case loads and frequently did not see them at all throughout the school year unless they made a point of introducing themselves to each student. Consequently, most of the resource teachers felt the need to reorganize the service delivery options for their students.

Numerous factors interfered with prior attempts at establishing an effective inclusive program, further accentuating the need to develop a more robust inclusion program at this school site. The master schedule did not include time for special educators to collaborate regularly with general educators; several special educators were teaching up to four periods each day of general education reading remediation classes in which a large number of students with disabilities were enrolled, and consequently, these teachers did not interact regularly with all of the students on their case load. Additionally, while general and special educators made gallant efforts to collaborate with one another, they found that they lacked the collaboration and communication skills necessary to reach consensus when making educational decisions regarding the protocol for students with high incidence disabilities.

Resultantly, despite the efforts of the resource teachers, many students with disabilities were not making academic gains that were commensurate with their aptitude

and effort. However, there was a general consensus among the resource teachers and administrators that, if the structure of the resource program were modified, these students would be able to succeed at a far higher level. The hypothesized reasons for students' lack of progress varied. The students who were in special education classes were not able to access the general education curriculum, largely due to lack of subject matter expertise on the part of their special education teachers, in addition to generally low expectations. The No Child Left Behind (NCLB) Act of 2001 requires that students with disabilities be exposed to general education curriculum, and be given the opportunity to learn from teachers who are specialists in their subjects. This legal requirement for "highly qualified" content teachers was an added impetus to ensuring that students with mild to moderate disabilities at the middle school site be more systematically included in general education classes,' rather than pulled to resource content classes taught by special educators who typically lacked the content specialty.

Concurrently, it was determined that the students who were already enrolled in general education classes taught by content area specialists were only receiving a minimal level of support in the form of infrequent curricular modifications and occasional environmental accommodations. In most cases, if such students were not able to sustain acceptable levels of success, their placement was changed and they were reenrolled in special education classes. As a result, students were required to either "sink or swim" and, if they should fail, supports were provided only in the form of segregated classes. Clearly, this model more closely resembled the old mainstreaming readiness model, as opposed to the inclusion model that promises that adaptations will be provided as needed in the general education setting.

Other factors also contributed to this particular school site reaching a turning point and creating an environment that was ripe for positive change. The school district within which this school was a part was also moving toward improving inclusive practices, which resulted in strong administrative support in favor of enhancing the outcomes for students with disabilities, and making whatever changes were deemed necessary in order to effect such change. Until this point, the administrators present at the school site were supportive of developing a continuum of less restrictive settings for students with disabilities, however, they were not aware of the numerous manifestations of such a program. Consequently, while intentions were good, previous school wide efforts had reached a standstill. The district-wide push renewed efforts to improve inclusive practices.

During this time, the school district offered a competitive grant in which schools were able to apply for and receive up to $15,000 in funding to design and implement an inclusive program on the school site. The grant writing team, led by the author, developed a grant proposal whereby the goal was to increase the quality of inclusive opportunities for students with high-incidence disabilities. Of the service delivery options explored, the grant writing team, coupled with other school-site stakeholders, designated co-teaching as the primary service delivery option by which students with disabilities would be educated in general education classes. Ultimately, the school was awarded the full $15,000, which was used to fund training opportunities for the collaborative teams and to purchase educational materials.

The purpose of this project was to review the literature related to inclusive practices, specifically as they relate to the use of the co-teaching service delivery model

and with a focus on secondary schools. After identifying the research and literature available on this topic, this paper describes the research done at the middle school in question in an effort to add to the literature base in this area. The results of those efforts are provided and a thorough analysis of the implications of those results are offered in the Discussion section.

CHAPTER 2

LITERATURE REVIEW

Legal Rationale for Inclusion

Access to high quality education has become a focal point from which to refer when examining the factors that interfere with or prevent unique groups of citizens from becoming full-fledged functioning and contributing members of society with all of the rights and privileges afforded therein (Blanchett, Mumford, & Beachum, 2005). For this reason, educational experiences that are replete with the same academic and social opportunities that students without disabilities access has become a dominant concern when considering the rights of students with disabilities. The importance of holding all students, particularly those in minority groups such as students with mild to moderate disabilities, accountable for meeting state adopted curriculum standards has accentuated the importance of providing all students with a high quality education (Turnbull, 2005). As established in the groundbreaking case Brown vs. Board of Education (1954), educating students in separate but equal schools creates inherently unequal environments. It can be said that the same holds true for students with disabilities who are educated in classrooms or schools that are segregated solely on the basis of students' disabilities.

The legal and legislative factors surrounding the implementation of inclusive programs began with The Education for all Handicapped Children Act of 1974 (PL 94142), in which the educational rights of students with disabilities were acknowledged formally in the law. The legal ramifications of PL 94- 142 of 1975 mandated that students with disabilities were ensured a free appropriate public education (FAPE) with the rights and protections provided through the development and implementation of the Individual

Education Plan (IEP). Prior to the implementation of PL 94-142, "more than one-half of the children with disabilities in the United States did not receive appropriate educational services that would enable such children to have full equality of opportunity" (IDEA, Page 5).

PL 94-142 also introduced the notion of the Least Restrictive Environment (LRE) into the vernacular of educators. It mandated that students with disabilities were to be educated, to the greatest extent possible, with their non-disabled peers (Bergren, 1997). As a result, following the passage of this bill, school districts across the United States began to implement a continuum of services and placement options for students with disabilities known as the "cascade of services". The cascade of services was to include the general education classroom as *the first* consideration for all students with disabilities. Moreover, placing students in special education classrooms was to be investigated only after exhausting resources available for participation in the general education setting (Deno, 1970).

Initially enacted in 1990, The Individuals with Disabilities Education Act (IDEA) expanded on the legal ramifications introduced by PL 94-142. At the time of the initial enactment of IDEA, students with learning disabilities were already enrolled in public schools, however IDEA required that schools would identify the special needs of these students and would then provide specialized services to meet their educational needs (Vaughn & Linan-Thompson, 2003).

In 1997, IDEA was reauthorized in order to, among other things, "ensure that all students have access to a challenging curriculum, are held to high expectations, and are included in school accountability mechanisms" (Palmer, Wehmeyer, Gipson, & Agran,

2004). Consequently, it became imperative that all students were educated in the least restrictive setting as determined appropriate by the IEP team. While this is not unlike the cascade of services as described by Deno (1970), IDEA mandated that IEP teams not only explore placement in the general education setting, but provide a legally justifiable rationale for choosing not to place a child in a general education setting.

Upon the enactment of Public Law 107-110, The No Child Left Behind Act of 2001 (NCLB), all students, including those with disabilities, must be taught by "Highly Qualified Teachers" so that they would have the same educational opportunities as students without disabilities. By requiring that all students be educated by teachers who meet the criteria of "highly qualified," the educational opportunities for students in segregated classrooms became a topic of scrutiny. How would it be possible for special education teachers, who typically teach several content area classes each day, be able to demonstrate subject mater competency in each core subject taught? With the introduction of the NCLB and the resulting mandates, it became necessary to reexamine the conditions under which students with disabilities are able gain access to content area instruction while continuing to meet their unique educational needs.

Academic Rationale for Inclusion

There are several academic justifications for including students with disabilities in general education classes. In many schools, special education teachers are required to teach several subjects to various grade levels, sometimes at the same time. This inevitably dilutes the amount of attention a teacher can devote to planning and delivering comprehensive, effective Lessons with sufficient differentiations strategies to meet their students' individual needs. As a result, students in special education settings, particularly

those in secondary grades, have historically been often exposed to watered down versions of the same curriculum that their nondisabled peers were accessing on a regular basis (Stainback, 1984).

Special education teacher credentialing requirements in California establish that special educators must demonstrate basic competency in a broad range of subject areas, without necessarily having to demonstrate specialized knowledge in any one core field (Shaul, 2004). Correspondingly, special educators typically lack the subject matter expertise that is required of secondary content area teachers. Secondary general education teachers, on the other hand, often have undergraduate degrees or comparable coursework in the content area in which they teach, and have also taken specific methodology courses addressing the pedagogical aspects of delivering content in their field. This discrepancy in teacher knowledge and expertise results in a cycle of educational inequality that is thought to be detrimental for students with disabilities whose needs have historically dictated that they would be educated in more restrictive settings (Yell & Katsiyannis, 2004). Thus, co-teaching as service delivery option for students with disabilities is an attempt to reconcile the problem of how to provide students with disabilities with high quality content area instruction, while meeting their individualized needs as expressed in their IEP (Murawski & Dieker, 2004).

Moral and Ethical Rationales for Inclusion

Research indicates that inclusion promotes social benefits for all students (Fitch, 1999; Staub, 1996; Weiner, & Tardif, 2004). As students with disabilities often have weak social competencies, they benefit from highly structured settings in which they can receive systematic social skills support in a general education classroom while interacting

with same-age peers (Salend, 2000). Additionally, students with disabilities often have difficulties generalizing their skills in novel settings (Forness & Kavale, 1996), making it intensely challenging to maintain social connections in general education settings without ongoing support from a special educator to facilitate progress. In light of this, the general education classroom can be an ideal environment in which to concurrently develop and practice social skills while continuing to make academic progress.

Baker et al. (1995) state that educating students with disabilities in inclusive settings promotes greater social, emotional, and academic development than does educating students with disabilities in segregated environments. Ritter (1999) found that students with disabilities who have been educated in segregated settings have been shown to have lower self-esteem than their peers who have been educated in non-segregated setting. He attributes this to the stigma associated with placement in special education classrooms. According to Weiner and Tardif {2004), students had more positive social and emotional functioning, and were more accepted by their peers, when they were in inclusive educational settings.

Research also indicates that students without disabilities also benefit from participation in inclusion classrooms. Staub (1996) found that, among other benefits, students without disabilities who were enrolled in inclusive settings showed improvements in their ability to develop friendships with students with disabilities, and these interactions improved their self-esteem. Bishop (1995) found that inclusive classroom settings resulted in an increase in the responsiveness towards the needs of others, which also increases self-esteem for all students involved.

Although these claims offer a promising rationale for promoting inclusion, actual empirical data does not definitively indicate that the mere introduction of students with disabilities into general education classes will result in greater self-concept (Murawski & Swanson, 2001; Whinnery et al., 1995) for all students involved. Although the research conducted thus far does not demonstrate with certainty that students in inclusive setting necessarily fare better than those in segregated settings, the determinations based on the pivotal court hearing Brown vs. Board of Education confirm that, with all things being equal, separate is inherently unequal.

Co-Teaching as a Service Delivery Model for Inclusive Classes

Co-teaching is distinct service delivery option that differs considerably from "mainstreaming". Cook and Friend (1995) define co-teaching as when "two or more professionals deliver substantive instruction to a diverse or blended group of students in a single physical space" (p.1). As described above, co-teaching by special and general educators is an attempt to meet the needs of students with disabilities in the general education setting while continuing to ensure that they are able to access all of the accommodations, modifications, and specialized instruction that is prescribed in the IEP.

Necessary Components of Co-Teaching

In order to ensure that a successful inclusion program with effective co-teaching teams can be established, research indicates that administrative support is a fundamental necessity (Burstein, Sears, Wilcoxen, Cabello, & Spagna, 2004; Deshler, 2006). Administrators are in the unique position to have a tremendous impact on the material resources provided to co-teaching teams, access to funding, planning professional

development, as well as influencing the change in culture (Fullan, 2001) that must transpire on many campuses before the benefits of inclusion can be realized.

Developing collaborative relationships can be a delicate process that can manifest as anything from an unsuccessful arranged marriage with warring factions to a thriving professional, rejuvenating partnership. Teachers who are flexible, are strongly committed to teaching and the act of co-teaching, and who have strong interpersonal skills are those who have been shown to have been the most successful at establishing and maintaining effective collaborative relationships (Arguelles, Hughes, & Schumm, 2000; Allen-Malley & Bishop, 2000; Gately & Gately, 2001).

