The Impact of Placement on Reading and Mathematics Achievement of Students with High Incidence Disabilities

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Abstract

The question of where best to educate students with disabilities to maximize their academic achievement has been discussed and researched for over four decades, with inconsistent and contradictory results. This study focused on the mathematics and reading achievement of middle and high school students with mild disabilities in an urban district in a plains state, as measured by state assessments. The study was comprised of 430 students in the area of mathematics and 449 in the area of reading. The intent of the study was to determine if placement in inclusive settings made scoring proficient in reading and mathematics more likely than placement in non-inclusive settings. The dependent variable was the individual student's academic performance, proficient or not proficient, on state reading and mathematics assessments. The independent variable was the instructional delivery model in which each student was placed respectively for reading and mathematics instruction (general education with no support, general education with support of a special education co-teacher or paraprofessional, separate special education classroom, and separate special education school). Control variables included the student's disability category, race, gender, poverty status, and the school attended by each student. The study employed a Two-Stage Least Squares regression to estimate the odds of students scoring proficient in reading or mathematics based on their instructional delivery model. The first of two main findings was that the instructional delivery model in which a student receives instruction significantly affects performance in mathematics. For each increase in delivery model restrictiveness the odds of scoring proficient in mathematics decreased. The second finding was that the effect of instructional delivery model on reading proficiency was not significant.

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be a life-long learner. I love you very much and miss you daily—I am forever indebted to you for your years of love, support, guidance, and understanding.

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Introduction

Student academic achievement is the focus of educational policy in the United States. Two major education statutes—the No Child Left Behind Act of 2001 (NCLB), the current reauthorization of the Elementary and Secondary Education Act (ESEA), and the Individuals with Disabilities Education Improvement Act of 2004 (IDEA)—require school districts to report the academic performance of students on state assessments in reading and mathematics. Under NCLB, students are assessed annually in grades 3-8 and once in high school, and their performance is reported publicly by disaggregated sub-groups, including students with disabilities who receive special education services, students from economically disadvantaged families, students who receive English Language Learner services, and students from racial/ethnic minority groups. Each state has established annual targets for the percentage of students who will score proficient (at standard) and above in both subject areas. The targets increase each year toward the final requirement of 100% of students scoring proficient or above by 2014. The overall percentage of students scoring proficient and above is measured each year against the set target to determine if districts make "adequate yearly progress" (AYP), which is defined in NCLB as "the measure of yearly progress of the state and of all public schools and school districts in the state toward ensuring all public school students meet the state's academic content and achievement standards" (Section 1111(b) (2)).

Districts also are required to use achievement data to determine whether programmatic changes are required to assist a specific identified group of students to make AYP (20 U.S.C Sec. 1400(c)(5)(A)). When a school does not make AYP for two consecutive years, it is identified for "school improvement," which requires the district to help the school make substantive and significant changes in its approaches to teaching and learning, using achievement data and research to inform instructional strategies (Kansas State Department of Education [KSDE], 2010). Consideration must be given to individual student, classroom, and school level factors that are influencing the performance of all students (Ma, 2001). The intended impact of NCLB is to improve the academic achievement of all students, including, in conjunction with the IDEA, that of students with disabilities. In this regard, efforts to understand the factors influencing the achievement of students with disabilities must focus on these students' access to the general education curriculum.

As such, in addition to mathematics and reading performance of students with disabilities, the additional variable of "educational placement" (i.e., where the student receives instruction) must be considered and reported annually. The IDEA also requires that students with disabilities be educated in the "least restrictive environment" (LRE) consistent with their educational needs. Introduced as a grounding principle of the Education for All Handicapped Children Act (EAHCA) of 1975 (Turnbull, 1993), the LRE requirement has been retained in all subsequent reauthorizations of the statute, including the most recent 2004 IDEA reauthorization, which states that:

> To the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are non-disabled; and special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only if the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily. (34 C.F.R 33.114[a] [2])

Moreover, in both the 1997 and 2004 reauthorizations of IDEA, Congress concluded that the education of children with disabilities is more effective when schools have high expectations for these students when they are included to the maximum extent possible in the general education curriculum in a regular classroom. In terms of reporting, states must report annually to the federal Office of Special Education Programs (OSEP) the degree to which each student with a disability participates in the general education classroom, according to four levels of inclusion: (a) removal from general education classroom less than 21% of the school day, (b) removal for more than 21% of the day but less than 60%, (c) removal for more than 60% of the day, and (d) education provided in a separate location away from general education peers. As such, OSEP level of inclusion placement data do not provide information on the curricular areas in which the student is participating in the general education classroom, whether increased access to the general education curriculum is occurring, or how the student is progressing within the curriculum (Holdheide & Reschly, 2008). Moreover, this problem is further complicated at the secondary level where students with disabilities may, for example, receive academic instruction for reading in a general education classroom and mathematics instruction in a special education classroom.

The term inclusion is generally used to describe the participation of students with disabilities in general education classroom. It was first used in the early 1990s, replacing the term mainstreaming, which is the practice of permitting students with disabilities to participate in general education classrooms to the greatest extent possible, while designating a special education classroom as the student's primary placement (Sailor, 2002). Conversely, inclusive education is defined as "an arrangement in which (a) all students attend the school they would attend if non-disabled (with rare exceptions based on medical and forensic considerations); (b) school and general education classroom placements are age/grade appropriate; and (c) special education supports are provided in the general education classroom" (Sailor, 2002, p. 5).

The first mainstreaming programs developed after passage of the EAHCA were "pull-out" programs in which students with disabilities received most of their academic instruction outside the general education classroom, in resource rooms, from special education teachers. Gradually, after Dunn's (1968) influential criticism that separate, self-contained special education classrooms were unjustifiable, efforts were made to increase the amount of academic instruction provided to students with disabilities in general education classrooms (Zigmond, 2003). Research on the most instructionally effective placement for students with disabilities, which began in the 1960s and continues to this day, has produced mixed results at best, with no conclusive answer to the placement effects question.

Early research focused on whether students with disabilities achieved at higher levels in general education classrooms or special education pullout programs. Contrary to Dunn's (1968) original claim about the academic advantages of general over special education placements for students with mild or high-incident disabilities, Carlberg and Kavale's (1980) meta-analysis of this early research found that placement effects depended on the type of disability, with students with the "mental retardation" label, currently intellectual disability (ID), showing no differences in reading achievement across special and general education placements, while those with the "behavior disorders," currently emotional/behavioral (E/BD), and learning disabilities (LD) labels experienced a modest academic performance advantage from being placed in special education over general education classrooms. Research results in the 1980s and 1990s were mixed. For example, Wang and Baker (1985) found that mainstreamed disabled students consistently outperformed non-mainstreamed students of comparable special education classifications, thus supporting Dunn's (1968) claim about the advantages of general education placements for students with high-incident disabilities. Subsequently, Klingner, Vaughn, Hughes, Schumm, and Elbaum (1998) and Waldron and McLeskey (1998) found that students identified as LD who were included full-time in a general education classroom improved significantly in reading achievement but not in mathematics, whereas Saint-Laurent et al. (1998) found that general education placements for students identified as "at risk," including those identified for special education services, did not demonstrate significantly better achievement in reading or mathematics.

More recent research on the effects of inclusive education on achievement has continued to produce mixed results, both with regard to reading and mathematics achievement and for different types and levels of disability. For example, Rea, McLaughlin, and Walther-Thomas (2002) found that students with LD served in general education classrooms achieved higher scores on the language and mathematics subtests of the Iowa Test of Basic Skills than students who were pulled out for their special education services, but that the two groups earned similar scores in reading comprehension, social studies, and science. Conversely, other contemporary research studies (e.g., Burstein, Sears, Wilcoxen, Cabello, & Spagna 2004; Fore III, Hagan-Burke, Boon & Smith, 2008; Manset and Semmel, 1997) produced mixed results or inconclusive findings regarding the relative advantage of general and special education placements for students with disabilities. Most recently, Holdheide and Reschly (2008) concluded that:

> Research findings to date offer no conclusive answers regarding the best profile of placement options (e.g., Gable & Hendrickson, 2000; Madden & Slavin, 1983). Students with high incidence disabilities—such as specific learning disabilities, emotional disturbance, other health- impaired learning, and mild mental retardation—do not achieve significantly better in more restrictive settings such as special classes than they would if they remained in general education without special education services (Forness, Kavale, Blum, & Lloyd, 1997; Kavale, 2007). Although research on this question is complex, further empirical evidence is needed to guide inclusion efforts.

This is consistent with Zigmond's (2003) conclusion that the findings of decades of research on the relative effects of general and special education placements are at best inconclusive. In addition, Zigmond criticized much of this research as methodologically flawed. In terms of meta-analyses of placement effects research, she argued that many included studies unworthy of consideration because of methodological limitations as well as research that was conducted in such a wide range of contexts that meaningful comparisons were impossible. In terms of the placement effects research itself, it suffers from inconsistent definitions of placement conditions across researchers (Saint-Laurent et al., 1998; Zigmond, 2003), lack of random or matched sample assignment to placement conditions (Fore et al., 2008; Waldron & McLeskey, 1998; Saint-Laurent et al., 1998; Zigmond, 2003), and absence of monitoring of placement condition implementation (Saint-Laurent et al., 1998), and insufficient description of implementing teachers' backgrounds, professional experiences, and instructional practices (Fore et al. 2008), all of which raise trustworthiness concerns and hinder replication. In addition, too much of the placement effects research conducted during this period sought to determine the best place to educate students with disabilities without differentiating among types and levels of disability and corresponding goals of instruction, creating what Zigmond called the "best for whom" (p. 196) problem.

Finally, there are relatively few studies that have compared the placement effects of different levels or models of inclusive education, such as the consultant model in which a special educator consults with the general educator regarding the education of a student with a disability (Friend & Bursuck, 2006; Pugach & Seidl, 1995), the co-teaching model in which special and general educators share responsibility for teaching a class that includes one or more students with disabilities (Austin, 2001; Fishbaugh, 1997; Scruggs, Mastropeiri, & McDuffie, 2007), and the paraprofessional model in which an in-class paraprofessional supports the general education teacher's instruction of one or more students with disabilities (Elliott &McKenney, 1998). Moreover, the few studies that do exist (e.g., Manset & Semmel, 1997; Saint-Laurent et al., 1998), exhibit many of the same methodological limitations common to placement effects research generally. That is, this research also suffers from inconsistent definitions of service delivery models or placement conditions across researchers, lack of random assignment to treatment conditions (inclusion model), and lack of monitoring of treatment implementation (Zigmond, 2003).

Problem

Although there is a significant body of literature on inclusive education, most of it focuses on the philosophy of inclusion and its justification in terms of academic and social benefits for students with disabilities, and on general and special educators' attitudes toward and support for inclusion (see below). There is also a good deal of prescriptive literature on choosing among and implementing various models of inclusive education (e.g., Cole, Horvath, Chapman et al., 2000; Friend & Bursuck, 2006; Gee, 2002; Snell & Janney, 2000) and preparing general and special educators for their respective roles (McLeskey, Waldren, So, Swanson, & Loveland, 2001; Van Laarhoven et al., 2006). The problem, however, is that there is a paucity of conclusive, quality empirical research on the effects of placement on the academic achievement of students with mild disabilities to guide school districts in their efforts to maximize the achievement of these students in the least restrictive environment consistent with their instructional needs, according to the interlocking requirements of NCLB and the IDEA.

Guidance on complying with this requirement is lacking because, as we have seen, research on the effects of placement options on the academic achievement of this population of students has been inconclusive and, in some cases, methodologically flawed. Given the availability of data on the performance of students with disabilities on state assessments, placement effects research since 1997 has improved somewhat (Burstein, et al., 2004; Rea, et al., 2002) with respect to considering, for example, the effects of inclusive placements on the social development of students with disabilities (Banerji & Dailey, 1995; Erwin & Sookak, 1995), their effect on the achievement of students without disabilities in inclusive classes (Fisher, Pumpian, & Sax, 1998; Peltier, 1997), and even the effects of different models of inclusive education, such as co-teaching and cooperative teaching (Manset & Semmel, 1997; Saint-Laurent et al., 1998). However, as Zigmond (2003) noted, important methodological concerns remain in addressing the placement effects question, including the "best for whom" (p. 196) problem, especially with regard to the differential effects of inclusive placements for students with different types mild disability (Madden & Slavin, 1983). A related concern, according to Zigmond, is that research on the effects of inclusive placements has not paid sufficient attention to the influence of student or school characteristics on placement effects, in terms of the former, characteristics such as race, socio-economic status, and gender, in terms of the latter, characteristics such as building inclusiveness, and student demographics, and teacher attitudes toward or support for inclusion.

Finally, because inclusive education varies by amount or level of inclusion and type of inclusive education model (e.g., indirect support to teacher, special education co-teacher, or special education paraprofessional in the classroom), another concern is the need for research on differential effects of various levels or models of inclusion. Although the amount of time students with disabilities participate in the general education classroom is reported annually to OSEP, the manner in which this information is reported lessens its utility for research, especially at the secondary level. That is, in addition to lacking information on the curricular areas for which the student is included or whether increased access to or progress in the curriculum is occurring, Holdheide and Reschly (2008) also pointed out that OSEP's most inclusive level (removal from regular classroom for less than 21% of the day) still allows a student to receive instruction in a separate special education setting for up to 75 minutes of the instructional day. Moreover, OSEP level of inclusion data are even less meaningful at the secondary level where students with disabilities may receive instruction in different subject areas under different types of placements, from most to least inclusive.

Purpose of the Study

This study was undertaken to address this problem by providing empirical evidence to guide districts in making evidence-based placement decisions for students with disabilities. Members of IEP teams and school administrators need to know what placement conditions are likely to have the greatest academic impact on these students' to be able to make appropriate, individualized placement decisions for them. In order to do this, they need valid, reliable evidence on the relationship between placement options or instructional delivery models and academic performance. Toward this end, the present study sought to answer the following question: How does instructional delivery model affect the academic performance of middle and high school students with mild disabilities?

Specifically, the study examined the reading and mathematics achievement of secondary students identified with the mild disabilities of LD, ID, E/BD, and OHI under four instructional delivery models in an urban school district, as measured by their performance on state assessments. The instructional delivery models included, from most to least inclusive, placement in (a) a general education classroom with indirect support to the teacher from special education consultant, (b) a general education classroom with in-class support from a special education co-teacher or special education paraprofessional, (c) a special education classroom (removed from general education), or (d) a separate setting (in a special education special day school). In order to provide valid, reliable evidence on the relationship between instructional delivery model and academic performance, the present study was designed to address the methodological challenges noted above. In addition to addressing level and model of inclusive education, the study addressed Zigmond's (2003) "best for whom" problem by considering the effects of four instructional delivery models on the achievement of students with different mild disabilities, as she and Madden and Slavin (1983) recommended. The research also was conducted at the secondary level and in all middle and high schools of the participating district, as recommended by Fore et al. (2008) and McDonnell et al., (2003), respectively, and it also considered the influence of the student characteristics of race, socio-economic status, and gender on the effects of inclusive placements on academic achievement, as well as that of the school characteristic of building inclusiveness.

Methodological Approach

This study was designed to provide empirical evidence to guide districts in making evidence-based placement decisions for secondary students identified with the mild disabilities of LD, ID, E/BD, and OHI. As such, it examined the mathematics achievement of 430 students and the reading achievement of 449 middle and high school students with mild disabilities under four instructional delivery models, ranging from inclusion in a general education classroom with indirect support to the teacher from special education consultant through placement in a separate special education special day school. The predictor variable was student's access to general education curriculum as measured by inclusiveness of placement in terms of placement in one of the four delivery models. Control variables were selected to address the individual variables of type of mild disability, race, gender, and socio-economic status, as well as the school fixed effects variable of "building inclusiveness" to account for the influence of building-level preferences, norms, and other conventions regarding inclusive education.

Significance of the Study

The focus on academic achievement outcomes for all students, including students with disabilities is apparent in state and federal education law. Despite this increased emphasis on improving academic outcomes, and the NCLB/IDEA requirement that improving the achievement of students with disabilities must be done in the most inclusive placement consistent with their instructional needs, there is a paucity of research to guide districts in making evidence-based placement decisions, especially for secondary students identified with the mild disabilities. The present research is significant because it has been designed to address this specific policy problem.

As such, the present research also is significant because increasing the academic performance of students with disabilities increases the likelihood of them achieving more positive post-school outcomes, including enrollment in post-secondary education and employment, both of which contribute ultimately self-sufficiency. Improvement in these areas is significant because currently adults with disabilities are employed at the rate of 19.2% compared to 64.5% of adults without disabilities (Bureau of Labor Statistics, 2010), and they enroll in post-secondary education at the rate of 14% compared to 53% for adults without disabilities (Able Trust, 2009).

The study also provides critical guidance for schools and districts in meeting the AYP requirements of NCLB for students receiving special education services, who like nondisabled students, are expected to reach 100% proficiency by 2014. This is significant because schools that do not meet the AYP standard are subject to sanctions including restructuring and loss of federal and state funds. Finally, this study contributes to closing the achievement gap between students with and without disabilities, a central goal of NCLB/IDEA and of parents, educators, administrators, and policy makers.

Chapter 2

Review of Literature

The need to understand the relationship between appropriate educational placement and the academic achievement of students with disabilities is evident in the special education literature. Both the progression of special education policy from focusing solely on access to school buildings and regular classrooms for these students to their access to and performance in the general education curriculum, and the research base related to it can be traced in this literature through distinct phases. For the purposes of this review, the following topics and phases of research will be considered: (a) standards-based reform and inclusion, (b) placement effects research, (d) models of inclusive education, (e) teacher readiness for and attitude toward inclusion, and (f) the educational needs, performance, and characteristics of students with mild disabilities.

Standards-Based Reform and Inclusion

Although states retain the authority for public education in the United States, the federal government has at times over-ridden that authority, using the "equal protection clause" of the fourteenth amendment, to protect the interests of vulnerable groups. The Elementary and Secondary Education Act of 1965 (ESEA) and the Education of all Handicapped Children Act of 1975 (EAHCA) are two primary examples of such intervention, the former statute focusing on students from low-income families and racial/ethnic minority groups, the latter on students with disabilities and their families.

Beginning in 1994, a series of five interrelated federal statutes introduced and eventually mandated the current accountability-based reform logic of standards-based reform (SBR) throughout public education, including special education (Skrtic, Harris & Shriner, 2005).

Although accountability has been part of public education since the emergence of the common school in the 19th century, SBR changed the nature of the accountability mechanism. The central components of the new mechanism are: (a) student outcomes as the measure of professional and system performance, (b) the school as the basic unit of accountability, (c) public reporting of student achievement, and (d) attachment of consequences to school performance levels (Elmore, Abelmann & Fuhrman, 1996). The first law leading to the eventual codification of the SBR framework was the 1994 statute, Goals 2000: Educate America Act (Goals 2000), which was significant because it advanced the idea that all students, including those served in compensatory education and special education, must achieve at higher levels through access to challenging curriculum and quality instruction (Riley, 1995). The second statute was the 1994 reauthorization of the ESEA as the Improving America's Schools Act (IASA), which was seen as an important vehicle for "promoting school improvement and infusion of resources to promote inclusive education and standards-based accountability for student progress" (Kleinhammer–Tramill & Gallagher, 2002, p. 27). The next statute, the 1997 reauthorization of the IDEA, aligned special education systems, services, and accountability mechanisms with the emerging SBR framework of Goals 2000 and the IASA (McDonnell, McLaughlin, & Morison, 1997). The 1997 IDEA embraced the fundamental goal of SBR, which by 1997 was the unification of educational systems and services to support all students in reaching high standards, which was to be achieved by aligning assessment and accountability systems to hold schools accountable for the academic progress of all students (Kleinhammer–Tramill & Gallagher, 2002).

Although the 1997 IDEA required the inclusion of students with disabilities in state and district assessments, it didn’t require that their assessment results be considered in programmatic decision making (Yell & Shriner, 2005; Thurlow, 2002). This requirement came with the fourth statute in the series, the 2001 reauthorization of the ESEA as the No Child Left Behind Act (NCLB), under which the assessment results of all students, including those with disabilities, must be part of a single accountability system premised on "adequate yearly progress" (AYP), a requirement that put "teeth into the accountability intentions of IDEA 97" (Thurlow, 2002, p. 2). Although special education accountability had been based on compliance with the procedural requirements of the IDEA, the 1997 IDEA and NCLB merged special education accountability with that of general education under the reform logic of standards-based accountability (McLaughlin & Tilstone, 2000; Salvia & Ysseldyke, 2004). The fifth law in the series, the 2004 reauthorization of the IDEA, retained and extended the SBR framework of the 1997 IDEA and NCLB (Skrtic et al., 2005).

Under NCLB districts are required to demonstrate movement, measured by AYP, toward the goal of all students scoring proficient or above on state assessments by the year 2014. Both acts are concerned with the quality of education students receive as demonstrated by their academic performance, including graduation rate and performance on reading and mathematics assessments, which must be reported for all students and for several disaggregated sub-groups, including students with disabilities.

Under IDEA public reporting requirements, districts report academic performance and educational placement data for students with disabilities to their state education agency, which in turn reports them to the federal Office of Special Education Programs (OSEP), U.S. Department of Education, in terms of progress toward meeting 20 performance indicators specified in a State Performance Plan (SPP). In addition to indicators for reading and mathematics achievement, the SPP contains an indicator for the educational placement of all students with disabilities. Thus, the increased contemporary focus on academic outcomes is linked to the long-standing IDEA principle of “least restrictive environment” (LRE), which has been a part of IDEA since its inception as the EAHCA in 1975.

The LRE principle requires that students with disabilities be educated to the maximum extent consistent with their instructional needs with students who are not disabled (Turnbull, Stowe & Huerta, 2007). As such, although there is a regulatory preference in favor of inclusive general education placements, the LRE preference is a rebuttable presumption. That is, an inclusive placement in a general educational classroom “is not an absolute right but is secondary to the primary purpose of [appropriate] education” (Turnbull, 1993, p. 159). The value of LRE placements is recognized both in terms of giving IDEA-eligible students more opportunities and incentives for development and making them less likely to be stigmatized, as well as helping nondisabled students learn about human diversity, but for purposes of the statute, LRE must be considered in light of appropriate education. Establishing this balance is the responsibility of the IEP team, which is charged with considering the needs of each student and, on this basis, determining the educational placement?