Both special and general education teachers have a lot to gain from having a successful co-teaching relationship. This style of teaching results in both teachers utilizing their strengths in such a way that all students benefit from their unique professional competencies, which by merit of credentialing requirements, are quite dissimilar. Special educators traditionally have extensive training in strategic instruction, behavioral support, and differentiating instruction. All of these skills become critical in a successful inclusive classroom (Magiera, Smith, Zigmond, & Gebauer, 2005). On the other hand, in secondary grades in particular, general education teachers have a deep understanding of specific core fields, and the special educator has the novel opportunity to learn the subject through the process of co-teaching with the content area specialist (Murawski & Dicker, 2004).

Phillips (1995) found that, by co-teaching, co-teachers felt they had grown professionally by developing a deeper sense of the necessary components for meeting the developmental, social, and academic needs of all students. Hardy (2001) suggested that

having special educators in general education classes contributed to changes in the instructional behaviors of general education teachers, and supported the development of a successful partnership between the general education and special education teachers. Many general education teachers have come to accept that students with disabilities are coming... whether they're ready for them or not. Often, they are relieved to have additional support in meeting the needs of students with disabilities, despite the complications that are often entailed in such an arrangement.

Developing a successful co-teaching relationship requires numerous considerations. In the planning stages, Friend and Cook (2003) suggest that voluntary participation contributes to the formation of successful partnerships. Historically, teachers have considered their positions semi-autonomous, and forced collaborative relationships can be perceived as threatening to their classroom sovereignty. Friend and Cook also found that teachers, when given the opportunity to choose if, and with whom, to co-teach, are more receptive and report greater levels of success for both their students and for themselves.

Possibly the most important component in any successful co-teaching relationship is the need to establish rapport and parity. One tool, developed by Murawski and Dieker (2004) is the S.H.A.R.E. worksheet (described in methods section), which serves as a catalyst to initiate discussions around the issues of co-teaching and meeting the needs of all students in a general education setting. Friend and Cook (2004, pg. 188-189) emphasize that teachers need to establish parity during the planning stages of their relationship, and continue to do so throughout their relationship in order to maintain co-equal status in their co-taught classroom.

As schools embrace co-teaching as a common service delivery option for students with disabilities, special education teachers face a challenge in making regular contact with all of the students on their caseloads. For this reason, it is preferable to cluster students with disabilities into specific general education classes. While it is desirable to maintain "natural proportions" (Salend, 2001; Murawski, in preparation) of students with disabilities to those without, the practical aspects of schools often require clustering which results in a disproportionate number of students with disabilities in the inclusive classroom. Murawski cautions, however, that no more than 30% of a class should consist of students with disabilities if positive academic and behavioral results are to be gleaned. Clustering more than that may actually result in a loss of the benefits generally recognized through inclusive efforts. However, in many settings, these proportions are skewed, possible disrupting the "natural proportions" that are hypothesized to result in gains for students with disabilities (Dieker & Murawski, 2003). This is the core of another necessary component for successful co-teaching: heterogeneous classes. Currently, research indicates that heterogeneous classes are necessary for successful coteaching in order to provide students with disabilities with a same age peer group to reinforce appropriate social and academic behaviors and expectations (Hourcade & Bauwens, 2001).

Co-teaching is a multi-faceted way of delivering instruction that extends beyond the scope of what transpires only in the classroom. According to Murawski (2004), there are three elements in successful co-teaching: co-planning, co-instruction, and coassessing. Murawski has found that that co-planning is the most important and the most frequently overlooked aspect of co-teaching. While it may take many forms - be it formal

meetings on a daily or weekly basis, or quick informal discussions between classes, it is essential that both teachers devote time to this in order to maximize the benefits of co-teaching for their students and themselves. Student outcomes and teacher satisfaction both increase when teachers make sure that they devote time on a regular basis to planning the content and the strategies to be utilized in the co-taught classes.

Co-instruction is the second necessary element in effective co-teaching. It incorporates both teachers in meaningful interactions with all students in the classroom at a single time. Co-instruction may take many forms, and it should vary as needed according to the academic needs of the student population and the instructional content being delivered (Friend & Cook, 2003). Torgesen (1996) found that, in order for instruction to be effective, particularly for students with learning disabilities, it must be explicit, intensive, and supportive. With this in mind, it is imperative that co-teachers carefully plan lessons that will meet the needs of their very diverse student populations.

At any time, effective methods of co-instruction may manifest as one of various teaching arrangements. Regardless of the style of co-instruction that teachers select, it is important that they switch roles often so that students do not grow to see one teacher as having more authority or capability that the other, possible reducing the impact one co-teacher may have with the students (Murawski, 2004).

Co-Teaching Approaches

Whole group instruction, known as Team Teaching or One Teach/One Support (Friend & Cook, 2003), typically entail having both teachers taking an active role in presenting instruction, often tag-teaming throughout the class period. In order for this, or any, style of co-instruction to work out successfully for both teachers involved, it is

critical that ample co-planning has been done prior to each class in order to ensure that one of the teachers (often the special educator) is not relegated to a reactionary role by virtue of being unaware of the lesson plans for the day.

Another style of co-instruction is small group instruction. In this type of arrangement, teachers may elect to do station teaching, parallel teaching, or alternative teaching (Friend & Cook, 2003). In these models, teachers can organize their groups based on learning styles, teaching strengths, and/or student needs. For example, students can select which of two groups to participate in, depending on the mode of instructions being utilized.

Although best practice dictates that co-teaching is delivered to heterogeneous groups of students, in an ideal co-teaching situation, teachers would have the ability to group their students flexibly. Teachers 'may elect to form groups of students based on need, as long as the groups are not determined by the mere presence of a disability. In ensuring that students with disabilities are not grouped together by pure virtue of their disability, the benefits of inclusion and co-teaching can be realized.

The final necessary component of co-teaching is co-assessment. Ideally, both teachers would have determined prior to initiating their co-teaching relationships how they would assess their students, and would be willing to reexamine the protocols used for assessment regularly as they become more familiar with their students. Co-assessing involves deciding upon the content knowledge and/or skills to be measured, the degree of accuracy to be attained, and the mode of assessing. Although there is no mandated protocol dictating the extent to which IEP goals are to be considered in making assessment considerations, conversations around co-assessing should also include

decisions about the IEP goal attainment, and individual student improvement (Struyk & Epstein, 1995).

General findings regarding co-teaching indicate that strong co-teaching relationships can result in overall very positive results for both students (Bauwens & Hourcade, 1997; Dieker, 1998; Walther-Thomas, 1997), and their teachers (Adams & Cessna, 1993; Walther-Thomas, 1997; Dieker & Murawski, 2003). Although the preliminary research indicates that co-teaching can be a powerful service delivery option for students with disabilities, more research must be conducted to verify the permutations and limitations of these programs (Murawski & Swanson, 2001). In fact, Boudah, Schumaker, and Deschler (1997) suggest that, despite a strong literature base describing the theoretical advantages of implementing collaborative teaching programs, more systematic research must be conducted to gauge the effectiveness of such programs. Murawski and Swanson (2001) assert that, although there is research to support inclusion, more empirical evidence must be ascertained in order to determine if co-teaching is, in fact, among the most effective service delivery option for students with disabilities.

As of now, there is very little evidence documenting the advantageous use of co-teaching in secondary math classes (Magiera, Smith, Zigmond, & Gebauer, 2005). Most states have established standards for math that are the same for students with and without disabilities (Goldstein, 2004). In light of the pervasive difficulties that many students with disabilities have thus far encountered in math curriculum (Algozzine, O'Shea, Crews, & Stoddard, 1987), it is imperative that more research be conducted in order to determine which teaching strategies are among the best practices in the field (Deshler, 2006). With this need in mind, this research was conducted to add to the literature base

and possibly lend insight into the burgeoning, but largely undocumented, practice of co-

teaching, particularly as it relates to secondary math instruction.

CHAPTER 3

METHODS

Setting

The research data presented is a compilation of evidence gathered over the course of two academic years at a public middle school of grades 6-8. The school is a part of the Los Angeles Unified School District, the second largest school district in the nation. During the first year of the study, there were approximately 1198 students enrolled in the regular school, and 406 students enrolled in the humanities magnet program. During the second year, there were 1109 students enrolled in the regular school, and again 406 students in the magnet program. The school is on a traditional calendar with each school day divided into six academic classes, with an advisory period at the beginning and end of each day. All classes meet at the same time each day and in the same order each day. All of the general education teachers participating in the study were assigned to one classroom for the entire day and were not required to "travel" from classroom to classroom throughout the day.

At the onset of this study, there were 5 resource specialists (i.e., special education teachers) employed at this school site, each responsible for approximately 25-28 students on their caseload. The resource specialists taught several subjects each, depending on the needs of the students as well as their teaching strengths. All of the resource specialists had been trained to teach the district adopted intensive reading and writing curriculum, and four of them were teaching at least one two-hour block of that class each day. Per district approval, these classes were given general education class codes and were populated by students without disabilities as well as students with disabilities.

Traditionally, the resource teachers attempted to ensure that students on their caseload were enrolled in their intensive reading and writing classes, but there were numerous scheduling conflicts that made that impossible. Consequently, there were a handful of students in special education who did not see a resource teacher at all during the school day. Scheduling conflicts with teams and cores conspired to make frequent contact between resource teachers and students even more problematic.

Participants

Table One depicts the demographic information regarding the teachers and students included in years one and two of the study.

Teachers - Year One

During the first year of this study, there were six teachers involved: three general education teachers and three special education teachers. A resource specialist and a general education math teacher taught the experimental groups while the remaining three teachers taught the control groups.

Mr. W, the general education math teacher who co-taught the experimental groups, taught a total of five math classes daily. He taught four Math 7 classes, and one 7th grade Algebra class. At the time the study was initiated, Mr. W had a total of 8 years teaching, 4 of which were spent teaching Math. His teaching credential qualified him to teach English, which he'd done for 4 years prior to starting his current position. Mr. W also fulfilled the requirements to receive a LAUSD Middle school authorization to teach math at the secondary level and he was "highly qualified" per NCLB. At the onset of this 'study, Mr. W described his experience teaching students with disabilities as "very limited". He stated that he'd had "a couple of" students with disabilities in his classes in

the past, although those students were able to perform very well without accommodations and he'd never found it necessary to collaborate with a special educator to improve such students' abilities to access and master grade level curriculum. Accordingly, Mr. W had never co-taught any of his classes nor had he ever established any type of relationship that he'd described as "collaborative" with his colleagues.

Mrs. H was one of the general education math teachers who taught one of the control groups. She had 33 years of teaching experience at the onset of the study. All of her teaching experience was spent teaching math at the secondary and post secondary levels. She also had the additional responsibilities of being the chairperson of the math department, as well as being the "math coach" for the school, which entailed serving as a mentor teacher and performing administrative tasks in addition to typical classroom duties. Mrs. H's academic background and teacher training qualified her as being "highly qualified" by the standards set forth in NCLB. Mrs. H did not describe herself as having had any relevant experience working with students with disabilities in her classrooms.

Mr. R taught the other 7'1' grade comparison condition. At the onset of the study, he'd had 12 years of teaching experience, and extensive coursework in the area of math. His mathematical and professional background qualified him as "highly qualified" per NCLB. During the year that he participated in the study, he taught four 7th grade math classes, and one art elective class.

The remaining three teachers who participated in the study were special educators. Ms. G, the resource specialist, had four years of teaching experience, all of which were spent teaching 6th grade Math and English to students with disabilities in segregated special education classrooms. The year the study was initiated was her first

year teaching 7th grade Math. During this year of the study, she co-taught two 7th grade classes daily: Math and Science. She also taught one self-contained special education Math 7 class to a group of 13 students, all of whom had identified disabilities. She was in the process of completing her teaching credential in Special Education at the time the study was initiated. Ms. G was not highly qualified to teach math (per NCLB), but had demonstrated subject matter competency by passing the Multiple Subject Assessment Test (MSAT), a battery of tests used to qualify elementary school and special education teachers to teach multiple subjects in the state of California.

The comparison groups of students with disabilities in segregated settings (i.e., Special Education classes) were taught by the two remaining special education teachers. Mr. S replaced another teacher who left the school approximately four months after the academic year began. This teaching position was Mr. S's first, and he was beginning to take special education credential courses during this time. Accordingly, he was not highly qualified as determined by the parameters outlined in NCLB, although he had demonstrated multiple subject matter competency by passing the MSAT. During this year, Mr. S taught two 8th grade Algebra classes, two 6th grade Math classes, and one 7th grade math class; each of these classes was designated as a class serving only students in special education.