Public reporting of placement decisions is done in terms of the amount of time students with disabilities spend in one of four types of placements, determined by OSEP relative to percent of time spent in and removed from the general education classroom. Under current OSEP guidance, students participate in the general education classroom within the Local Education Agencies (LEAs) in four different environments; (a) Regular Class, (b) Resource Room, (c) Self-Contained, and (d) Separate Setting. The first OSEP placement term, Regular Class (RC) refers to students removed from general education less than 21% of their school day. The second, Resource Room (RR), is defined as a student removed from general education for less than 60% but more than 21% of their day. The third OSEP term, Self-Contained (SC), refers to a student removed from general education for more than 60% of their day in a general education building. The final OSEP placement term, Separate Setting (SS), includes students who receive their education in a separate location away from their general education peers. OSEP requires all districts report the environment—regular class, resource room, self-contained, or separate setting—for each student with a disability. The reporting represents the overall educational placement of the student during the school day, but does not reflect student placement in specific curricular area classrooms or the type of support the student is provided in the general education setting. The four OSEP environments represent inclusive settings (Regular Class and Resource Room), less inclusive settings (Self-Contained), and exclusive (Separate Setting) environments on the continuum of services.

The concept of SBR has support from many educators, the general public, and policymakers. Like any policy, however, there are those that offer criticism as well. Most of this criticism is directed at the implementation of NCLB and the provisions of accountability related to high stakes testing (Barth, 2006). In its research synthesis on SBR, the Mid-Continent Regional Educational Laboratory (McRel) found that the majority of studies showed a positive relationship between SBR and the achievement of students on state assessments (Lauer et al., 2005). Overall, SBR has impacted curriculum and instruction positively, which in turn has influenced student achievement positively. However, SBR has had a disproportionate impact on at risk students, who still do not have the same level of access to quality instruction as their more advantaged peers (Lauer et al., 2005). In addition, the issue of the effect of SBR on students with disabilities needs to be explored further to answer the question of whether SBR limits the efforts of teachers to individualize instruction for students with disabilities (Lauer et al., 2005).

Placement Effects Research

In combination, NCLB and the IDEA require state and local educators to improve the reading and mathematics performance of students with disabilities through access to the general education curriculum and use of evidence-based instructional practices in the least restrictive environment. The central problem, then, is determining which educational placements constitute the best environment for students with disabilities with particular types of needs and instructional goals. Research on the effects of educational placement on achievement is presented in the next two sections. The first section includes early research during the period from the enactment of the EAHCA in 1975 through the 1997 reauthorization of the IDEA. The second focuses on more recent research from 1998 to the present under the SBR reform logic of NCLB and the IDEA.

Early Research

As early as 1968, Dunn concluded that students who were labeled "educable mentally retarded" made as much or more progress in the general education setting as they did in separate special education classrooms. Dunn supported a pullout program for students on a more limited basis in order to address any special needs of the child. The question of where students with disabilities should receive their education was later impacted by two important court cases; *Pennsylvania Association for Retarded Children (PARC) v. Commonwealth of Pennsylvania* in 1972 and *Mills v. Board of Education of the District of Columbia,* also in 1972. The former case established the right of students with disabilities to be educated alongside of their non-disabled peers to the greatest extent possible consistent with their educational needs (Zigmond, 2003)-the concept is still known today as Least Restrictive Environment.

In 1980, Carlberg and Kavale completed a meta-analysis with different results. This study showed students with the disability category of mental retardation served in a pullout program scored as well as those who were served in a general education classroom. For students being served under the categories of learning disabilities and the emotionally disturbed, it was concluded those who were served in a more restrictive setting such as the special education classroom, had a small advantage academically over their similarly disabled peers who remained in general education classes.

Conversely, Leinhardt and Pallay (1982) determined students with learning disabilities achieved better academic outcomes in a special education classroom. These studies were typically looking at a small sample size while comparing students in general education classes with no support from special education with students who were receiving services from special education teachers in a smaller setting. The placement of students was determined by the IEP team, so the concept of random assignment to a group also did not exist.

During the 1980's, Madeline Will, the Assistant Secretary for the Office of Special Education and Rehabilitative Services (OSERs) for the United States Department of Education called for the elimination of the dual system of education between general education and pull-out programs-either Title 1 or Special Education. Will shared the most often used strategy for students who were experiencing learning problems were to remove these students from the classroom for additional assistance. The flaw with this delivery model was the assumption that the source for the poor performance was a problem with the individual child and not whether there were deficiencies within the learning environment (Will, 1986).

The call to eliminate the dual system of education produced new delivery models, which emphasized inclusion of students with disabilities in more general education settings with support from Special Education. Studies based on the new inclusion model yielded mixed results as well. In 1995, Baker, Wang, and Walberg concluded the inclusion of disabled students consistently outperformed their peers in non-inclusive environments who had comparable special education classifications. The separate system of special education has not had improved academic outcomes for students with disabilities. The segregation of students had a negative impact to both their social adjustment and academic performance. It is clear that including students in general education settings produces significantly better academic, attitudinal effects (self-concept and attitudes toward learning) and process outcomes Baker, et al., 1995).

Students with the label of LD were the focus of two separate studies and a literature review during this time. Each study found that students were not making satisfactory progress according to the researcher. The first study concluded severe LD students did not make as much growth as their peers; however, the pace of their gains was similar to that of their peers (Banerji and Dailey, 1995). The second study concluded that general education settings produce undesirable outcomes for LD students and there is not a simple answer to the question of where effective and appropriate services can be provided to LD students (Zigmond, et al., 1995). The review of the literature found LD students fail to make satisfactory progress academically or socially in a general education classroom, therefore the needs of this group of students were not being met in the general education classrooms because inclusion was not focused on education but rather on organization, that is, on *where* to teach students as opposed to *what and how* to teach them (Harrington, 1997). The evidence supports the idea that students with disabilities require additional support beyond that of their general education peers. The evidence on whether one specific placement or delivery model is more beneficial for students with disabilities is contradictory.

An additional literature review looked at the overall research on the pragmatic implementation of inclusion; which noted that in order for the full benefits of inclusion to be realized, the concept would have to be promoted by experienced teachers and the allocation of resources was imperative to it being successful (Peltier, 1997). The resources, once targeted at the pullout or special education classrooms, would need to be redistributed to the general education classroom in order to support the students being placed in that environment. Five potential benefits of inclusion were identified; including, a) reduced fear of human differences, b) growth in social cognition of the non-disabled peers who learn to be more tolerant, c) improvement of self-concept development of personal principles, d) an increased responsiveness of secondary students to the need of others, and e) the development of warm and caring friendships. The recommendation was that inclusion should be implemented because of the basis of social justice, social relationships, and the inadequacies of traditional special education pullout programs (Peltier, 1997).

A meta-synthesis of eleven articles published between 1984 and 1994, examined eight different models of inclusion by looking at the measurement of outcomes for students who were pulled out entirely or pulled out for a portion of their school day demonstrated inconclusive results regarding placement (Manset & Semmel, 1997). Even the best results of research of this time were mixed.

In 2003, Zigmond concluded the efficacy research, spanning over 30 years, provided no compelling research evidence that placement was a critical factor in social progress or academic achievement of students with mild/moderate disabilities. Zigmond proposed two explanations for the lack of research evidence demonstrating a pullout or a full inclusion model produces better results. The first is that studies that examine this question are limited when one looks for a project with appropriate controls and dependent variables. In addition, the random assignment of students to the treatment is usually not an option since volunteer groups or pre-existing classrooms were used. There is further compromise on the data in that the samples in the experimental and control groups are not appropriately matched based on the severity of the disability. The second belief is the concept of “one best place” for students goes against the core concept of Least Restrictive Environment. Each placement should be based on the individual needs of the student as opposed to including everyone of a specific disability into one service delivery model.

Research 1998 to Present

The reauthorization of IDEA in 1997 placed strong emphasis on access to the general curriculum for all students. “IDEA 1997 provides a new and heightened emphasis on improving educational results for students with disabilities, including provisions which ensure these children: 1) have meaningful access to the general curriculum through improvements to the IEP, and 2) are included in general education reform efforts related to accountability and high expectations, and focus on improved teaching and learning” (IDEA’97 Introductory Comments-Topic Brief, 1999). By placing the education of children with disabilities in the context of educational reform, the focus shifted from the idea of access to education to improvement of performance and achievement for students with disabilities (Kelly, 2006). IDEA was reauthorized again in 2004 in order to align it with NCLB. The emphasis on compliance with procedures was lessened and the focus was again on student outcomes and student achievement. The two laws are more closely aligned than they were previously.

According to Turnbull, et al. (2007), the core principle of NCLB-the principle of accountability- focuses on schools educating all students well enough to demonstrate proficiency in core academic subjects. To monitor this principle, the government relies on standardized state assessments of students. IDEA reinforces this concept with the participation of students with disabilities on assessments. Two SPP indicators address this; the first requires participation of students with disabilities on the reading and mathematics assessments. In Kansas the targeted participation is 95%. The second monitored indicator examines the percent of students with disabilities proficient on the reading and the mathematics assessments. During this time period several studies began to focus on the academic outcomes students with disabilities were achieving.

A literature review by Walker and Ovington in 1998 found that much of the research on the effects of inclusion on students' performance was skewed due to a small sample size. Many studies have been more anecdotal or have focused on special education students alone. The age or severity of disability of the researched population were contributing factors to the varying results obtained for special education students, whether they are in pre-school, mildly disabled or severely disabled.

In 1998 Saint-Laurent et al looked at a treatment and comparison group of students that received their instruction in a traditional classroom versus one which included the PIER model (collaborative consultation, cooperative teaching, parent involvement, and strategic and adapted instruction in reading, writing, and mathematics). The study focused on general education students and those at risk, which included disabled and non-disabled students. General education students in the treatment group outperformed those in the comparison group in reading. At risk students in the treatment and comparison group were not statistically different. In writing, the students included in the at risk group scored significantly higher than the comparison group, while the general education students had no significant difference. In mathematics, the general education students in the treatment group scored higher than those in the comparison group. The "at risk" group had no difference in mathematics.

In the same year, Waldron and McLeskey (1998) conducted a study of elementary students in grades 2-6. Seventy-one students were in an inclusive model and seventy-three were served in a special education classroom. Teachers in the study volunteered to participate and were provided specific training in the model. The findings showed students with LD made significantly more progress in the inclusive setting for reading than those students served in the special education classroom. There was no difference noted for mathematics. More severe LD students did not make as much growth as their less severely disabled peers. An additional study was completed by Klingner et al. (1998) focusing on LD students in grades 3-6 who were served through full time inclusion in general education. The study looked at 114 students, of which 25 were labeled LD. Teachers were provided a year of professional development. Findings from this study showed that high achieving students and low to average achieving students improved statistically significantly in reading and mathematics. LD students improved in reading, which was the focus of the study. The performance of students with LD did not significantly improve in mathematics. For students with the lowest performance level, the support of the resource room was more beneficial than the inclusion setting with supports. The poor readers made no progress. Students who received their instruction and support within the general education classroom with support did not have their academic needs addressed sufficiently to make progress. The authors noted the level of external support provided through the study exceeded what was likely available in a typical inclusion class setting.

The effect of the inclusion of students with special education services on general education students in grades 1 through 5 was studied by Huber, Rosenfeld, and Fiorello (2001).

Over 477 general education students were studied over three years. Students in the study either received their instruction with completely non-disabled peers or in a class with students with disabilities. The study focused on inclusive practices and whether there was an academic effect on low achieving general education students by having special education student in the same classroom. General education students who were higher achieving did not maintain their level of achievement outcomes, with most losing ground overall. The reading scores of general education students were not significantly impacted, while their scores in mathematics had mixed results.