The other special education teacher, Mr. H, had had over 25 years of experience teaching students in special education classes. During the study, he taught three math classes to students in grades 6-8 as well as an intensive reading and writing development 'class. His teaching credential qualified him to teach students with a "learning handicap" (the old California credential for working with students with mild to moderate

disabilities), and he taught students who were in the Special Day Program (SDP; for self-contained classes) as well as the Resource Specialist Program (RSP). Despite being highly experienced in special education, Mr. H had not demonstrated subject matter competency in Math and he was not highly qualified at the time the study was initiated.

Teachers - Year Two

During the second year of the study, Mr. W and Ms. G continued to co-teach with each other. During Year Two, they co-taught two classes and tripled the number of students with disabilities in each of their co-taught classes (from n = 7 to n = 21 dispersed between their two classes). As with the previous year, Ms. G also taught a segregated Math 7 course in which all students enrolled had various disabilities. Mrs. H continued to teach the control general education class in which all students enrolled did not have disabilities.

Unlike the previous year, Ms. G also co-taught two 6th grade math classes with Mr. C, a 6th grade math and science teacher, in addition to the classes co-taught with Mr. W. At the time, Mr. C was in his 2°a year of teaching, and he'd earned his multiple subject teaching credential the previous year. Thus, Mr. C. was considered highly qualified to teach 6th grade students. At the time this study was initiated, he had never taught children with disabilities nor has he established a collaborative relationship with any other teachers; however, he reported that he'd taken a class in his credentialing program that introduced him to the needs and challenges of working with children with disabilities.

There were two more non-coteaching comparison groups for 6th grade during Year Two. Mrs. R was a veteran general education teacher with over 25 years of

teaching experience, the past 13 of which were spent teaching Math and Science to 6th grade students. Her teaching credential was in elementary education, which qualified her to teach the Math and Science core to students up to grade 6.

Mrs. T taught the last 6th grade comparison group which consisted entirely of students with disabilities. At the time the study was initiated, it was her first year teaching at the school, although she'd had 12 years of experience teaching children at her former school, a non-public school in which all students enrolled had emotional disturbances and/or behavioral disabilities. Her teaching credential qualified her to teach students with mild/moderate disabilities in grades K-12. During the course of this study, Mrs. T taught three math classes: grades 6, 7 and 8. She also taught two science classes to multiple grade levels.

Students and Conditions- Year One

Co-Teaching Condition (COT)

During the first year of implementation, the experimental group (Le., COT-7) consisted of the students in a single 71h grade Math course, which was co-taught by Mr. W. and Ms. G. In this class, approximately 18% (7 out of 38) of the students had mild to moderate disabilities, and would have been enrolled in a segregated math course if the study were not being conducted. Of the students with disabilities represented in this study, most of the students qualified for special education services with learning disabilities and/or Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder. Several students had autism or Asperger's syndrome.

Non-Co-Teaching Conditions (CON, SPED-ONLY, GE-ONLY)

Of the three self-contained special education comparison group classes (e.g., SPED-ONLY 7.1, 7.2, and 7.3), Ms. G. taught a single class of 14 students with disabilities. For the purposes of this study, this class is referred to as SPED-ONLY 7.1. Mr. S taught a class in which there were nine students enrolled (SPED-ONLY 7.2), and there were eight students enrolled in Mr. H's class. (SPED-ONLY 7.3).

While Mr. W. co-taught only one period each day, two of his other classes were used as comparison groups to measure the relative differences in skill changes for students in co-taught versus non co-taught classes. There were 4 (out of 36 total students) students with disabilities, making the percentage of students with disabilities 11%. This condition was known as the consultative condition (i.e., CON-7.1) because Mr. W did receive occasional informal consultative assistance from special educators who had students with disabilities on their caseload in this class. In his other consultative class (CON-7.2), there were 7 students with disabilities, out of 34 total students (21%).

Mrs. H's general education control class was designed to be one of the two classes without students with disabilities (i.e., GE-ONLY 7.1). However, it was later determined that there were indeed two students with identified disabilities in this class. Because of the nature of their disabilities (i.e., physical disabilities), it was subsequently determined that their academic performance was not affected in any way by their disabilities. Thus the class was maintained as a comparison setting and these students' disabilities will not be considered for the purposes of this research study. Mr. R taught the GE-ONLY 7.2 class in which there were a total of 28 students enrolled; none of whom had identified disabilities,

Students and Conditions - Year Two

Experimental Groups

During the second year of the study, there were a total of three experimental groups and seven comparison conditions. In the 6th grade experimental class, which was co-taught by Mr. C and Ms. G, there were a total of 34 students. Fourteen of those students had identified disabilities. In that class, the percent of students with disabilities was 41%.

The other two experimental (intervention) groups were 7th grade classes cotaught by Mr. W. and Ms. G. In the first of those two classes (COT-7.1), there were 16 students with disabilities and 19 students without, making the percent of students with disabilities approximately 46% of the total class. In the second co-taught math class (COT-7.2), which was also co-taught by Mr. W and Ms. G, there were 6 students with identified disabilities and 29 students without, making the percent of students with disabilities approximately 17%. (It should be noted that at the end of the academic year, 2 of the 30 students without disabilities were assessed and determined to be eligible for special education services. This change increased the percentage of students with disabilities to 23% of the class.)

Comparison Groups

Mr. W taught one other general education Math 7 class (CON-7) in which there were a total of 8 students with disabilities enrolled, and 28 students without disabilities, making the percent of those with disabilities 22%.

Mrs. R taught two 6th grade math classes, one of which was assessed for the purposes of this study. This class had a total of 35 students enrolled, none of whom had

identified disabilities. This class is considered a "General Education Only" comparison conditions (GE-ONLY 6).

Mrs. H. taught two comparison group classes with 38 students on one class, and 40 students in the other. There were not any students receiving special education services in her classes at the time. Thus, both of these classes were considered "General Education Only" comparison conditions as well (GE-ONLY 7.1 and GE-ONLY 7.2)

The last comparison group was taught by Ms. G. This class consisted of 18 students with identified disabilities, and was considered a "Special Education Only" comparison condition (SPED-ONLY 7).

Instrumentation

In order to measure the mathematical skill gains made by the students with disabilities in both the experimental and control math classes, the researcher assessed the students' skills using two primary measures, The first test was an assessment of basic skills. The other assessment used for research purposes was the California Standards Test. Table 2 provides an overview of which assessments were provided in the various conditions over years one and two.

Basic Skills Test

The basic skills test (BST) consisted of 48 open ended math computation problems extracted from the KeyMath test. This assessment was selected because the researcher wanted a measure that would incorporate math skills for all four math skill areas (addition, subtraction, multiplication & division of whole numbers, integers, fractions and decimal numbers) with a wide range of difficulty levels. This was considered important because the researcher wanted this test to be very sensitive to

minute changes in students' skills over each of the nine academic months during which the study was being conducted. An additional consideration in its selection was the relative rarity of its use at the school site. The KeyMath test, unlike the Kaufmann Test of Educational Achievement (KTEA) and the Woodcock-Johnson Test Revised (WJ-R), was not used for special education assessment or to determine eligibility at this school, which meant that using it would not reduce the testing validity of the data found when testing students for their IEP's. Validity and reliability scores are not provided for this assessment because it was not administered in its entirety. Additionally, standard scores were not derived from students' raw scores malting issues pertaining to statistical validity irrelevant.

For the purposes of this study, this test was administered twice during the course of each academic year as a pre and post measure; first on the third day of the school year in all of the participating classes, and again during the last week of the school year. All students were given exactly one 55 minute class period to complete the assessment, and there was not any type of prompting or help given to any of the students.

California Standards Test

The other data collection tool used for this research study was the California Standards Test (CST), a standardized assessment administered to students in the state of California during May of each traditional academic school year. This test, unlike the Basic Skills Test, was administered only once during the academic year, so pre- and postdata an the same assessment is not available. Moreover, this assessment does not measure basic skills. Rather, it assesses student mastery of grade level standards (as deteunined by the state), and a strong majority of the math problems are application problems that

integrate a variety of skills into each problem, as well as require substantial reading. This is a very important distinguishing characteristic in that many of the skills that are assessed on the CST are unique to the grade level and were not addressed at all on the basic skills test. For example, released test questions excerpted from the 7th grade CST require that students convert numbers from Standard Form into Scientific Notation, to compute the length of the missing side of a triangle using the Pythagorean Theorem, and to distinguish the characteristics of irrational versus rational numbers. Such skills correspond closely to the content standards set forth by the state of California, but do not necessarily indicate advances in number sense as measured by the BST. The Math subtest of the CST, which was used in this study, is an untimed multiple choice assessment consisting approximately 70 questions given over the course of two consecutive testing days.

Procedure

Grant Funding

In planning and implementing the grant, budget determinations and expenditures were made at the discretion of involved administrators with guidance from the principal grant writer (the author). The grant writing team chose to invest in educational equipment that was believed to make grade level general educational curriculum more accessible to students with disabilities. These purchased materials included A1phaSmarts, computer programs, math manipulatives, and additional typical classroom resources such as colored paper, organizational materials for students, transparency film, crayons, colored pencils, projector pens, and so forth. All materials purchased were available for any of the math classes, including those co-taught and the comparison classes.

The bulk of the grant funding went to enlisting professional experts to train the entire school staff, all of the school administrators, and the select teachers and assistants who would be participating in the program. This training was conducted in three stages, and was facilitated by a university professor who was also a nationally recognized expert in the field of co-teaching. Ultimately, the entire administrative staff attended a half-day training first, followed by a two day training for the general and special education teachers, and the instructional assistants who were planning to participate in co-teaching. Finally, the entire school staff was trained in an afternoon staff development session. While the grant was written to support co-teaching in 7th grade Math and Language Arts classes, the research presented here specifically addresses the academic implications of co-teaching in the 6th and 7th grade Math classes.

Identifying Teams

Co-teaching teams were selected based on a variety of factors. The author, along with the assistant principal in charge of special education and the principal of the school, determined that 7e' grade would be the most appropriate age group to start with as the special educator who would be co-teaching was familiar with most of the students and thus was able to assist in identifying the students to participate in the co-taught classes. In order to select a team of general education teachers to start the inclusion program, the grant development team evaluated personality characteristics, teaching strengths and interests, and professional competencies of the various interdisciplinary teams on the campus. Of the three 7th grade teams from which to select, one was affiliated with the magnet school, which limited the number of students that could attend classes taught by such teachers due to class size constraints. The other team of teachers typically taught

students who were bilingual and participating in the English as a Second Language curriculum. The team that was eventually selected, known as the Jaguars, was the team that typically taught the "cluster" of students in the resource program, and the team that taught the students in the traditional school program (as opposed to the students in the Magnet School) who were participating in the intensive reading and language development program. This team was determined to be the most appropriate team of teachers because they were a cohesive group of teachers who had demonstrated the ability to collaborate productively as an interdisciplinary team. Moreover, the math and Language Arts teachers in the Jaguar core were both very engaging teachers who had historically been very receptive to having students with disabilities enrolled in their classes.

Setting Up Co-Taught Classes

Programming Students

Year one. Upon determining that the inclusion program would start with students in the 7th grade, programming students was made only after very careful consideration of each of the students' unique academic, social, and emotional needs. At the end of the academic year prior to the implementation of the inclusion program, each of the three special education math teachers were asked to make placement reconunendations for each of the students in their 6th grade math classes. The teachers were asked to consider the students' basic math computation skills, their creative problem solving/mathematical resourcefulness, work habits, anticipated ability to perform in a general education classroom with less academic support that they'd had previously, and level of parental support for their child's academic achievement and for the program.

Surprisingly, only one of the three teachers (the grant'writer) recommended that any students participate in general education co-taught classes. The other two teachers did not believe that any of their students were good candidates and did not make any recommendations. Because there weren't sufficient teacher recommendations, other avenues were explored to designate students with disabilities for participation. The resource teacher who was leading the inclusion program had the opportunity to teach two summer school math courses at which time she worked closely with several of the students who had not been recommended to participate. In working with those students, she made the determination that they were suitable for the program and proceeded to enroll them in the co-taught classes. Additional students were selected upon analyzing their academic grades and previous standardized test scores..