In 2002, Hagan-Burke and Jefferson concluded that schools hadn't reached consensus on where to best educate students with disabilities. The recommendation is to ensure placement decisions for students are based on data and that a full continuum of services continues to be offered for all students as required by IDEA. Based on data, the recommendation is to pursue responsible inclusion, where students are included in general education to the maximum extent possible to meet their needs and to successfully implement the IEP, as opposed to full inclusion. In the same year, Rea, et al., (2002) studied 8th grade students in 2 schools within the same district. Within the study, 36 students receiving services under the LD label received instruction in an inclusion setting and 22 were served in a pullout setting. Students' characteristics were closely matched between the two groups in terms of IQ, number of years served in special education, and the number of years the students had lived within the district. Students in the inclusion model received instruction from teachers who had collaborative planning time. Students in the non-inclusive school did not receive any support in the general education setting. The findings from this study showed LD students who were the included achieved higher scores on the Iowa Test of Basic Skills (ITBS) in language and mathematics. The scores were comparable between both groups on reading, mathematics, and writing state assessments. This study was conducted in a small suburban school district. The results have not been replicated because the data analyzed was from 1994-1996 for setting and assessment scores. The accountability system has been updated with new assessments since this time.

McDonnell et al. (2003) studied the placement of students with developmental disabilities (DD) in a general education setting. The study focused on whether the students identified as DD made improvements on their own adaptive behavior and whether they successfully attained the IEP goals identified for them. The results suggested the presence of students identified, as DD did not negatively impact the general education students. The majority of non-disabled students met standards in language arts, reading, and mathematics regardless of whether they were in a classroom that included students with DD or a non-inclusive classroom. The study was conducted on a small sample size, which limits the generalization from its findings.

In a descriptive study, Burstein, et al., (2004) studied inclusion programs within two districts in California. The focus of the study was to identify successful delivery models, where less than 50% of special education students were taught in a pullout program. Students with more significant needs were addressed in a self-contained or segregated site. The project lasted for three years in a district that had begun the change process toward inclusion. The findings from the study were inconclusive as to the effectiveness of inclusion. The concern of clustering students into a limited number of general education classrooms was discussed. The authors believed students with special needs should be spread out throughout the building's general education classrooms; yet they were concerned if students were spread out, buildings would be unable to sustain an inclusion program.

The research of Nye, Konstantopouls, and Hedges (2004) on the effect of individual teachers on student achievement showed mixed results. Teachers in mathematics typically showed greater effect then those in reading. Teacher effects were also greater in building with low socio-economic status (SES) than in buildings with higher SES. The study was not able to determine which teacher characteristics were best able to predict student success.

Malmgren, McLaughlin, and Nolet (2005) used hierarchical level modeling to consider twelve variables that might have predictive value for students with disabilities on state assessments. The study looked at reading and mathematics test results on state assessments for grades 3, 5, and 8 in two school districts over a two-year period. Their findings showed that only the performance of general education students had a predictive value on 10 of the 12 variables analyzed. However, the study suggested school effects did impact students. Overall, schools with good results for the general education population had good results for their special education populations as well. Socio-Economic Status was significant in only one case. Of the special education variables, the overall percent of students who were special education within a building was not a significant predictor of performance.

One of the few studies available that analyzed secondary students was completed by Fore et al in 2008. This study looked at the classroom placement of students relative to the academic performance of the students with LD in content classes. Fifty-seven students were tested using a Multi-level Academic Survey Test (MAST). Reading and mathematics scores were examined relative to each student's grade level. The number of general education versus special education classes attended was considered, as well as the type of placement. The study found no statistically significant evidence to indicate academic achievement varied based on inclusive or non-inclusive placement. The only statistically significant difference was for students enrolled in a general education literature class as opposed to a special education literature class. The study was mixed on whether academic outcomes were improved for students in an inclusion setting.

The study also had the following implications: that educators must consider student outcomes when placement decisions are being made, the method in which decisions are made is important, and finally, a determination must be made to ensure that IEP goals can be met in the general education classroom. The study included a sample size of 57, which impedes the ability to generalize the findings from this study. Additionally, because IEPs tend to dictate where students receive their instruction based on the skill level/needs of the student then students who already perform higher are typically placed in general education while lower performing students are educated in the special education classroom setting.

Inclusion Models

In *Four Inclusion Models that Work*, Elliott and McKenney (1998) describe a quartet of inclusion models. These models are: General education with no direct support, co-teaching between two licensed professionals (one general education and one special education), paraprofessional support in a general education classroom, and/or students receiving support in a special education pull-out setting. Elliot and McKenney's work focuses on these possible models; but does not provide evidence regarding their effectiveness. Manset and Semmel's (1997) research is inconclusive when examining the effectiveness of inclusive programs for students with mild disabilities. Their research indicates that a one size fits all inclusion model is ineffective because it is not sufficiently specialized to meet the individual needs of students. According to Manset and Semmel (1997) the continuum of programming should be expanded to offer more support and individualized instruction to students with mild disabilities. Daniel and King (1997) investigated the impact of inclusion services on academic achievement. They used four dependent variables; parental concern; teacher/parent reports of instances of student behavior issues, students' academic performance, and students' self-reported self-esteem as dependent variables. Results from the Daniel and King (1997) study showed that parents were more concerned about their students if they were in inclusion and parents / teachers of students in inclusion classes reported more behavior issues. Although there was no pre-measure of self-esteem noted, students reported lower self-esteem when served through an inclusion model. The research data yielded that gains occurred in reading; however, there was no statistical difference in performance in students in spelling, language, and math. Overall, Daniel and King (1997) concluded that there was no evidence to show that services provided through the inclusion model provided any instructional advantage. The data did support higher rates of behavior problems in inclusive classrooms, and that inclusion did not increase the self-esteem of included students, although they had no pre-measure to support this claim.

Hocutt (1996) found the critical question of effective services is not placement; but, instruction. Students identified as Learning Disabled tend to have better academic outcomes in special education settings. Students tend to have a lower self-concept when served through inclusion in general education at the elementary level. Hocutt states that high functioning students identified with an Emotional Disturbance tend to benefit socially and academically from the general education setting. However, lower functioning students with an Emotional Disturbance served through inclusion in general education tend to drop out of school in general education due to repeated course failures. Students identified with mental retardation benefitted from a general education classroom that had incorporated cooperative learning with active involvement of the student in teacher directed and supervised instruction. The evidence available regarding the benefits of inclusion services at this time is rather inconclusive. Services provided through inclusion have evidential support as beneficial in some situations; but not in others, not. Thus, clearly the burden falls on the IEP team to discern both the services needed and the best delivery of such services for each unique student. Moreover, the *Oberti v. Clementon* 1993 decision upheld the right of the student to be educated in a regular classroom with non-disabled peers. As a result, today the burden of proof to remove a student from general education and demonstrate the educational benefit of the removal for the student lies with the school district and the IEP team.

General Education Classroom with No Special Education Support

The first model referred to by Elliott and McKenney (1998) is placement in a general education classroom with no support from special education. This model was reviewed by Calhoun and Elliott (1977), Leinhardt and Pallay (1982), and Madden and Slavin (1983); who, concluded that the achievement of students with mild disabilities placed in general education classes depends substantially on the nature of the instructional program utilized in the general education classroom. If individualized instruction occurred in the general education classroom, students with mild disabilities had higher rates of achievement than if served in a special education classroom. Madden and Slavin (1983) also found when individual support was not delivered, there was little difference between academic achievement for students with disabilities placed in a special education classrooms versus general education classrooms. In addition, they found that any differentiated method of instruction for students with mild disabilities was at least as effective as, and usually more effective than, traditional non-differentiated instructional methods designed for non-disabled students.

General Education Classroom Co-Teacher or Paraprofessional Support

Elliott and McKenney (1998) included two models of direct support in the general education classroom. The first of these is a Special Education licensed Teacher, typically referred to as a co-teacher, and the second is a paraprofessional; which, in the literature is either a classroom paraprofessional or a one on one paraprofessional.

Scruggs et al. (2007) conducted a meta-synthesis of 32 qualitative investigations of the co-teaching model. The evidence revealed that in most instances, the special education teacher functioned in a subordinate role using the co-teaching approach of one teach and one assist. Scruggs et al. (2007) concluded that research on the efficacy of co-teaching is limited. Yet, some outstanding efficacy variables have been identified; amiability of co-teachers, degree of administrative support of co-teaching within the building, shared plan time for co-teachers, and the quality of professional development regarding co-teaching. Of the 32 qualitative studies reviewed, Scruggs et al. (2007) found most of the research focused on individual investigations with few attempts to summarize the overall findings. The meta-synthesis revealed both special education and general education teachers reported the co-teaching experience benefitted them professionally. Both groups also noted an increase in cooperation among students in their classes. Teachers did feel there should be (an unspecified) minimum academic level or behavioral level for students to achieve before being included. Scruggs et al. (2007) expressed a concern about whether special education students were truly receiving special education when they were included in general education classrooms. His investigation showed they were receiving good general education instruction with assistance; but, the argument can be made that it is not specially designed instruction. The meta-synthesis of Scruggs et al. (2007) agrees with the research of Hocutt (1996), in which it was found that non-disabled students benefitted most in reading, mathematics, and language skills in a classroom with two teachers. The non-disabled students supported while in general education classes demonstrated greater gains than their non-disabled peers in the same setting with no support.

The first of two models of paraprofessional support in general education classrooms is a one on one paraprofessional for a student with significant needs and a classroom paraprofessional assigned to work with all students, focusing on students with mild disabilities. Giangreco (2010) has extensively researched the topic of one on one support noting several concerns. Among his concerns are that the placement of a one-on-one paraprofessional may have potential harm to the student-either socially or academically. The concept of one-on-one paraprofessionals does not have a large research base to inform and guide policy and practices of districts. Data is not required to be collected by OSEP based on the demographic characteristics or the disability categories for students receiving one-on-one paraprofessional support. Giangreco (2010) further questions the assignment of paraprofessionals to provide the bulk of instruction to students who have been identified as having more complex learning characteristics; thereby not ensuring students have access to highly qualified teachers.

In order for students to receive an education to the greatest extent possible in the general education setting, many districts have integrated paraprofessionals into general education classrooms to assist the teacher in meeting the needs of a student with disability. According to Mueller and Murphy (2001), more research is needed to understand when it is and is not appropriate to rely exclusively on a paraprofessional in a classroom to assist a student with a disability. This one on one support of a paraprofessional into a classroom can have unintended negative consequences, such as limiting the ability of the student with a disability to become an independent learner, interfering with interactions with peers, and interfering with the teacher's interactions with and sense of responsibility for the student.

The use of paraprofessionals in a classroom to assist with all students with disabilities within a classroom, not to meet the needs of only one student is a common practice in school districts. Most of the current literature available focuses on parameters for making the decision to utilize such a paraprofessional or instructions for collaboration of the teacher and paraprofessional to meet the needs of students. The conclusions of Carter, O'Rourke, Sisco, and Pelsue, (2009) are summative of the previous findings. They report that more than 312,000 paraprofessionals are employed in the United States. Almost every student with a disability attends a school that employs a paraprofessional. Increased reliance on paraprofessionals and the increasing number employed elevates the need for additional research on the efficacy of the tasks they are asked to perform and the type of knowledge training they need to be effective (Carter et al., 2009).