Year two. By the time the second year of the study was initiated, the school district had established (and this school was required to adopt) new guidelines for programming students in the resource program. Specifically, there were not to be any more segregated classes taught by resource specialists other than an elective course intended to support students in meeting the academic challenges presented in their general education content area classes (i.e., Study Skills class). Rather, all students in the resource program were to be enrolled in general education classes for all content areas. All supports, including those accommodations delineated in their IEP's, were to be provided within the context of a tiered approach incorporating co-teaching as one of the most intensive support options available for students in the resource program.

As a result of the new mandates, and due to very limited personnel at the school site, most of the students with disabilities were enrolled in general education co-taught

classes. In doing this, many of the general education classes in which resource students were enrolled had close to 50% students with disabilities. Clearly, as denoted in the review of the literature, this did not correspond to the natural proportions that are deemed ideal for inclusive programs. However, the school site determined that it would be necessary to "cluster" students by teacher so that the resource specialists would be able to effectively monitor their students' academic progress.

Delegating Responsibilities in the Co-Taught Classrooms

During the last three weeks of the academic year prior to the year that the study was initiated, each of the co-teaching teams were trained by a university professor with national recognition in the area of co-teaching preparation. During one of the three day training sessions in which these teachers participated, they received the S.H.A.R.E. worksheet, which was created and published by the university trainer (Murawski, 2004). As part of the training process, each co-teaching partner responded privately and in writing to the questions listed on the S.H.A.R.E. worksheet, which served as a catalyst for the teachers to reflect upon his/her beliefs, philosophy and attitudes regarding most of the critical aspects of managing the classroom environment, sharing teaching and classroom responsibilities, and issues pertaining to serving students with disabilities. After completing the worksheet, the teachers were brought together on a later date to discuss their responses using the S.H.A.R.E. worksheet as a canvas from which to base their conversation topics.

By the time year one of the study began, Mr. W and Ms. G had discussed at length what they each envisioned for themselves and their students in the co-taught classes. Both teachers agreed that it would be each of their responsibilities to get to know

and interact with all of the students in such a way that they would each feel comfortable making accommodations to assignments and the classroom environment if they felt it was necessary and justified, providing supplementary materials to students, and providing individualized support to students throughout each class period as needed.

CHAPTER 4

RESULTS

Year One Results

Basic Skills for 7th grade

All subgroups

Tables 3-5 depict the mean raw scores on the Basic Skills Test earned by each of the subgroups of students participating in the first year of the study. As demonstrated, the mean raw score for the pre-test was 25.86, while the mean raw score for the post test was 29.6. This is an average improvement of approximately 3.72 points, or about a 14.38.% improvement over the pre-test scores.

Students with Disabilities in Segregated Settings

The students with disabilities who were enrolled in segregated special education classes (SPED-ONLY 7.1, 7.2 and 7.3) improved overall by 3.14 points (14.13%),

Students with Disabilities in General Education Co-Taught Settings

The students with disabilities who were taught in the general education co-taught class (COT-7) improved their scores an average of 6.43 points, which is 25.58% higher than their initial score. However, those students with disabilities in a non-co-taught, consultation only general education classroom (CON-7) demonstrated scores that actually dropped 1 point, a decrease of 4.8% from their initial scores.

Students Without Disabilities

Students without disabilities who were enrolled in the co-taught general education class (COT-7) improved their score by 4.97 points, which is an improvement of 17.7%, whereas students without disabilities who were enrolled in the consultation-only general

education classes (CON-7.1 and 7.2) improved their score by an average of 6.6 points, which is a 21.53% improvement.

The general education students in the comparison general education only classes (GE-ONLY 7.1 and 7.2) improved their scores by 2.86 points, which results in an improvement of 8.63%. Of all of the groups of students without disabilities, this group of students showed the least amount of improvement, both in terms of their point increase, and their percent of increase.

Year Two Results

Basic Skills Test Results for 66 Grade: Year Two

All Subgroups

Tables 6-8 illustrate the changes in raw scores on the Basic Skills Assessment made by students in the *6th* grade during the second year of the study. These data include the mean pre-test score, mean post-test score, the raw point change, the percent of change, the overall mean as well as the range in scores on the pre- and post- tests. On this subtest, the students with disabilities enrolled in a general education co-taught math class earned the lowest mean pre-test score of 18 answers correct out of a total of 48 (equivalent to 37.5% correct), while the students in the general education only control class earned the highest mean pre-test score of 27.05 (equivalent to 56.3% correct). This represents a range of 9.05 points between the highest and lowest mean pre-test scores. On the post-test, the students with disabilities again earned the lowest mean score or 26.4 (or 55% correct), while the students without disabilities enrolled in the co-taught comparison class (COT-6.1) earned the highest mean post test score of 34.6, which is equivalent to

72% correct. On the post test, the range between the lowest and highest mean scores was 8.2 points.

Results from this pre- and post- assessment show that the students with and without disabilities who were enrolled in a co-taught class made greater gains in their math computation skills that those students who were not in a co-taught class at all.

Results from this assessment were not obtained for students in the 6'h grade who were enrolled in segregated special education settings (SPED-ONLY 6). The reasons for this omission are discussed in the Limitations section of chapter five.

Students with Disabilities in General Education Co-Taught Settings

During the second year of the study, students with disabilities who were enrolled in the 6`1' grade co-taught class with Mr. C and Ms. G (COT-6.1) showed an increase of 8.4 points on the BST. This corresponds to a 46.67% increase over their pre-test scores.

Students Without Disabilities

Students without disabilities who were enrolled in the COT-6.1 class improved their average score by 1 I.19 points, or 51.78%. The students without disabilities who were enrolled in the co-taught class in which there were not any students with disabilities enrolled (COT - GE 6) improved their scores by only 9.38 points, or 37.2%. In other words, students without disabilities actually improved their percent of increase when enrolled in a co-taught class in which students with disabilities were present. The implications of this finding are critical and will be discussed in Chapter Five.

Students who were enrolled in the GE ONLY - 6 conditions improved their score by an average of 7.25 points, or 26.84%. This is the smallest point increase seen in all 6th grade class assessed.

Basic Skills Test Results for 7rh Grade. Year Two

All Subgroups

Tables 9-11 depict the mean scores on the Basic Skills Test earned by each of the 7`h grade subgroups of students participating in the second year of the study. As demonstrated, the mean score for the pre-test was 27.3, while the mean score for the post test was 32.28. This is an average improvement of approximately 4.98 points, or an 18.24% improvement over the pre-test scores.

Students with Disabilities in Segregated Settings

The students with disabilities who were enrolled in segregated special education class (SPED ONLY 7.1) improved overall by 4.5 points (23.2%). As seen in the data from year one of the study, this subgroup of students was again ranked the lowest on both their pre- and post-test scores when compared to each of the other subgroups. Furthermore, the discrepancy between pre-test scores for this group of students and the students with disabilities enrolled in the co-taught classes was 4.6 points, while the discrepancy on post-test scores was 6.1 points. This reveals that these students who were enrolled in the segregated setting not only made less progress than all other groups of students assessed, their gap between their skills and those of the students with disabilities in the general education class grew even wider.

Students with Disabilities in General Education Settings

The students with disabilities who were taught in the general education co-taught classes (COT-7.1 and 7.2) improved their scores by an average of 6 points, which is 25% higher than their initial score. This point increase is identical to that of the students with disabilities enrolled in the consultative classes. Although these two sets of students (COT

and CON) showed comparable increase in scores, their percent of increase differed. Students with disabilities in CON-7 class increased their scores by only 6 points, or 19.4%. This is 5.6% less than that of students with disabilities in co-taught classes. This indicates that students with disabilities in the co-taught classes improved more than those students with disabilities receiving only consultative support in the general education setting.

Students Without Disabilities

Students without disabilities who were enrolled in the co-taught general education classes (COT-7.1 and 7.2) improved their score by 8 points, which is an improvement of 29.6%. This group of students showed the greatest increase in their scores when both their raw point change and percent of change is considered.

Students without disabilities who were enrolled in the CON-7 class improved their scores by an average of 6 points, an improvement of 21.4%.

The general education students in the GE-ONLY 7.1 and 7.1 classes improved their scores by 5.4 points, which results in an improvement of 15.7%. Of all of the groups of students other than those in the segregated special education setting, this group of students showed the least amount of improvement in terms of their point increase.

California Standards Test for 6th grade: Year Two

All subgroups

Tables 12-14 depict the mean scores on the California Standards Test (CST) for students who participated in the second year of the study while in the 6th grade. Pre-test scores are not available for this assessment, as it is administered only once each year, so student scores from the 5th grade were used as comparisons to the scores earned during

the course of the research study. On the CST, the mean pre-test score was 307.53, while the mean post-test score was 302.71. This is an overall drop of 4.82 points, or 1.7%

Students With Disabilities

On the California Standards Test, the students with disabilities who were enrolled in a segregated special education class (SPED-ONLY 6) decreased their mean score by 16.75 points, which is a negative change of 6.1%. This is a greater drop than that of all of the other subgroups of students assessed. Implications of this will be discussed in Chapter Five.

Students with disabilities enrolled in the general education co-taught (COT-6.1 SPED) class showed a drop in their mean test scores of 3.15 points, which corresponds to a 1.07% decrease.

Students Without Disabilities

The students without disabilities in the COT-6.1 class showed a mean drop in their scores of 8.75 points, which corresponds to a 2.77% decrease. This is the largest drop in scores for all subgroups enrolled in general education math classes.

Students in the COT-GE 6 class were the only students in the 6th grade who demonstrated an increase in their CST scores during this study. These students improved their mean score by 8.2 points, which corresponds to a 2.5% increase.

Students without disabilities in the GE-ONLY 6 comparison group showed a decrease of 3.65 points in their California Standards Test scores (-1.08%).

California Standards Test Results for 7th Grade: Year Two

All Subgroups

Tables 15-17 show the mean 6'1' and 7'h grade CST scores, the raw point increase and the percent of change earned for the students who participated in the second year of the study while they were in the 7th grade. On the CST, the-mean pre-test (6'1' grade scores) score was 301.02, and the mean post-test (7'h grade) score was 334.87. This corresponds to an overall increase of 33.81 points, or 11.25% increase. Additionally, the range of scores in 70' grades is broader (x=84.87) than it was when these students were in the 6th grade (x=78.62), suggesting that there was a greater disparity between overall scores during the year these students participated in the research study.

Students with Disabilities in Segregated Settings

Students with disabilities who were enrolled in a segregated special education only setting (SPED-ONLY 7.1) for their math instruction demonstrated an improvement of 33.75 points, which corresponds to an increase of 12.7%. Their raw point increase is only .3 points higher than that of the students with disabilities who were enrolled in the co-taught math classes, although their percent of increase exceeds that of the students with disabilities who were enrolled in the co-taught class percent of improvement (n=11.59%) because their initial score was over 20 points lower than the latter group's. This discrepancy will be analyzed further in Chapter Five.

Students with Disabilities in General Education Settings

Students with disabilities enrolled in the co-taught classes (COT-7.1 and 7.2) showed an overall increase in their scores of 33.75 points, or 12.7%. These students' mean 6'h grade score was *288.55* points, while their mean 7'h grade CST score was 322.

The final group of students with disabilities considered in this assessment area was the students with disabilities enrolled in the CON-7.1 and 7.2 classes. This group of students' mean 6`h grade CST score was 296.19, while their mean 7th grade score was 333. This is an increase of 36.54 points, or a 12.32% increase. This group improved their scores more than both of the other groups of students with disabilities. Additionally, there was a 7.64 point difference between their 6t" grade mean scores and those of the students with disabilities enrolled in co-taught classes, while that discrepancy grew by I I points during the year of the study. Again, the implications for this difference will be discussed in Chapter Five.

Students Without Disabilities

Students without disabilities in the COT-7.I and 7.2 groups improved their CST scores by an average of 21.18 points, which is an increase of 6.92%. This group of students showed both the weakest point increase and the weakest percent of increase of all .of the 7`1' grade students participating.

Students in the CON-7.1 and 7.2 classes improved their scores by an average of 37.18 points, which corresponds to an increase of 12.06%. This group of students' initial 6th grade mean score was only 2.36 points higher than the COT-7.1 and 7.2 GEN ED students, while the difference between their 70 grade mean scores jumped to 18.34 points.