There is little research on the achievement outcomes of students with disabilities who received their instruction under either of the previously mentioned paraprofessional models. In one study, a different factor showed conclusive evidence. Gerber, Finn, Achilles, and Boyd-Zaharias (2001) compared the achievement of nondisabled students in three instructional settings: a typical-size classroom with no support, a typical -size classroom with a teacher-aide (paraprofessional), and a smaller classroom with no aide (paraprofessional). They found no significant differences in student achievement based on paraprofessional support yet did yield a significant difference based on class-size. In both paraprofessional scenarios, students in the small classes outperformed those in larger ones.

Special Education Resource Room

The final inclusion model referred to by Elliott and McKenney (1998) is a pull-out class option, where students are assigned to a regular classroom but receive part of their education in a separate resource room setting for certain subjects or short periods of instructional time. This model shows benefits for certain groups of students. Leinhardt and Pallay (1982) synthesized previous research on placement effects and found that for students with mild disabilities, the special education resource room option was better than an unsupported general education classroom. Their review also noted students identified as educable mentally retarded (EMR) had better attitudes and perceptions of themselves when educated in a more isolated setting. They concluded that multiple variables were important to student outcomes. Overall, they determined that the setting was not the most important variable. Rather, the influential factor was what occurs instructionally within that setting. Leinhardt and Pallay's (1982) recommendation was that educators should focus on identifying effective instructional strategies to influence academic outcomes and LRE placements when considering moral and social needs.

Manset and Semmel (1997) synthesized eleven separate studies which examined a total of eight different models of inclusive education. The review findings were inconclusive yet did reveal some helpful information. Despite the all inclusive intent of many inclusive programs, students with mild disabilities were not truly fully included for their entire day. Also, reading and mathematics outcomes for students with mild disabilities and low achievement revealed larger academic gains for students served through a traditional pullout program. In addition, the duo noted the general education students in the general education classroom achieved positive gains which suggests that when creating a successful environment for students with disabilities, typically achieving students also benefitted. Madden and Slavin (1983) concluded there were few advantages to placing students full-time in an isolated setting for special education. The study noted a possible exception for students with IQs below the mid-70 range. The best placement for most students according to Madden and Slavin was in a general education classroom utilizing individual instruction or in a general education classroom utilizing an itinerant well-designed, pullout, special education setting for additional support. Baker et al

(1995) concluded that the use of a separate system of special education has not improved the learning of students with disabilities; in fact it may have harmed the academic performance and social adjustment of these students.

In conclusion, the overall question of what impact placement has on academic outcomes has not been definitively answered. Fore et al. (2008) summarized the question of the relationship between educational placement and academic outcomes found in the current literature. As expected, varied conclusions have been drawn over time based on the individual research available. In 1980, Carlberg and Kavale indicated students with severe learning problems may achieve more in a special class. Since then, several researchers have determined that inclusive versus non-inclusive settings demonstrate no difference in the academic achievement of students with disabilities (Manset & Semmel (1997) and Waldron & McLeskey 1998). Holloway (2001) found that students with disabilities may achieve more in academic programs when the special education classroom is combined with the regular class instead of supporting either a regular class placement or a special education placement. In conclusion, the overall question of what impact placement has on academic outcomes has not been definitively answered**.** Hocutt (1996) concluded there is a clear need to preserve a full continuum of services for students with disabilities.

Essential Components of Inclusion Education

Burstein et al. (2004) reviewed the literature to determine what supports need to be in place for personnel readiness for moving from a non-inclusive to an inclusive delivery model. Their review highlighted the observations and recommendations of the following researchers:

- Teachers have insufficient skills and training to adequately serve student with special needs (Houck & Rogers, 1994; Schumm & Vaughn 1991).

- Teachers need to receive systematic and intensive training that includes research-based best practices in inclusive schools in order to increase their confidence and competence in providing instruction to students with disabilities (Little, 1993).
- Staff development must be ongoing and participatory—study groups, teacher collaboration, and long-term partnerships (Little, 1993).

An additional component of successful inclusive education is teachers' philosophical commitment to carry it out. Villa and Thousand (2005, p. 8) identified the following beliefs as indicators of such commitment.

- Each student can, and will, learn and succeed.
- Diversity enriches us all, and students at risk can overcome the risk for failure through involvement in a thoughtful and caring community of learners.
- Each student has unique contributions to offer to other learners.
- Each student has strengths and needs.
- Services and supports should not be relegated to one setting (e.g., special classes or schools).
- Effective learning results from the collaborative efforts of everyone working to ensure each student's success.

Teacher Readiness for and Attitude toward Inclusion

This section reviews the literature on the extent to which general education teachers' are prepared for inclusive education and their attitudes toward it as a practice and policy.

Teacher Confidence Instructing Students with Disabilities

Several factors influence both the general education and special education teachers' reaction to and philosophy regarding inclusion. The question of teacher reaction was studied by

Forlin, Douglas, and Hattie (1996). Their research showed that teachers were more accepting of children with physical disabilities than those with intellectual disabilities. The level of acceptance for all students decreased as the degree of severity increased. Educators were typically more accepting of students with mild or moderate disabilities if they were an integrated part of the school day. Educators who were more experienced tended to be less accepting. Educators in the study had strong beliefs regarding inclusive practices that did not support expanding inclusion. According to Buell, Hallam, Gemel-McCormick, and Scheer (1999) instructors who had positive views of inclusion, also had more confidence in their individual ability to successfully teach students in an inclusive setting and to adapt classroom materials and instruction to meet the individual needs of students. In 2008, Elliott reported the results of looking at teacher attitude toward inclusion and the success of students in the curricular area of physical education. The study suggested that the relationship between the teachers' attitude toward inclusion and their effectiveness in working with students with disabilities.

In addition to attitude, teacher training is imperative to the successful inclusion of students into a general education setting. Shade and Stewart (2001) found that pre-service teachers that enrolled in one special education course had their dispositions and instructional competencies altered. The recommendation for a course in special education is also supported by Coombs-Richardson and Mead (2001) who concluded that an increase in knowledge and an improvement in attitude toward included students are obtained when teachers are provided in-service and pre-service training in the area of special education.

Teacher Attitude toward Inclusion

Support for inclusion within the literature discusses that overall teachers support the inclusion principle that students have the right to be educated with their peers in their home school. However, support for the ideal has a limited influence on the actual implementation (Croll & Moses, 2000). As noted by McLeskey and Waldron (2000), far more teachers support and accept the concept of inclusion than are willing to actually teach in an inclusive classroom (p. 51). A survey conducted by Garriott, Snyder, and Miller (2003) explored the beliefs of pre-service teachers regarding the appropriate place for students with mild disabilities to receive their education and to explore the reason for the belief. The results showed that fifty-five percent of pre-service teachers thought that students should receive their education in a general education classroom, while forty-five percent indicated they should be instructed in a special education setting. Garriott et al. identified eight themes from responses to support why students should be included. These are: students should not be isolated, there is a benefit for all students, ability of the student to learn in general education, social benefits exist for the student in general education, a need for equal opportunity, better preparation for the real world, increased self-esteem, and the ability of general education teachers to teach students with disabilities. From this same study, the teachers who supported a placement in special education identified seven areas of support for their belief; which include: ability to receive more individualized attention in special education, the non-occurrence of distraction by students with disabilities, lack of skills of general education, prevention of teasing and bullying, students with disabilities feeling more at ease with special education peers, and a separate education setting being easier for everyone. Teachers have expressed reservations about the overall feasibility of inclusion; the reservation is related to the type and the severity of the children's difficulties and the school's ability to meet the students' needs (Croll & Moses, 2000). In addition, Shade and Stewart (2001) state that teacher-training facilities do not adequately prepare teachers for the realities of teaching in an inclusive setting. In 2002, Avramidis and Norwich conducted a literature review on teacher attitude toward integration/inclusion. Their review concluded that the attitudes toward inclusion are strongly influenced by the nature of the disability and the professional background of those being asked to implement inclusion. School district staff has more positive attitudes regarding inclusion than those at the classroom level. In addition, studies suggested that general educators have not developed an understanding of disabling conditions and are not supportive of placement of students with disabilities into the regular classrooms. This attitude was explained as being a result of no systemic modification to school structure, no regard to teacher instructional expertise, and no guarantee that resources would continue to be allocated (Avramidis & Norwich, 2002).

Needs, Performance, and Characteristics of Students with Mild Disabilities

With regard to the uncertainty of special education identification and placement process, the degree of ambiguity depends on the type and level of severity of the disability in question. There is little ambiguity in the identification of students with physical, sensory, or more significant intellectual disabilities (i.e., moderate to severe mental retardation). These "low-incidence" disabilities are associated with observable patterns of biological symptoms or syndromes, and are thus comprehensible as objective pathological conditions (Mercer, 1973). Although in such cases there is little difficulty identifying a student as disabled or determining a disability type, placement decisions require judgment and thus are somewhat more ambiguous because of learning-relevant variability within low-incidence disability types based on the degree to which intellectual capacity is affected (e.g., a blind student can be highly intelligent and thus very capable and successful in a regular classroom, or, if whatever caused the blindness also affected intellectual capacity, can have a host of learning problems and thus need more intense and thus more restrictive placement).

Conversely, both aspects of the identification (i.e., eligibility and classification) and placement process are highly ambiguous for students with “judgmental” disabilities, i.e., the “high-incidence” disability classifications of intellectual (ID), emotional disturbance (ED), and learning disabilities (LD). In most cases, students so classified do not show biological signs of pathology and thus the presence and type of disability must be inferred from behavioral manifestations (Daily, Ardinger, & Holmes, 2000; Mercer, 1973; Ross, 1980). This means that the identification process does not result in objective distinctions, either between disabled and nondisabled or among the three high incidence disability classifications (Gartner & Lipsky, 1987; Stainback & Stainback, 1984; Wang, Reynolds, & Walberg, 1987). Moreover, the distinction among ID, ED, and LD is even more ambiguous because there are “no behavioral characteristics . . . associated exclusively with any one of the three [classifications],” which means that children who are identified as ID, ED, or LD in school “reveal more similarities than differences“ (Hallahan & Kauffman, 1977, p. 139; Hallahan, Kauffman, & Pullen, 2008). Finally, as a consequence of their common characteristics, “teaching techniques do not differ among the three [classifications]” (p. 139), which makes placement decisions more ambiguous as well.

Summary

The answer to the question of what is the best placement for students with mild disabilities remains elusive. Most studies demonstrate that an inclusive setting meets the needs of students at least as well as a segregated setting, even if the student’s outcomes are not at an acceptable level. The question has been answered on a moral and ethical level indicating that the inclusion of students in general education to the greatest extent possible is the appropriate choice under the concept of Least Restrictive Environment. A concern remains related to the attitude of general education teachers and their acceptance of students with disabilities. Students are typically referred for special education when they fail to make progress at a level comparable to their peers. Historically, the referral equated to the removal of the student from the general education classroom in effect making the student the responsibility of special education. In an inclusive model it is imperative that the recommendations related to teacher training, plan time, and support are upheld or students are returned to the same conditions that have already been proven to be unsuccessful.

Chapter 3

Methods

This study offers a view of the results for 430 students with disabilities on state assessments in mathematics and 449 students with disabilities in the area of reading for an urban district disaggregated by type of placement or instructional delivery model, and disability category for students in 6 middle schools, 3 comprehensive high schools, and a secondary special education day school. The district has a population of students with disabilities, which exceeds the national average of 9.1% of a population being identified. Within the study district, the district average for students served in Special Education is 15.6%. Several buildings have populations between 20% and 25%. Teachers were not provided any additional training or resources beyond what the district had already allocated. It is not anticipated that this study will provide conclusive answers to all of the questions identified in the literature. However, it will inform the field of education and further our understanding of the academic effects of inclusive programming.