The GE-ONLY 7.1 and 7.2 groups increased their scores by an average of 40.75 points which, unlike their percent of increase, is higher than the point increase seen in each of the other groups of 7'h grade students. However, their percent of increase was

only 11.88%, which is less than that of all of the other subgroups other than the GE Co-T students.

Special Education Comparisons

All Settings

Tables 18 and 19 represent the percent of change made by each group of students with disabilities participating in both years of the study. 7th grade students included those educated in the co-taught settings (Grade 7 COT), the consult settings (Grade 7 CON), and the segregated settings (Grade 7 SPED-ONLY). The 6th grade students included students enrolled in the co-taught settings (Grade 6 COT), and the segregated setting (Grade 6 SPED-ONLY).

Assessment Data

Results from two assessments are exhibited: the Basic Skills Assessment (BST) and the California Standards Test (CST). The column headed "Year 1: BST % change" shows the percent of change in scores on the Basic Skills Assessment during the first year of the study. The column headed "Year 2: BST % change" shows the percent of change in scores on the Basic Skills Assessment during the second year of the study, and the column headed "Year 2: CST % change" shows the percent of change in scores on the California Standards Test during the second year of the study.

On these tables, data is presented as percent of increase only, rather than a combination of the former as well as actual change in points. *This was* done for two reasons. Firstly, the total number of points available on the CST was based on *a scaled score* of 600, whereas the maximum score on the BST (x=48) corresponds to the maximum *raw score* attainable. Displaying the actual change in points would

misrepresent relative point gains or losses when comparing the two assessment measures. Additionally, by presenting only the percent of change, all numerical values demonstrate the change as it is relative to each subgroups' initial starting score.

General Education Settings

Students with disabilities in the 7th grade who were enrolled in the general education co-taught classes (Grade 7 COT) made the greatest percent of change in their basic skills on the BST in both year one (n=25.58%) and year two (n-25%) than all other subgroups of 7th graders with disabilities. The 7th grade students with disabilities who were enrolled in general education consult classes (Grade 7 CON) improved their scores on the BST during year two by 19.4%, but their scores actually showed a drop during year one on the same assessment measure (-4.8).

Students in the co-taught 6th grade class (Grade 6 COT) were the only group to take the basic skills assessment (only administered to 6th grade during year two), They showed the greatest percent of increase when compared to all of the subgroups of students with disabilities (46.67%),

On the California Standards Test, 7th grade students with disabilities enrolled in the general education co-taught class (Grade 7 COT) increased their scores by 11.59%. The 7th grade students with disabilities enrolled in consult general education classes (Grade 7 CON) increased their scores by 11.48% which is a negligible difference when compared to those students enrolled in co-taught classes.

During year two of the study, students with disabilities in the co-taught 6th grade class (Grade 6 COT) decreased their score on the CST by an average of -1.07.

Although any drop in scores is alarming, this drop is actually less than that of the students with disabilities enrolled in segregated special education settings.

Special Education Settings

During year one of the study, students with disabilities in the 7th grade who were educated in segregated special education settings increased in their skills on the BST by 23.5%. During year two, their percent of increase remained relatively constant at 23.2%.

In contrast to the results on the BST, 7th grade students with disabilities who were enrolled in the segregated special education setting (Grade 7 SPED ONLY) improved their scores on the CST by 12.7%. This is higher than that of the 7th grade students with disabilities who were enrolled in co-taught classes (n=11.59) and non co-taught classes (n=11.48).

Scores for students in the 6th grade who were enrolled in segregated special education settings dropped by 6.1%. This is a 5.17% greater drop in scores than that of 6th grade students with disabilities enrolled in co-taught general education classes.

General Education Comparisons

All Settings

Tables 20 and 21 show the percent of change made by each of the subgroups of students without disabilities participating in both years of the study. 7th grade students included those educated in a co-taught general education Math course (Grade 7 COT), those educated in a general education consult class (Grade 7 CON), and those students who were taught in the general education only settings (Grade 7 GE-ONLY).

The 6th grade students included students enrolled in the co-taught general education class that included students with disabilities (Grade 6 COT), students who were enrolled in a general education co-taught math class that did not include any students with disabilities (GRADE 6 COT-GE), and student who were enrolled in a general education only class taught by a teacher who was not participating in a type of collaborative program at the time (Grade 6 GE-ONLY).

Assessment Data

Results from two assessments are exhibited: the Basic Skills Assessment (BST) and the California Standards Test (CST). The column headed "Year 1: BST % change" shows the percent of change in scores on the Basic Skills Assessment during the first year of the study. The column headed "Year 2: BST % change" shows the percent of change in scores on the Basic Skills Assessment during the second year of the study, and the column headed "Year 2: CST % change" shows the percent of change in scores on the California Standards Test during the second year of the study.

Year 1 Basic Skills Test

On the BST, students without disabilities enrolled in the Grade 7 CON class improved their scores by 21.53%. Students without disabilities enrolled in the Grade 7 COT made the second greatest amount of increase of 17.7%, while students in the Grade 7 GE-ONLY group increased their scores by only 8.63% during the first year of the study.

Year 2 Basic Skills Test

During the second year of the study, both 6th and 7th grade students were assessed using the Basic Skills Test. During this year of the study, 7th grade students

enrolled in the Grade 7 COT class made the greatest percent of improvement (29.6%) as compared to 7th grade students in the CON classes (21.4%) and those in the GE-ONLY classes (15.7%).

Students without disabilities in the 6th grade general education classes showed overall greater increases on the basic skills test than students in the 7th grade. Students in the Grade 6 COT class showed a dramatic 51.78% increase in scores. Students in the Grade 6 COT-GE group showed a 37.2% increase, while students in the Grade 6 GE-ONLY group again showed the lowest percent of increase at 26.84%. Overall, during year one, 6th and 7th grade students in the GE-ONLY classes demonstrated the weakest improvement in their basic skills scores.

Year 2 California Standards Test

During the second year of the study, both 6th and 7th grade students were assessed using the California Standards Test. As shown, students without disabilities in the 7th grade who were enrolled in the co-taught classes (Grade 7 COT) showed the weakest percent of increase (6.92%) when compared to the other 7th grade general education subgroups. Students in the Grade 7 CON group improved their scores by 12.06%, while the students in the Grade 7 GE-ONLY group showed an increase of 11.88%.

In contrast to the overwhelmingly positive gains seen in the 7th grade, many students in the 6th grade saw their scores drop. The students without disabilities enrolled in the co-taught class (Grade 6 COT) saw a 2.77% drop in their scores. Students in the other co-taught 6th grade class (Grade 6 COT-GE) saw a 2.5% increase in their scores. This is a difference of 5.27%. Students in the Grade 6 GE-ONLY classes saw a drop of

1.08% in their scores. It should be noted that, during this year of the study, the mean 6`1' grade score on the CST dropped considerably throughout the entire school district.

CHAPTER 5

DISCUSSION

Analysis and Implications

Impact on Basic Skills (BST) Improvement by Teacher

In Year One, although 7`h grade students with disabilities who were enrolled in segregated special education classes (SPED-ONLY 7.1-7.3) improved overall on the Basic Skills test by 14%, it is important to note that when disaggregated by teacher, there is a significant difference in improvement scores. Those students with disabilities who were taught by Ms. G, the same teacher who was co-teaching with Mr. W during this study, improved their mean score on the Basic Skills Test by a 23% increase over their pre-test scores. In contrast, the students with disabilities who were enrolled in segregated special education classes taught by Mr. H and Mr. S (both of whom did not participate in co-teaching) improved their scores by less than 5%.

The implications of these differences suggest that the act of co-teaching served to benefit the students in Ms. G's class as evidenced by their increase in scores. Evidently, Ms. G was able to take the content material demonstrated by the general educator (Mr. W) with whom she was co-teaching in another setting, in order to improve her content teaching in the segregated special education condition. The students with special needs were then able to gain from this content knowledge to improve their basic skills scores.

The students with disabilities who were taught in the general education co-taught class (COT-7) in the first year of the study improved their scores about 26%. When compared to the improvements made by students with disabilities who were enrolled in a general education class that was not co-taught (CON-7), there is a significant difference

in scores. Those students with disabilities in a non-co-taught general education classroom (CON-7) demonstrated scores that actually decreased by almost 5%. Students with disabilities who were enrolled in the special education class (SPED-ONLY 7.1) taught by Ms. G made a 24% improvement. Obviously, both the COT condition and the SPED-ONLY condition showed substantially more improvement than the students with disabilities who were enrolled in the general education class without the additional inclass support from the special educator (CON). In this case, it appeared that, although the general and special educator were able to collaborate to help students with disabilities in the co-taught setting, and that the special educator was able to infuse the skills learned from the content specialist into the SPED-ONLY condition, the general educator (Mr. W) was not able to support the students with disabilities without the additional support from the special education teacher in the consultative (CON) condition during the first year of implementation.

Impact on BST Improvement by Condilion

During the second year of the study, results for students in the various conditions differed substantially. Both students with and without disabilities enrolled in the cotaught **Oh** grade math class (COT) improved their scores by close to 50%. These students showed greater improvements in their percent of increase when compared to both other groups of 6th grade students in which there were not any students with disabilities enrolled. Specifically, students in the co-taught general education only class (COT-GE) showed an increase of 37% while the non co-taught class (GE-ONLY) class improved by only 27%.

In the 7th grade, students with and without disabilities in the co-taught classes (COT) improved their scores between 25 and 30%. In comparison, students with and without disabilities in the consultative class (CON) improved their scores between 19 and 21%. Again, while there was definite improvement on the Basic Skills Test by both students with and without disabilities in the general education classroom, there is a significant positive difference between those in the co-taught setting and those who were not.

Impact on CST by Teacher

Assessment data from the California Standards Test (CST) was gathered only during year two of this study.

Analysis of CST scores for 7th grade show that students without disabilities who were enrolled in the consultative condition (CON) with Mr. W. improved their scores by an average of 12%. This is a slightly greater percent of increase than the students enrolled in both of the control classes (GE-ONLY 7.2 and 7.3) with Mr. W where the average percent of increase was slightly more than 11%. One possible explanation for this may be the influence that co-teaching had on the general education teacher during year two of this study. Unlike the results seen in year one, it appears that Mr. W was able to learn more about meeting the needs of diverse learners from working with Ms. G. and the students with disabilities. In fact, Mr. W remarked on numerous occasions that, during the 2nd year of co-teaching, he'd become "more creative and more willing to experiment with new techniques in all of [his] classes." Evidently, this change in pedagogy resulted in improved outcomes for all of Mr, W's students, not only those with disabilities.

Impact on CST Scores by Condition

Interestingly, except for the 6th grade non-disabled students in the co-taught general education only class (COT-GE 6), each subgroup of 6th grade students showed an overall drop in their CST scores. The 6th grade students who were enrolled in a segregated special education class (SPED-ONLY 6) showed the greatest decrease (-6%) in their scores when compared to all of the subgroups. This drop in scores is substantially more than that seen by the students with disabilities in the co-teaching condition (COT=1%). 6th grade students without disabilities also decreased in their scores in the various conditions (COT=-3%; GE-ONLY=-1%).

Students without disabilities in the co-taught 6th grade class without any students with disabilities enrolled (COT-GE) showed an increase of 2.5%. As stated above, this is the only group of 6th grade students to demonstrate an increase in their CST scores during this year of the study. In considering this, one must question why so many of the 6th graders (both with and without disabilities) dropped in their scores. However, it is also important to note the relative successes of the co-taught conditions. Students with disabilities in the co-taught condition did significantly better than their counterparts in the special education only condition. Also, students without disabilities did significantly better than their counterparts in the general education only condition. However, the fact that students without disabilities did so much better when in a class that was co-taught and did not include students with disabilities must also be considered.

The 7th grade students with disabilities appeared to improve at about the same rate of increase (12%) in the various conditions. These students performed slightly lower in the co-teaching condition (CON-l 1.59%), compared to the consultative condition

(CON=12.32%) and the special education condition (SPED-ONLY=12.7%). In fact, students without disabilities also improved around 12% on the CST in the consultative condition. However, these non-disabled peers only improved around 7% in the co-teaching conditions.