The data to be analyzed is from a district offering a full continuum of services, as required by law, and includes students to the maximum extent possible to continue to meet the students' academic, behavioral, and emotional needs. Approval has been obtained from the Human Subjects Research Committee and from the School District's Research Committee to work with student state assessment scores, student demographic data, student special education data, and classroom data (see Appendix A). Students were selected based on their enrollment within the district at one of six middle schools, three high schools, or the special education school. Students were grouped based on their assignment to classrooms by district personnel and the current special education services they receive as outlined in their IEP and their placement into classes based on the master schedule. The study focuses on the academic achievement outcomes as measured by state assessments in the areas of mathematics for 430 students and in reading for 449 in grades 6-12 in a large urban school district for students with disabilities. State assessments consist of two test types; the general assessment and the modified assessment. Both versions of the test are based on the state standards, the modified assessments contain one less answer choice then the general assessments. The study district's model would align with what Hagan-Burke and Jefferson (2002) call responsible inclusion, which is a mixture of general education classrooms and pullout special education classrooms.

The dependent variable of achievement outcomes will be students with disabilities' individual performance levels on 2009 state assessments in the areas of reading and mathematics, respectively. Students with disabilities participated in either the general assessment or the state's modified assessment. Students who participated in the alternate assessment were excluded from analysis. The district has internal guidelines for participation in the modified assessments, which require students to be performing at or below the 3rd percentile on other standardized tests. In order to take an alternate assessment, the preponderance of data must indicate the student is performing at or below the 1st percentile. Student performance data on state assessments was retrieved from the state-sanctioned website, which allows districts to create individual student reports of student's performance pertaining to each tested reading and mathematics indicator of the state curriculum standards.

The independent variable will be the instructional setting in which the student received instruction in reading and in mathematics, respectively. All students with disability classifications of learning disability (LD), intellectual disability (ID), emotional/behavioral disability (E/BD), or other health impaired (OHI) were categorized into this variable based on the classroom instruction setting where they received their reading and mathematics instruction. These settings included four instructional options: (a) general education classroom with no support from special education, (b) general education classroom supported by a special education co-teacher or a special education paraprofessional, (c) self-contained special education classroom, and (d) classroom in a separate special education day school. Classroom rosters, which include all students, were downloaded from the district's student information database and coded with the appropriate instructional delivery model by the special education department chairperson in each district middle school and high school for each reading/language arts and mathematics class offered on the master schedule during the 2008-2009 school year. Student reports from the state assessment were downloaded from the state-sanctioned website to obtain the performance level of each student in reading and mathematics, the measure of academic achievement for each student. Performance level scores are reported as academic warning, approaches standards, meets standard, exceeds standard, and exemplary based on cut scores. For state reporting purposes under AYP, the scores of academic warning and approaches standard are considered not proficient. The categories of at standard, exceeds standard, and exemplary are considered proficient and above. The reported performance level scores were collapsed into the categories of proficient and not proficient for the purpose of this analysis.

In addition, basic demographic data was provided by the district's director of demographics. The data include each student's school building, gender, race, free and reduced lunch status (as a measure of socio-economic status), and disability classification. These data will be used to examine the influence of a student's race, gender, socio-economic status (as measured by free and reduced lunch status), and disability type on the effects of delivery model on the dependent variable of the 2009 state reading and mathematics assessment proficiency level achieved by each student. The aim will be to determine the impact of the student's instructional setting on student reading and mathematics performance on state assessments.

The data set includes all students with disabilities in grades 6-12 who participated in either the state reading or mathematics assessment listed by an anonymous student number, demographic information of grade, race, and gender for each student, the respective instructional delivery model for reading and mathematics courses, as well as the student's disability classification and performance level on the reading assessment and the mathematics assessment. The individual student variables are presented in Table 1.

Table 1:Student Level Variables Data Summary

Student Level Predictors		
Student-Level (Demographic)		
	Category Name	**Description**
1	Gender	0=female, 1= male
2	Race	0=non-white, 1= white
3	Mathematics proficiency level or Reading proficiency level	0=non-proficient, 1=proficient
4	Disability Category 1	Emotional Disturbance (ED)
5	Disability Category 2	Learning Disability (LD)
6	Disability Category 3	Intellectual Disability (ID)
7	Disability Category 4	Other Health Impairment (OHI)
8	Lunch	0=Full Pay, 1=Free or Reduced
9	Instructional Delivery Model 1	General Education Class with no support from Special Education
10	Instructional Delivery Model 2	General Education Class with support from a Special Education Co-Teacher or Paraprofessional Support
11	Instructional Delivery Model 3	Special Education Classroom
12	Instructional Delivery Model 4	Special Education Building-Separate Setting

The number of students for each variable is shown in Table 2 for mathematics and Table 3 reading.

Table 2: Number of students per student variable in mathematics

NUMERICAL COUNTS OF RELEVANT STUDENT VARIABLES	
Mathematics Counts for Students with Disabilities in Grades 6-12	
Male Students with Disabilities	308
Female Students with Disabilities	122
White Students with Disabilities	199
Non-White Students with Disabilities	231
Free or Reduced Lunch Students	332
Full Pay Lunch Students	98
Disability Category 1 ED	84
Disability Category 2 LD	232
Disability Category 3 ID	30
Disability Category 4 OHI	84
Students with Disabilities in Mathematics Instructional Delivery Model 1	89
Students with Disabilities in Mathematics Instructional Delivery Model 2	175
Students with Disabilities in Mathematics Instructional Delivery Model 3	129
Students with Disabilities in Mathematics Instructional Delivery Model 4	37

Table 3: Number of students per student variable in reading

NUMERICAL COUNTS OF RELEVANT STUDENT VARIABLES	
Reading Counts for Students with Disabilities in Grades 6-12	
Male Students with Disabilities	321
Female Students with Disabilities	128
White Students with Disabilities	214
Non-White Students with Disabilities	235
Free or Reduced Lunch Students	342
Full Pay Students	107
Disability Category 1 ED	93
Disability Category 2 LD	238
Disability Category 3 ID	35
Disability Category 4 OHI	83
Students with Disabilities in Reading Instructional Delivery Model1	97
Students with Disabilities in Reading Instructional Delivery Model 2	180
Students with Disabilities in Reading Instructional Delivery Model 3	132
Students with Disabilities in Reading Instructional Delivery Model 4	40

A summary of instructional delivery models by disability for mathematics is presented in Table 4 and for reading in Table 5.

Table 4: Summary of Instructional Setting by Disability for Mathematics

INSTRUCTIONAL DELIVERY MODEL COUNT BY DISABILITY GRADES 6-12				
	Disability Category			
Instructional Delivery Model	1: ED	2: LD	3: ID	4: OHI
1	12	57	1	19
2	27	108	3	37
3	19	64	24	22
4	26	3	2	6

Table 5: Summary of Instructional Setting by Disability for Reading

INSTRUCTIONAL SETTING COUNT BY DISABILITY GRADES 6-12				
	Disability Category			
Instructional Delivery Model	1: ED	2: LD	3: ID	4: OHI
1	13	59	3	22
2	39	102	8	31
3	12	74	22	24
4	29	3	2	6

A summary of the frequencies of the sample population by building is presented in Table 6.

Table 6: Summary of Frequencies of Students by Building

Building	**Special Education Count Reading**	**Special Education Count Math**
472	59	59
521	50	51
544	57	59
550	54	56
552	28	32
553	34	34
556	37	35
558	38	41
560	36	42
572	37	40
Total	430	449

A summary of students in each instructional delivery model for mathematics and reading by building is shown in Table 7 and Table 8, respectively.

Table 7: Summary of Instructional Delivery Model by building for Mathematics

Instructional Delivery Model for Mathematics				
Building	**Instructional Delivery Model 1**	**Instructional Delivery Model 2**	**Instructional Delivery Model3**	**Instructional Delivery Model 4**
472	12	26	21	0
521	13	23	14	0
544	8	28	21	0
550	15	15	24	0
552	1	26	1	0
553	2	32	0	0
556	12	14	22	0
558	16	0	22	0
560	10	11	15	0
572	0	0	0	37

Table 8: Summary of Instructional Setting by building for Reading

Instructional Delivery Model for Reading				
Building	**Instructional Delivery Model 1**	**Instructional Delivery Model 2**	**Instructional Delivery Model3**	**Instructional Delivery Model 4**
472	11	30	18	0
521	4	21	26	0
544	7	44	8	0
550	14	15	27	0
552	12	17	3	0
553	9	25	0	0
556	13	12	10	0
558	11	0	30	0
560	16	16	10	0
572	0	0	0	40

With regard to the possibility of selective bias due to disproportional assignment of students with disabilities to particular general education classrooms, the distribution of students across general education teachers within each school for reading and mathematics was tabulated. The tabulation showed that, except for one school in reading and one in mathematics where one or two general education teachers had a disproportional number of students with disabilities assigned to their classrooms, the majority of schools had a relatively even distribution of students with disabilities across general education teachers (see Appendix B).

Analytical Strategy

The central question of this dissertation is whether the instructional delivery model for secondary students with mild disabilities—reflecting the degree of inclusion in general education classrooms—is associated with their proficiency levels in mathematics and reading. From a conventional standpoint, this question implies the following logit model:

$$\log (P_i=1/P_i=0) = \alpha + \boldsymbol{\beta D_i} + \boldsymbol{\gamma S_i} + \boldsymbol{\delta C_i} + \varepsilon_i \qquad (1)$$

where P_i is the probability for the test performance of student i to be proficient or above, $\boldsymbol{D_i}$ is a vector of indicators for various delivery models (general education setting with no support, general education setting with co-teacher or paraprofessional support, special education classroom, and separate setting), $\boldsymbol{S_i}$ is a vector of indicators for disability classification (LD, ID, E/BD, OHI). $\boldsymbol{C_i}$ is a series of observed controls. These include student race, gender, and poverty status, as well as school fixed effects to account for the influence of building-level preferences, norms, and other conventions on both special education processes and student performance. Finally, ε_i is a random error term.

Given the available data, however, this conventional model is subject to significant omission bias. That is, because the success of inclusive education is influenced by general education teachers' attitude toward or support for including students with disabilities in their respective classrooms (see below), the central problem is the lack of a reliable measure of such attitudes or support for the general education teachers in the data. For instance, without such a measure, the effect of an inclusive delivery model on academic performance may be overestimated if the average general educator favors having students with mild disabilities included in their classroom, because the estimated delivery model effect would pick up part of the favorable teacher influence. By the same logic, the same effect may be underestimated if the average general educator is biased against having students with mild disabilities included in their classroom. The existing literature on inclusion effects offers a number of insights that pertain particularly to this problem of underestimation. That is, although general educators typically support inclusion in principle, concerns among them over increased work and responsibility (Jones, Thorn, Chow, Thompson, & Wilde, 2002) and insufficient preparation for teaching students with disabilities (Houck & Rogers, 1994; Schumm & Vaughn, 1992; Smith, Tyler, Skow, Stark, & Baca, 2003; Stanovich & Jordan, 2002) mean that many oppose actually including such students in their classrooms (Croll & Moses, 2000; McLeskey & Waldron, 2000; Scruggs & Mastropieri, 1996; Vaughn, Schumm, Jallad, Slusher, & Saumell, 1996), which diminishes the effect of inclusive education on the included students'academic performance (Cook, Semmel, & Gerber, 1999; VanReusen, Shoho, & Barker, 2001).

Analytically, omission biases due to the general education teacher's unobserved attitude toward including students with disabilities in her or his classroom can be reduced by means of an instrumental variable regression model. This approach involves two stages (Wooldridge 2002). In the first stage, the proposed predictor (X: delivery model) is regressed on an instrumental variable (Z) that is uncorrelated to not just the omitted measure (W: general education teacher's attitude towards such inclusion), but also the proposed outcome measure (Y: proficiency). In the second stage, the proposed outcome is regressed on the predicted values from stage one. Given the assumptions regarding the instrumental variable, the two stage procedure purges the central omission bias from the estimated effect of delivery model on proficiency.

The key challenge in this regard is to specify an appropriate instrumental variable (Z). A plausible candidate is special education classification (LD, ID, E/BD, OHI), for two reasons. First, special education classification is likely to be at best weakly related to general education teacher's attitude towards inclusion. While this assumption (Cov[Z, W]=0) is not directly testable, the existing literature suggests that, although teacher attitudes toward inclusion covary with the severity of the disability and the amount of perceived additional teacher responsibility required, a general teacher is likely to develop his/her particular attitude towards the inclusion of students with mild disabilities (i.e., LD, ID, E/BD, OHI) in their classrooms *regardless* of the specific mild disability classification because the behavioral characteristics and associated instructional needs of ,and thus required accommodations for, students in these classifications are very similar (Hallahan & Kauffman, 1977; Hallahan, Kauffman, & Pullen, 2008). Therefore, if the teacher disfavors inclusion, his or her attitude is likely to vary little by whether the included student's disability is classified as LD, ID, E/BD, or OHI. Similarly, these disability classifications are likely to matter little when the teacher favors inclusion.

Second, mild disability classification is also likely to be weakly related to student proficiency level. The existing literature offers competing views on this assumption (Cov[Z, Y]=0). Some note that disability classification is strongly related to student performance, and that the instructional delivery model affects in part reflect the achievement implications of particular disability categories (Bryan, Bay, and Donahue 1988; Keogh, 1988). From this standpoint, it is necessary to include special education classification as a key control measure when estimating delivery model effects, as shown in equation 1 above, despite the risk of potential collinearity problems. There are also those, however, who argue that mild disability classification is largely unrelated to performance, and that the delivery model is a much stronger predictor of achievement irrespective of disability category. This view stresses the fundamental academic benefits of inclusionary approaches to instruction for all students in the mild disability classifications (e.g., Gartner & Lipsky, 1987; Wang, Reynolds, & Walberg, 1986, 1987). The available data in this study permits an explicit test of the competing views on the relationship of mild disability classification to student proficiency level. Table 9 below shows the results of probit models predicting the marginal effects of different disability categories on proficiency (with OHI treated as the baseline reference category). Except for the LD effect on reading proficiency, which is borderline significant (-0.013, $p=0.045$), none of the disability categories strongly predict proficiency level in mathematics or reading. This constitutes important evidence supporting the assumption that special education classification may have a weak direct correlation to student proficiency level ($Cov[Z, Y]=0$).

Table 9

Predicted Effect of Special Education Classification on Mathematics and Reading Proficiency

	Mathematics		**Reading**	
	dF/dx	Std. error	dF/dx	Std. error
ED	-.0126	0.075	-.154	0.075
LD	.111	0.060	-.042	0.064
ID	-.197	0.084	-.038	0.106
LR chi2(3)	14.03		4.59	
Prob > chi2	0.0029		0.2046	
Log likelihood	-272.90037		-295.53169	

Given these covariance patterns, the instrumental variables probit model shown below can be specified to estimate instructional delivery model effects on proficiency, separately for mathematics and reading. It should be noted that

$$D_i = \alpha + \boldsymbol{\beta C_i} + \left[\boldsymbol{\gamma S_i}\right] + \upsilon_i \qquad (2a)$$

$$\Pr(\text{Prof}=1 \mid D_i^*) = \delta + \boldsymbol{\zeta C_i} + \gamma D_i^* + \nu_i \qquad (2b)$$

where D_i is the inclusion level implied by the instructional delivery model for student i. Unlike in equation 1, D_i here is *not* a categorical measure with four nominal levels (one for each delivery model), but is instead specified as a linear measure varying from one to four (1=most inclusive [general education setting with no support], 4=least inclusive [separate school]). The range of four distinct delivery models is treated as a linear continuum of inclusion levels, with relatively even distances between any given pair of adjacent points on the measurement scale. This approach is preferred because, at this point, instrumental variables regression models do not permit multinomial dependent variables in the first stage of the estimation (Greene 2002).[1] While an analytical limitation, the linear treatment of the measure for instructional delivery model is consistent with the fundamental question of this dissertation, concerning whether more inclusive delivery models are associated with greater student learning. Shown in brackets, $\boldsymbol{S_i}$ is a vector of indicators for disability classification, used as instruments to reduce omission biases resulting from unobserved attitudes towards inclusion on the part of the general education teacher. $\boldsymbol{C_i}$ denotes the same set of observed controls discussed in the context of equation 1, included here in both stages for consistent estimation.

D_i^* in the second stage is the predicted value for student i from the first stage, or the expected inclusion level *given* the disability classification for student i ($E[D_i \mid \boldsymbol{Si}]$), assumed to be free of the central omission bias. The outcome measure in stage two is the probability the student is proficient or above given the inclusion level implied by the predicted delivery model from stage one. Finally, υ_i and ν_i are random error terms. Ultimately, the two sage probit model shown in equations 2a and 2b implies a process where the inclusion level involved with the instructional delivery model mediates the effects of disability classification on achievement. In other words, inclusion outcomes are part of a process where the disability category affects learning only through its effects on the delivery model, as shown in Figure 1 below.

[1] See Appendix C for multinomial regression results, predicting the odds of distinct delivery models given special education classification.

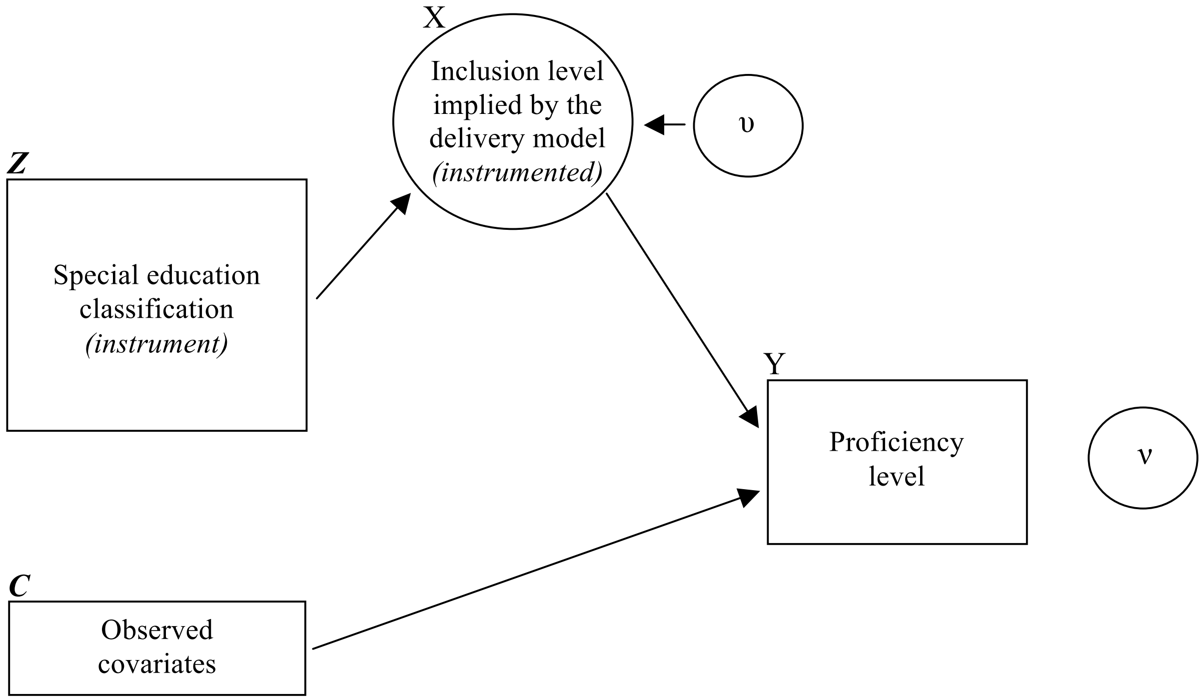

Figure 1. Conceptual Depiction of the Instrumental Variable Probit Mod

Chapter 4

Results

This study examined the proficiency level of 430 students with disabilities in mathematics and 449 students with disabilities in reading as measured by state assessment scores of proficient versus non-proficient under different instructional delivery models. The outcome was the student's mathematics and reading performance level on the state assessment of either 0=non-proficient or 1=proficient. The predictor variable was the students access to an inclusionary model (1=general education classroom with no direct special education support for instruction, 2=general education classroom supported by either a licensed Special Education teacher in a co-teaching model or by a Special Education Paraprofessional in a supported model) or their placement in a non-inclusive model (3=special education classroom within a general education building, or 4=placement in a special education separate setting within the district). Poverty status of the student (0=Full pay lunch, 1=Free and reduced lunch), the race of the student (0=non-white, 1=white), and the gender of the student (0=female, 1=male) were used as control variables, as well as the effects from the school building in which they receive instruction (building numbers were dummy coded). In addition to the available variables, the literature review reflected an additional variable that impacts the delivery of an inclusion model. This variable is that of teacher attitude toward inclusion. In order to account for any covariance between the delivery model and the omitted variable of teacher attitude which impacts student proficiency level in mathematics and reading in an unknown way, a Two-Stage Least Squares or instrumental variables probit regression (Woolridge, 2002 and Greene, 2002) was selected to conduct this analysis.

The research in this study was guided by the following research question. How does instructional delivery model affect academic performance for students with disabilities?

In a model presented by Raudenbush and Willms (1995) student achievement is affected by three factors: (a) student demographic variables, (b) school context, and (c) school policies and practices. Student demographic variables are comprised of the individual characteristics of a student—gender, race, socio-economic status, type of disability. School context variables are factors that are outside the control of the school such as the attitude of the community toward inclusive education, the attitude of staff regarding inclusive or non-inclusive education, the overall percent of students in an attendance center of a particular race, socio-economic status, or disability group. School policies and practices are factors within a building that the school is able to control, such as the instructional delivery model selected to meet the needs of students with disabilities. The school chooses the level of inclusion available within a building and how special education resources are allocated to support the selected model(s) along the continuum of services available to students with disabilities.

This study utilized two sequential models to measure the effects of instructional delivery model on the proficiency level of students in mathematics and reading. In the Two-Stage Least Squares model, the first stage focused on removing omission bias for variables that potentially impact proficiency level but do not have a measureable variable available. In order to remove the effects of missing variables, the instrumented variable was the delivery model in which students receive their instruction in mathematics and reading, respectively. General education teachers participating in an inclusive education delivery system have a belief system that is either embracing of inclusion or considers students with disabilities (regardless of the disability label) as not belonging in general education. The impact of this teacher attitude toward inclusion is not measureable. However, we know that this attitude does impact the overall proficiency levels of students with disabilities on state assessments and it is represented with the following equation:

$$\log (P_i=1/P_i=0) = \alpha + \boldsymbol{\beta D_i} + \boldsymbol{\gamma S_i} + \boldsymbol{\delta C_i} + \varepsilon_i$$

Where P_i is the probability for the test performance of student i to be proficient or above, $\boldsymbol{D_i}$ is a vector of indicators for various delivery models (general education setting with no support, general education setting with co-teacher or paraprofessional support, special education classroom, and separate setting), $\boldsymbol{S_i}$ is a vector of indicators for disability classification (LD, ID, E/BD, OHI). $\boldsymbol{C_i}$ is a series of observed controls. These include student race, gender, and poverty status, as well as school fixed effects to account for the influence of building-level preferences, norms, and other conventions on both special education processes and student performance. Finally, ε_i is a random error term.