Further examination of CST scores reveals that both 6th and 7th grade students without disabilities who were enrolled in co-taught classes in which students with disabilities were enrolled made slightly less improvement in their scores when compared to the students without disabilities who were enrolled in classes in which there were not any students with disabilities enrolled. At this juncture in the discussion, one can only speculate as to why this is the case, but two theories prevail.

Explaining Group Differences on the CST

One possible explanation is one heard frequently among teachers who are trepidatious about having students with disabilities enrolled in their classes. Concerned statements by these teachers imply that they believe the mere presence of students with disabilities may `holds back the rest of the kids' or that they will direct teacher resources away from students without disabilities. While it is not the purpose of this study to investigate this theory, evidence collected suggests that this theory is invalid. Under the supposition that this theory entails, one would expect that changes in scores would be inversely proportional to the number of students with disabilities enrolled in each class. However, the opposite was found to be true.

Scores of students without disabilities were disaggregated by class (COT-7.1 and COT-7.2) and the following results were shown: In the COT-7.1, there were 16 students with disabilities and 19 students without disabilities, making the percent of students with

disabilities almost 46%. In this class, students with disabilities improved their scores by an average of a little over 11%, and students without disabilities improved their scores by an average of almost 9%. In the COT-7.2 class, 6 of the 35 students had disabilities, making the percent approximately 17%. In this class, students with disabilities improved their scores by about 12%, while students without disabilities improved their scores by slightly under 7%. Contrary to these findings, one would expect the scores of students without disabilities to be higher in the COT-7.2 class, but the converse turned out to be the case. Clearly, the mere presence of students with disabilities in a classroom, even when natural proportions are not maintained, does not necessarily interfere with the progress of students without disabilities.

A different possible explanation for this state of events hinges upon the way that co-teachers spend their co-instruction time. Specific anecdotal evidence based on interviews with participating teachers may lend some insight into the reasons why students without disabilities may progress less in co-taught classes in which students with disabilities are enrolled than they do in non co-taught classes, or in co-taught classes in which there are not any students with disabilities enrolled. On several occasions, Mr. W remarked, "When Ms. G is in here, I don't have to work as hard to teach the students. We both only give 80% and the students benefit like it's 160%." Although it was not an ideal situation, Ms. G was typically the "primary" instructor throughout each class period in the 6'" grade co-taught setting, while Mr. C attended to other classroom tasks (i.e. grading papers). As the year progressed, Ms. G found that it was occasionally necessary to leave the classrooms to address student crises, chair IEP's, or observe students in other classrooms. While these are all legitimate professional responsibilities, they do reduce the

treatment integrity of the co-teaching program. Based on these common threads found in both co-teaching situations, it appears that the advantages of co-teaching were probably not being fully realized (Murawski, 2004). This suggests a very important consideration that should be explored at this point in the discussion.

Research has shown that although teachers often fancy themselves as "coteachers", their actions in the classroom may not always validate such a description. In fact, observations have shown that teachers often end up performing other duties which do not result in positive student outcomes. Murawski, in her co-teaching handbook (2004) addressed this very phenomenon by stating explicitly that "one teach, one grade papers" is not a legitimate incarnation of co-teaching. In this case, while the students with disabilities were in fact "included" in the classroom environment and lessons, what probably seemed to be inconsequential sacrifices made in the interest of efficiently tackling other teaching responsibilities may have inadvertently reduced treatment validity and lessened the benefit seen for the students without disabilities. While both teachers may have been satisfied that all of their students were being adequately exposed to the curriculum, in a more efficiently synchronized co-teaching classroom, both teachers would spend all of their time making effective use of instructional time and ensuring that they were supporting all students to not only access curriculum, but maximize each child's own potential.

In summary, overall findings suggest that, in general, students with disabilities who are educated in collaborative, co-taught classes make greater improvements in their math skills than do students with disabilities who are enrolled in special education only classes. Because special educators typically have to plan and prepare lessons for several

subjects and grade levels each day, the old adage rings true, "Jack of all trades, master of none." Specific results gleaned from this study indicate that special educators have a reduced ability to effectively plan and prepare lessons with the same level of expertise as their general education counterparts.

Additional Factors That May Impact Results

It is important to discuss any additional factors which may have impacted the results seen in this study. As described in the Methods section, both Ms. G and Mr. W were trained together on the rationale and techniques for co-teaching. As a result, they both had a framework from which to refer when developing their collaborative relationship and jointly designing lessons. This is surely one reason why students in their classes benefited to such a large degree when compared to all of the other groups assessed in this study. Unlike Mr, W, Mr. C was not fouunally trained prior to the inception of his co-teaching year. Although he was invited to attend several co-teaching workshops, he declined the opportunities, citing other professional obligations. It is likely that his lack of training resulted in weaker treatment fidelity; he was most likely unaware of the exact role that he, the general educator, was expected to fill while in the process of co-instructing. In contrast to the benefits seen in the classes co-taught by Mr. W and Ms. G, Mr. C's lack of preparedness probably played a role in the relative weaknesses seen in the co-teaching program that existed between Ms. G and Mr. C.

There are other considerations that also affected the quality of the co-teaching relationships that developed. Ms. G was able to have a common planning period with Mr.W and Mr. C during their first year teaching together. Scheduling conflicts prevented Ms. G and Mr. W from sharing a planning period during the second year of the study,

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but, because they were both very committed to the meeting the co-teaching challenge, they made a point of planning together on a daily basis. This often meant meeting in the mornings before school, during nutrition and lunch time, after school, or speaking frequently on the phone.

Although Ms. G and Mr.W were virtual strangers when they began co-teaching, they quickly found that their personalities were well suited to each other, Within the first several weeks, they'd established a strong rapport, which quickly turned into friendship. They had a lot of fun in the classroom together, and their jubilant relationship was evident to their students.

On the other hand, Mr, C and Ms. G had a very difficult time establishing rapport. They also had a common planning period, although it was underutilized. Mr. C relinquished the majority of teaching responsibilities to Ms. G. He was always willing to accommodate students and implement the suggestions Ms. G offered, but he typically offered little in terms of ideas or direction for instruction. Resultantly, these two teachers did not develop a truly collaborative relationship. Despite both of their best intentions, personality differences and lack of communication skills interfered with their ability to develop a professional collaborative relationship during their first year teaching together.

It is conceivable that the strength of the collaborative relationship between each pair of co-teachers had an impact on student outcomes. While the relatively weak collaborative relationship between Mr, C and Ms. G probably did not impair their students' growth, Mr. W and Ms. G shared an excitement and enthusiasm which was sure to have been imparted to their students.

Limitations to the Study

In setting up any research study, one attempts to eliminate as many extraneous factors as possible. Murawski (2002) confirms that any attempt to conduct quantifiable research on the success of collaboration in schools (versus analog settings) is especially difficult given the characteristics inherent to the setting. Unfortunately, it was not possible to create or maintain perfectly pure conditions for the duration of this experiment. After all, the subjects were public school children and the mechanism by which the program was assessed was inherently fallible.

Unbeknownst to the researcher at the onset of the 2nd year of research, the 6th grade co-taught classes (COT 6.1 and COT 6.2) were provided with a class set of laptop computers with a math tutorial program, which was to be used two days each week instead of traditional math instruction time. This additional experimentation was the result of a school-wide grant and these classes were selected by the administration without consultation with the primary researcher. The control class to which the cotaught classes were compared (GE-ONLY) was not using the laptops. As a result, the data collected in the 6th grade co-taught conditions should only be compared to other 6th grade classes while considering the influence the math tutorial computer program had on instruction and treatment fidelity.

Another limitation of this study was the inconsistency with which the assessments were given. Unfortunately, the BST was not administered to the 6th grade segregated class (SPED-ONLY 6) because the principal researcher had not planned to use data from this group until several weeks after the school year began. There was initial concern that, because this would be the first week of teaching at this school for Mrs. T, participating in the study might prove to be too overwhelming. However, she quickly adjusted and

willingly sought to take part. As it is important to use multiple measures to gauge the effectiveness of all programs, this inconsistency makes it difficult to measure these students' relative increases in skills.

There is an additional consideration one must keep in mind when evaluating the results of this study. Ms. G, the special educator who was co-teaching with Mr. C and Mr.W, was also the principal researcher. Being so involved in the study, she had a vested interest in ensuring that her segregated class was taught identical content as the students in the general education co-taught and consultative conditions. This aspect surely resulted in very positive gains for her students, and may have been the primary contributing factor that led to her students making such substantial gains as compared to each other group of students in segregated classes.

Finally, the last truly limiting charadteristic in this research study was the small sample size used. While one hopes to select groups that are accurately representative of the population, it was not logistically possible to select a sample size that was large and robust enough to accurately capture the true nature of the students in the entire school district. Although attempts were made to collect data on all students enrolled, transiency amongst the students and frequent absences prohibited some students' scores from being included in the data, further reducing the number of students in the sample.

Ultimately, these considerations limit the strength of any generalizations one can make about the data. Despite this, it is the intention of the researcher to provide the community with a detailed understanding of the advantages and disadvantages of co-teaching apparent in one urban middle school. Hopefully, this information will assist in helping other educators make informed decisions about the appropriate use of co-

teaching as a preferred service delivery option for students with mild to moderate disabilities in a math setting.

Future Research

As indicated in this study, special educators who have the challenging task of teaching multiple grade levels and subjects are limited in terms of the energy and resources they can devote to each of their classes, potentially reducing the quality of the instruction that is provided. Additional research is necessary in order to determine if this hypothesis is valid and, if so, offer an alternative to the current trend of employing one special educator to prepare for and teach a multiple of diverse classes on a daily basis.

In order to validate the findings presented in this research study, one would want to consider recreating the study with added emphasis on treatment fidelity and a larger sample size. Ensuring that all teachers are comparably prepared to enter into such a teaching situation would inevitably contribute to greater outcomes for students, as well as possibly more concrete evidence around co-teaching. The literature is clear that teacher training on co-teaching is critical for ultimate success (Villa, Thousand, Nevin, & Liston, 2005; Murawski, 2005) and this study confirms that the trained co-teachers were able to obtain positive academic outcomes for their students.

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APPENDIX A

Table 1

Teachers and Students in Study

YEAR ONE	Teacher(s)	# of Students with Disabilities	# of `• ;Students *wtthQ t D;sabilfes	Total # of :Students
COT=7 (Co-teaching 7th grade)	Mr. W Ms. G	7	31	38
CON -7.1 (Consultative 7t"	Mr. W	4	32	36
CON -7.2 (Consultative 7th	Mr. W	7	27	34
SPED-ONLY 7.1 (Special education-only 7tht grade)	Ms. G	14	0	14
SPED-ONLY 7.2 (Special education-only 7th grade)	Mr. S	9	0	9
SPED-ONLY 7.3 (Special education-only 7th grade)	Mr, H	8	0	8
GE-ONLY 7.1 (General education-only 7th grade)	Mrs. H	0	34	34
GE-ONLY 7.2 (General education-only 7th grade)	Mr. R	0	28	28
YEAR TWO-				
COT-6 (Co-teaching 6th grade)	Mr. C Ms. G	14	20	34
COT-GE 6 (Co-teaching 6th grade General education only)	Mr. C Ms. G	0	33	33
SPED-ONLY 6 (Special education-only 6th grade)	Ms. T	8	0	8
GE-ONLY 6 (General education-only 6th grade)	Ms. R	0	35	35
COT-7.1 (Co-teaching 7th grade)	Mr. W Ms. G	16	19	35
COT-7.2 (Co-teaching 7th grade)	Mr. W Ms. G	6	29	35
CON -7 (Consultative 7th grade)	Mr. W	8	28	36
SPED-ONLY 7 (Special education-only 7th grade)	Ms. G	18	0	18
GE-ONLY 7.1 (General education-only 7th grade)	Mrs. H	0	38	38
GE-ONLY 7.2 (General education- only 7th grade)	Mrs. H	0	40	40

APPENDIX B

Table 2

Assessments in Year One and Year Two

Key: BST = Basic Skills Test (excerpted from KeyMath); CST = California Standards Test

APPENDIX C

Table 3

Basic Skills Test: 7`" Grade, Year One (2003-2004)

	Before	After	Point Change	% Change
SPED-ONLY 7.1, 7.2, 7.3	22.93	26.17	3.14	14.13
SPED-ONLY 7.1	24.41	30.15	5.74	23.5
SPED-ONLY 7.2 and 7.3	21.88	22.93	1.05	4.79
COT 7 (SPED students)	25.14	31.57	6.43	25.58
COT 7 (GEN ED students)	28.07	33.04	4.97	17.7
CON 7.1 and 7.2 (SPED students)	20.5	19.5	-1	-4.8
CON 7.1 and 7.2 (GEN ED students)	30.77	37.38	6.6	21.53
GE-ONLY 7.1 and 7.2	33.176	36.04	2.864	8.63
Mean	25.86	29.6	3.72	13.89
Range	12.68	17.88	} 3	" x

Table 4

Basic Skills Test. 7rh Grade, Year One (2003-2004), Raw Point Increase

Table 5

Basic Skills Test: 7`h Grade, Year One (2003-2004), *Percent of Change*

0

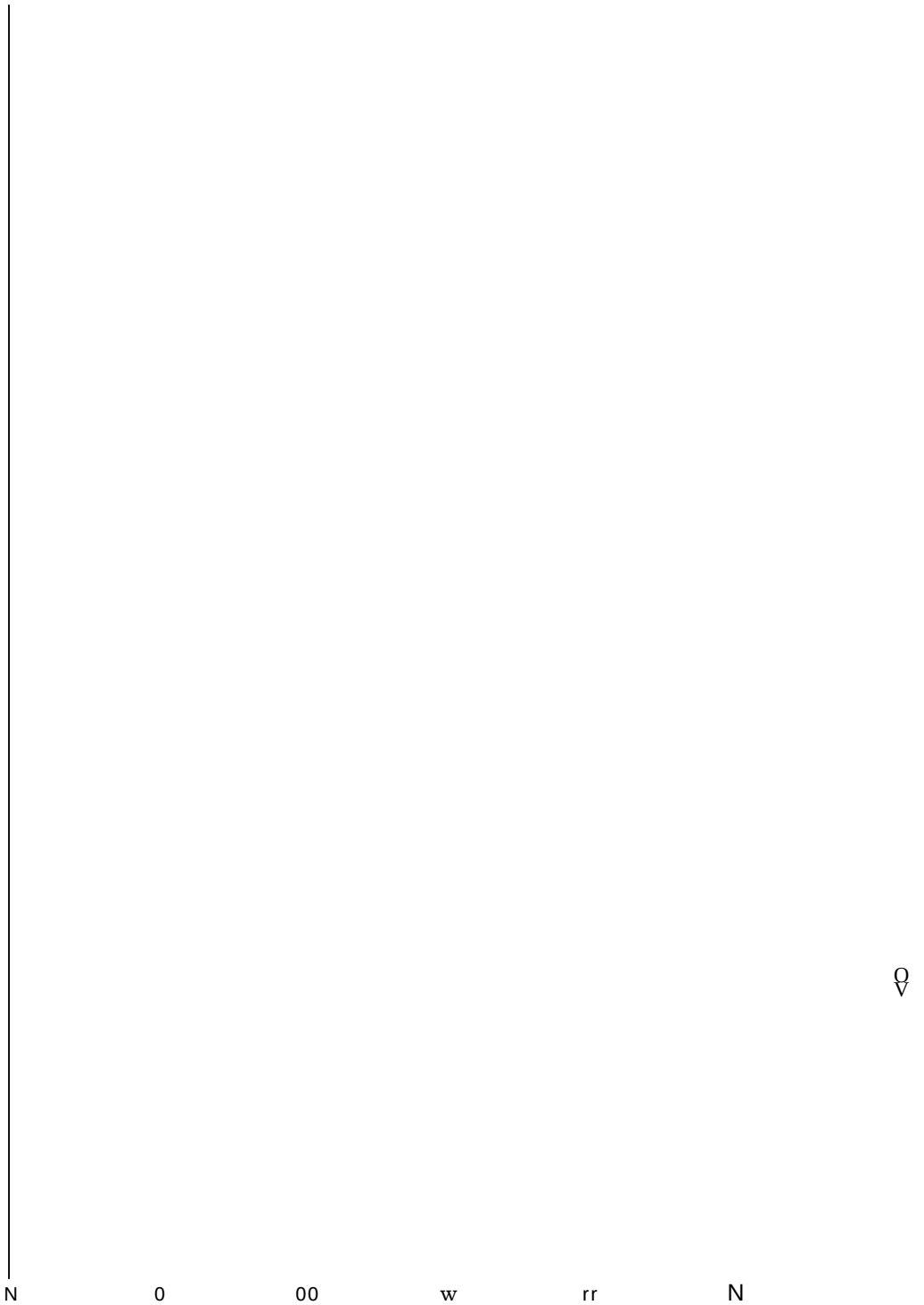
Table 6

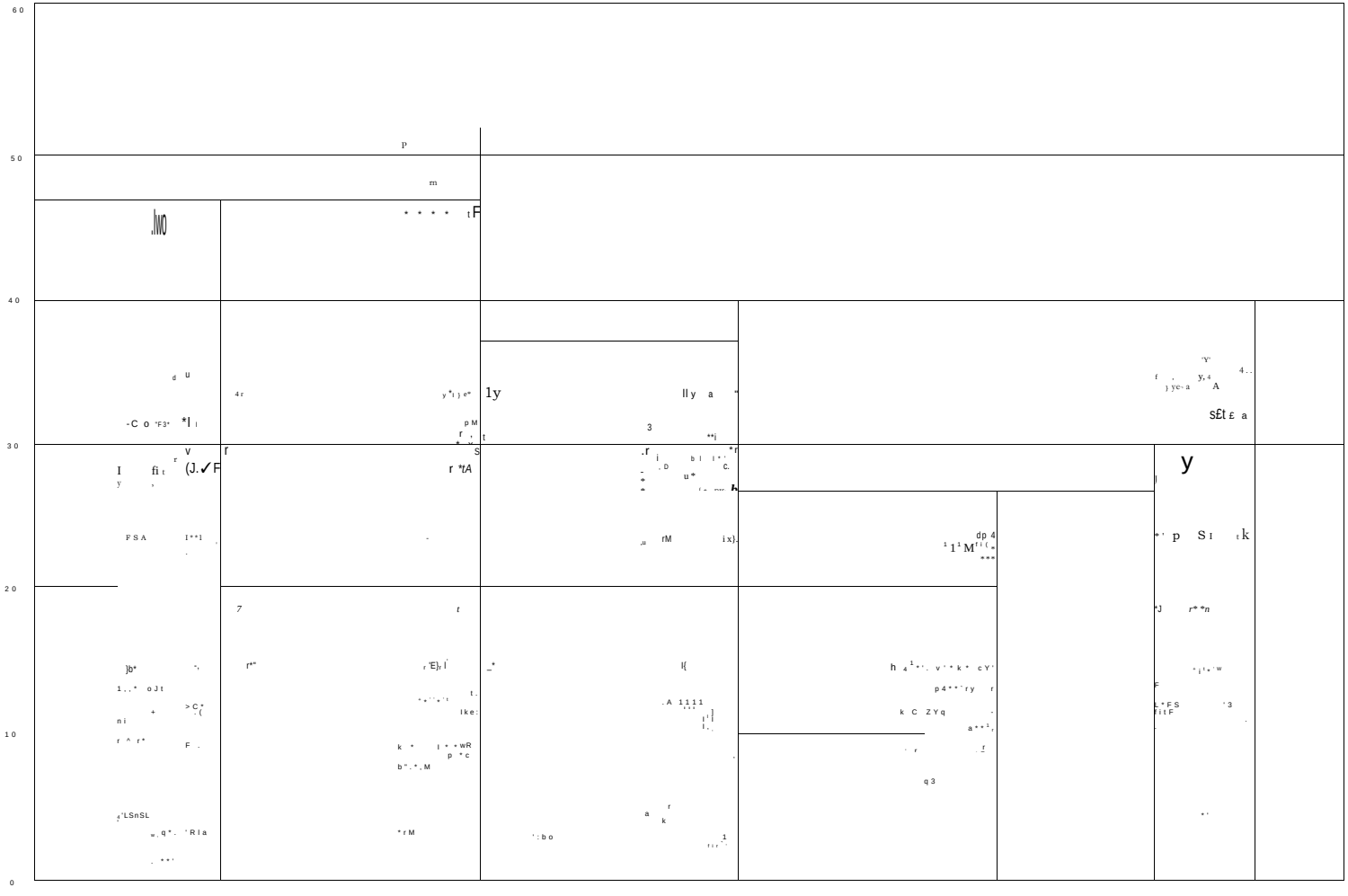
Basic Skills Test. 6th Grade, Year Two (2004-2005)

	Pre	Post	Point Change	% Change
COT-6 (SPED students)	18	26.4	8.4	46.67
COT-6 (GEN ED students)	21.61	32.8	11.19	51,78
COT-GE 6 (GEN ED students) GE ONLY 6 (mean of both classes)	25.22 27.05	34.6 33.8	9.38 7.25	37.2 26.84
Mean	22.97	31.9	9.055	40.623
Range	9.05	8.2		

Table 7

Basic Skills Test: 6th Grade, Year Two (2004-2005), Raw Point Change

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COT-6 (SPED students)
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COT GE 6 (GEN ED GE ONLY 6 (mean of both students)
classes)
Mean

Table 9

Basic Skills Test: 7to' Grade, Year Two (2004-2005)

	Pre	Post	Point	% increase
SPED ONLY 7	19.4	23.9	4.5	23.2
COT -7.1 and 7.2 (SPED students)	24	30	6	25
CON-7 (SPED students)	31	37	6	19.4
COT -7.1 and 7.2 (GEN ED students)	27	35	8	29.6
CON-7 (GEN ED students)	28	34	6	21.4
GE-ONLY 7.1 and 7.2	34.4	39.8	5.4	15.7
Mean	27.3	32.28	4.98	18.24
Range	15	15.9	h'	.+p?n}x+.42'

Table 10

Basic Skills Test: 7th Grade, Year Two (2004-2005), Point Change

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SPED ONLY 7 COT -7.1 and 7.2 CON-7 (SPED students)	(SPED COT -7.1 and 7.2 CON -7 students)	(GEN ED GE-ONLY 7.1 and students)	(GEN ED students)	Mean 7.2

Table 12

California Standards Test: G$^{tr'}$ Grade, Year Two (2004-2005)

	Avg. 5'h grade score	Avg. 6$^{tj'}$ grade Score	Point Change	% Change
SPED-ONLY 6	270.63	253.88	-16.75	-6.1
COT-6 (SPED	294	290.85	-3.15	-1.07
COT-6 (GEN ED	316	307.25	-8.75	-2.77
COT-GE 6 (GEN ED	322	330.24	8.2	2.5
GE-ONLY 6 (GEN ED students)	335	331.35	-3.65	-1.08
Mean	307.53	302.71	-4.82	-1.7
Range	64.37	77.47		

Table 13

California Standards Test: 6th Grade, Year Two (2004-2005), Point Change

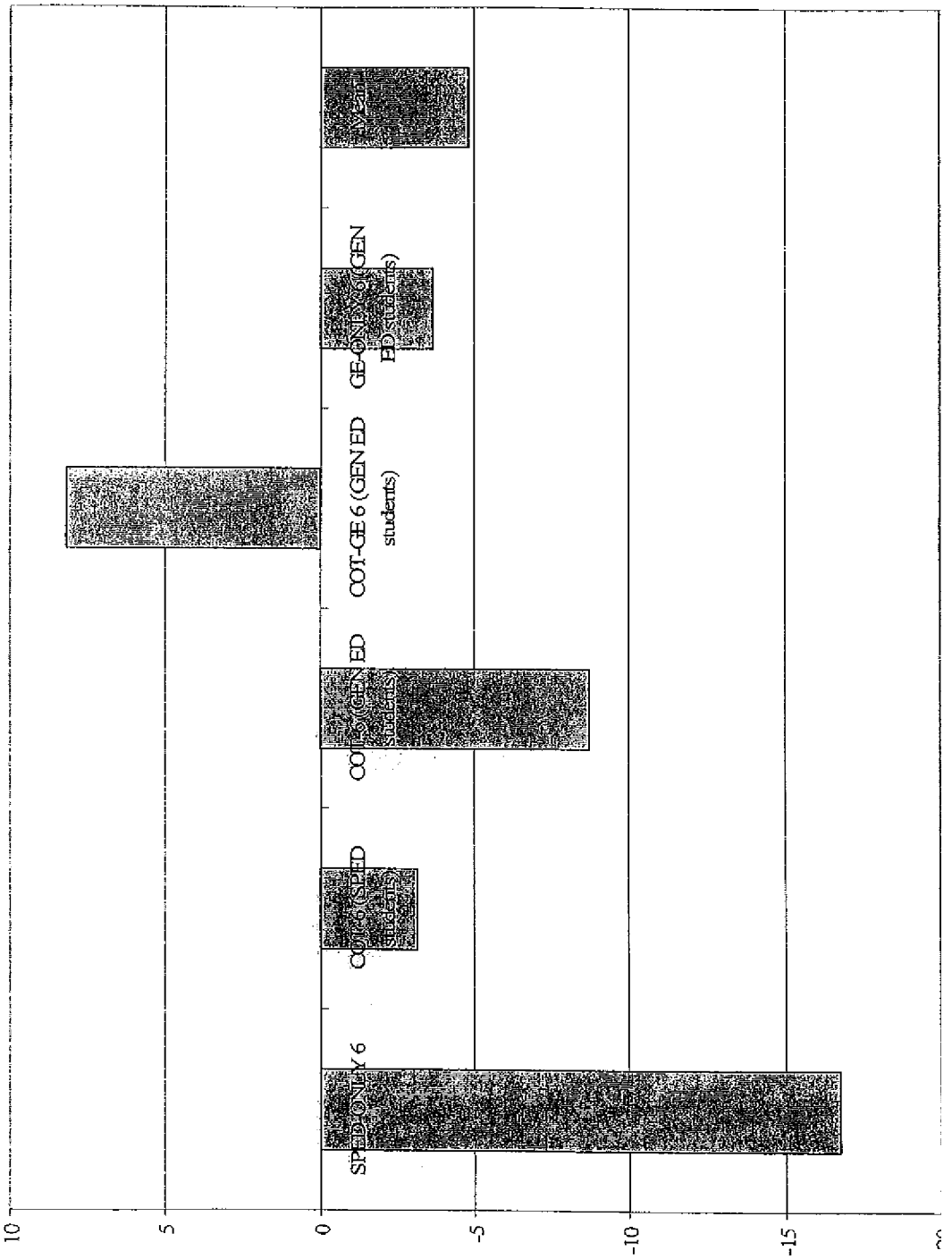

Table *14*

California Standards Test: 6th Grade, Year Two (2004-2005), Percent Change

Table 15

California Standards Test: 7`h Grade, Year Two (2004-2005)

	Mean 6th grade Score	Mean.7t" grade score	Mean CST Point Increase	Mean CST % Increase
SPED-ONLY 7	264.38	298.13	33.75	12.7%
COT-7.1 and 7.2 (SPED	288.55	322	33.45	11.59%
CON-7 (SPED students)	296.19	333	36.54	12.32%
COT-7.1 and 7.2 (GEN ED students)	305.82	327	21.18	6.92%
CON-7 (GEN ED	308.18	345.34	37.18	12.06%
GE-ONLY 7.1 and 7.2	343	383.75	40.75	11.88%
Mean	301.02	334.87	33.81	11.25%
Range	78.62	84.87	ma	y} -*

Table 16

California Standards Test: 7rh Grade, Year Two (2004-2005), Point Increase

Table 17

California Standards Test. 7rh Grade, Year Two (2004-2005), Percent of Change

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Table 18

Comparative Scores: Students with Disabilities

	Year BST % change	Year 2: BST % change	Year 2: CST % change
Grade 7 COT	25.58	25	11.59
Grade 7 CON	-4.8	19.4	11.48
Grade 7 SPED-ONLY	23.5	23.2	12.7

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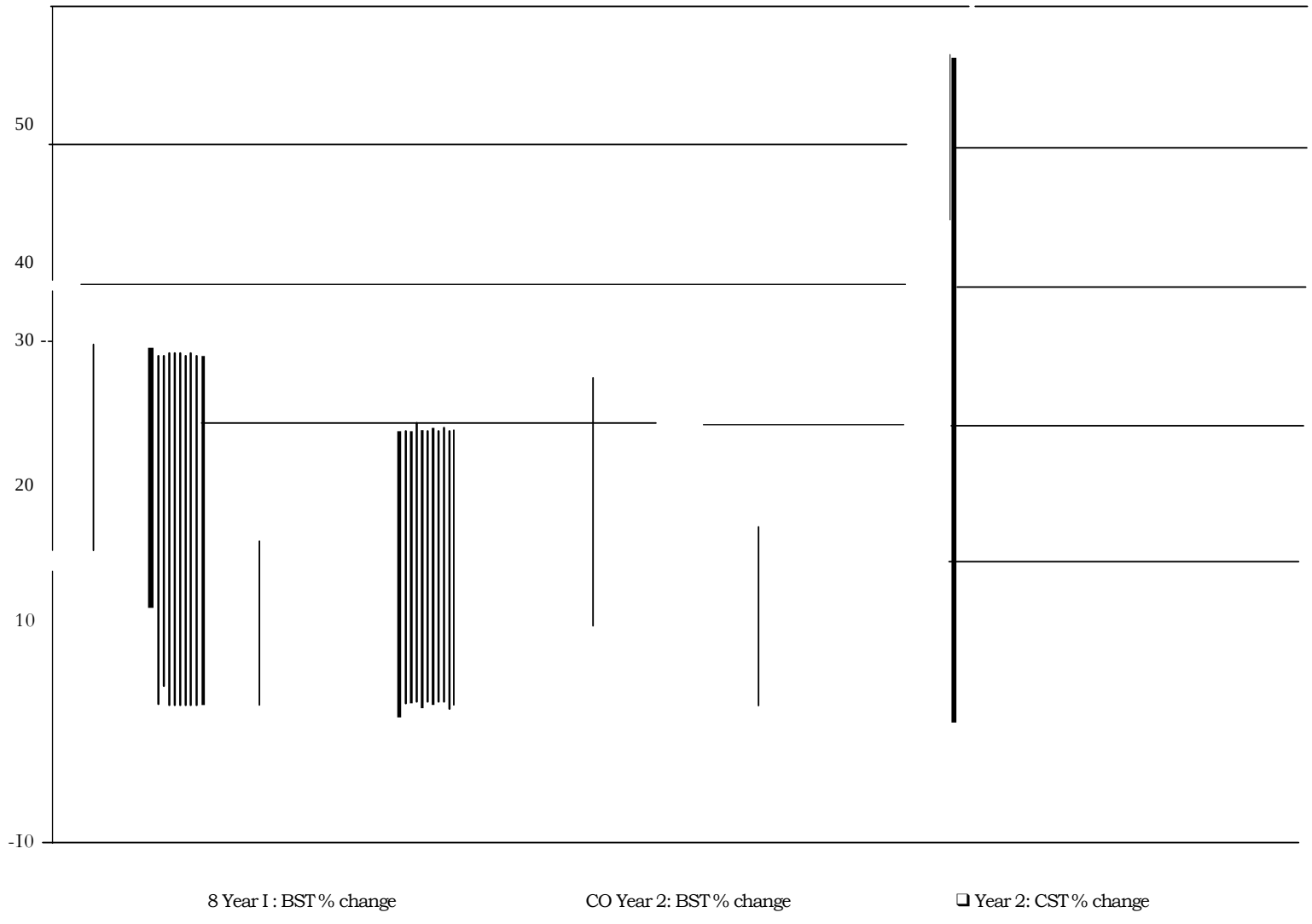
G Grade 7 COT ® Grade 7 CON Grade 7 SPED-ONLY ® Grade 6 COT Grade 6 SPED-ONLY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8 Year I : BST % change CO Year 2: BST % change ❑ Year 2: CST % change

Table 21

Comparative Scores: Students without Disabilities

	Year 1: BST % change	Year 2: BST % change	Year 2: CST % change
Grade 7 COT	17.7	29.6	6.92
Grade 7 CON	21.53	21.4	12.06
Grade 7 GE-ONLY	8.63	15.7	11.88
Grade 6 COT		51.78	-2.77
Grade 6 COT-GE		37.2	2.5
Grade 6 GE-ONLY		26.84	-1.08

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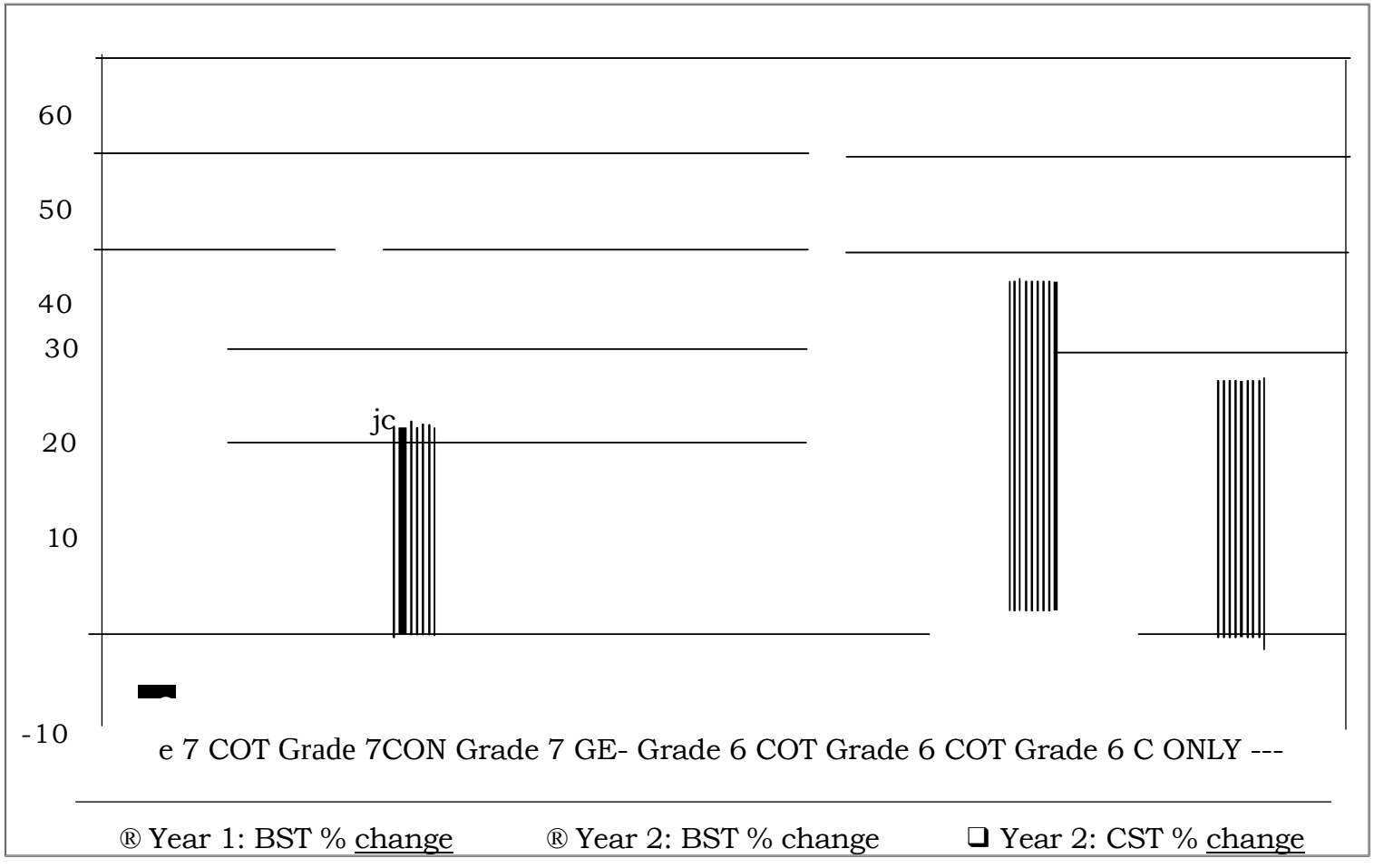
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❑ Year 2: CST % change