The first assumption of the model is that covariance between special education category and teacher attitude toward inclusion is zero, which is not testable because a measure does not exist within the available variables to measure teacher attitude regarding inclusion, Cov (SPED, t_{att})=0. Because special education categories are unrelated to teacher's overall attitude about inclusion (Croll & Moses, 2000; Shade & Steward, 2001; and Avaramidis & Norwich, 2002). Special education categories as an instrumental variable to help removed omission bias with regard to effect of delivery model on proficiency. In order to remove the omission bias from the studied delivery models, the raw delivery model is first regressed by the instrument of disability category-—other health impairment, emotional disturbance, learning disability, and intellectual disability—using the control variables of race, lunch, gender, and school attendance building. The estimated results from the first stage are then saved and used as the estimate, E[DELV| ed, ld, id].

The second assumption of the model is that the special education category and the proficiency level are not related, COV (SPED, PROF)=0. This assumption is testable, and yielded the following results. When mathematics proficiency level is regressed by the disability categories of emotional disturbance, learning disability, and intellectual disability no significant p values occur and the R^2 indicates a value of .027 which accounts for less than 3% of the variance in proficiency outcomes. When reading proficiency is regressed on the disability categories, an R^2 of .007 occurs meaning that the variation in proficiency scores are explained by less than 1% by the disability categories themselves.

The third assumption is that the covariance between the delivery model a student participates in is not related to their disability category. When Mathematics proficiency is regressed by disability category holding OHI as a comparison category, no special education classification yielded significant results (as shown in Chapter 3, Table 9) and copied below in Table 9.

Table 9

Predicted Effect of Special Education Classification on Mathematics and Reading Proficiency

	Mathematics		**Reading**	
	dF/dx	Std. error	dF/dx	Std. error
ED	-.0126	0.075	-.154	0.075
LD	.111	0.060	-.042	0.064
ID	-.197	0.084	-.038	0.106
LR chi2(3)	14.03		4.59	
Prob > chi2	0.0029		0.2046	
Log likelihood	-272.90037		-295.53169	

Stage two is represented by the following equation:

$$D_i = \alpha + \boldsymbol{\beta C_i} + \left[\boldsymbol{\gamma S_i}\right] + \upsilon_i \tag{2a}$$

$$\Pr(\text{Prof}=1 \mid D_i^*) = \delta + \boldsymbol{\zeta C_i} + \gamma D_i^* + \nu_i \tag{2b}$$

where D_i is the inclusion level associated with the instructional delivery model for student i. Unlike equation 1, D_i here is *not* a categorical measure with four nominal levels (one for each delivery model), but is instead specified as a linear measure varying from one to four (1=most inclusive [general education setting with no support] … 4=least inclusive [separate setting]). The range of four distinct delivery models is treated as a linear continuum of inclusion levels, with relatively even distances between any given pair of adjacent points on the measurement scale. This approach is preferred because current instrumental variables regression models do not permit multinomial dependent variables in the first stage of the estimation (Greene, 2002). Using this equation, math proficiency level and reading proficiency level are regressed using the endogenous regressors of school attendance building, race, poverty status, and gender, and the instrumented variable of delivery model as mediated by the effects of the instrumental variables of other health impairment, emotional disturbance, learning disability, and intellectual disability. The results for mathematics are significant and yield a Wald χ^2 of 125.34 as illustrated in Table 2. Students receiving their mathematics instruction in a less restrictive setting have a decreased likelihood of scoring proficient on the State mathematics assessment. For each increase in delivery model (1-4) the likelihood of a student scoring proficient decreases on average about 64 percent ($e^{-1.003)}$ when holding all other coefficients constant. The effect of the delivery model has a p value of 0.000. The results for reading are not significant and yield a Wald χ^2 of 40.95, which are also shown in Table 1 below. In reading each increase in delivery model (1-4) has a coefficient of .451 for delivery model; however, the effect is not significant with an overall p value of 0.198.

Table 10: Mathematics and Reading Results

	Mathematics		**Reading**	
	Coefficient estimate	Std. error	Coefficient estimate	Std. error
Delivery	-1.003***	0.269	0.451	0.350
White Student	0.119	0.130	-0.047	0.133
Free and Reduced Lunch Student	-0.209	0.203	-0.436**	0.175
Male Student	-0.036	0.139	0.102	0.141
School building 521	-0.665**	0.244	-0.368	0.252
School building 544	-0.449*	0.256	-0.287	0.238
School building 550	-0.984**	0.312	-0.85***	0.246
School building 552	-0.669**	0.288	0.233	0.306
School building 553	-0.304	0.265	0.055	0.290
School building 556	-1.42***	0.345	-1.011***	0.305
School building 558	-1.31***	0.381	-0.547**	0.264
School building 560	-0.403	0.282	-0.495*	0.277
School building 572	1.207*	0.671	-1.276*	0.684
Constant	2.543***	0.502	-0.242	0.777
Wald chi2	125.34			42.95

***p<0.001
**p<0.050
*p<0.100

Chapter 5

Discussion

Since the inception of special education, the question of the best place to educate students with disabilities has been debated and researched. With the passage of the Education for all Handicapped Children Act (EAHCA), programs were established in schools to meet the needs of identified students. Early on, most programs were self-contained or pullout programs where students were removed from general education classrooms and peers to receive services from special education teachers. This initial practice was criticized by Dunn (1968) as being a racially biased, instructionally ineffective, and socially stigmatizing. The debate over whether the best placement for students with disabilities is an inclusive or separate setting continues today. Although the EAHCA and IDEA both favor inclusive placements to the greatest extent possible, research has produced mixed results on the effects of inclusive versus non-inclusive delivery models on the academic achievement of students with disabilities (Zigmond, 2003). Moreover, this research suffers from methodological problems such as inconsistent definitions of placement settings, small research sample sizes, and outcome measures that are not comparable across studies (Zigmond, 2003).

This study was designed to examine the impact of instructional delivery model on the academic achievement of students with disabilities, utilizing four delivery model placement options—general education with no direct support, general education with a special education co-teacher or a special education para-professional, a special education classroom, or a special education classroom in a separate setting—and performance on standardized state assessments in mathematics and reading as measures of academic achievement. This study suggests that placement in an inclusive education instructional delivery model (either a general education classroom with no direct special education support or in a general education classroom with direct support provided by a special education co-teacher or a paraprofessional) increases the odds that a student identified with a range of high incidence disabilities will score proficient or above on the state assessment in mathematics, including students identified with other health impairment (OHI), learning disabilities (LD), emotional disturbance (ED), and intellectual disabilities (ID). The study did not find significant results for the impact of instructional delivery model on these students' in reading achievement.

The design of this study accounted for some of the methodological problems identified in earlier studies. It alleviated the question of placement settings and what they mean. The placement settings identified in Individuals with Disability Education Act (IDEA), regular classroom, resource room, self-contained, and separate setting were not used in this study because they do not allow for data to be organized with respect to individual academic classes, which is necessary for research in secondary schools. The IDEA categories are concerned with the percentage of the school day a student spends in general education or special education settings, but this gives no indication of the specific classes and academic subjects for which they are included or not. The data utilized in the present study indicates the student's educational placement in one of four instructional delivery models for reading and mathematics respectively. The second concern that the current study addresses is sample size. It used data for all students with disabilities in a moderate sized urban district, including instructional delivery model and state assessment scores for 430 students in mathematics and for 449 students in reading. Students attended of one of six middle schools, three high schools, or a separate special education day school. A third concern this study addressed is the lack of comparable outcome measures. The study utilized state general and modified assessment results in reading and mathematics, which are available for all students state-wide based on state standards. Finally, this study addressed the "best for whom" question regarding which placement options are best for which kinds of students using the demographic data that the district is required to collect under the NCLB disaggregation provision, which includes gender, race, poverty status, and presence of a disability. In addition, it used district disability classification data to identify the particular disability of each student identified as having a disability. The demographic data, disability data, and the school effects data were used as control variables. The Two-Stage Least Squares regression allowed for the impact of instructional delivery model on reading and mathematics achievement to be analyzed with the effects of individual teachers minimized by using the estimated effects from the first stage to reduce any effect of omission bias in the second stage.

Findings, Conclusions, and Recommendations

This section considers the findings and conclusions related to the research question of the impact of instructional delivery model on the mathematics and reading achievement of students with high incidence disabilities. It also offers explanations for the results, identifying additional questions raised by the study, offering policy recommendations and discussing its limitations.

Mathematics Results

Results of the study in mathematics clearly show that inclusive settings impact the likelihood of achieving proficiency on state assessments in a positive and significant way. The likelihood of a student scoring proficient on the mathematics assessment decreases by 1.003($p=0.000$) for each increase in instructional delivery model from 1 (general education) to 4 (separate setting). This finding is in alignment with previous research Bear and Proctor (1990) finding that students with disabilities tend to make more progress in general education than their peers do in special education in the area of mathematics, which contradicts that of Fore et al. (2002) which concluded there was no significant evidence to indicate that academic achievement in reading or mathematics varied based on inclusive versus non-inclusive settings except in literature class and Saint-Laurent et al. (1998) finding that there was not a statistically significant result for reading or mathematics. For students labeled as learning disabled specifically, this finding is consistent with those of Rea et al. (2002) showing that mathematics instruction in an inclusive setting provides achievement benefits to students. The results also suggest that receiving mathematics instruction in a general education classroom from a general education teacher has a positive impact for all students with disabilities regardless of disability classification.

Possible reasons for significant findings in mathematics achievement and not in reading achievement (see below) include differences in the nature of the subject matter, especially at the secondary level, and the degree to which special education teachers are prepared to teach mathematics and reading, respectively. In terms of the nature of mathematics content, student proficiency on its relatively more complex and esoteric knowledge and application standards requires specific formal instruction. According to Manouchehri and Goodman (1998), standards-based education succeeds when teachers understand the curricular and pedagogical implications of specific content-area standards and when they can engage students in relevant learning activities. Moreover, current mathematics standards emphasize “learning to think in more complex ways, understanding that there can be multiple solutions to problems” (Lauer et al., 2005, p. 28). In order for this more complex understanding and application of mathematics content to occur, instruction must be presented in a way that supports higher levels of understanding and thus can’t be presented to students in isolation but instead must be integrated across subject areas (Lauer et al., 2005). This raises the question of teacher preparation and licensure and the impact of the highly qualified status of both general and special educators on students into question. Typically, general educators are content experts and special educators provide teaching strategies to meet the individual needs of students. According to Pugach and Warger (1995) and Winn and Blanton (2005), as cited in Holdheide & Reschly (2008, p. 3), teacher preparation for special educators is more focused on instructional strategies and accommodations, but overall tends to lack specific content knowledge. Other research indicates that teachers who major in social and physical science academic subjects, including mathematics, demonstrate higher value-added instructional outcomes than their education colleagues without such preparation (Betts, Zau & Rice, 2003). Additional research indicates that teachers who hold an advanced degree are more effective in assisting students with disabilities boost their mathematics achievement than teachers with a baccalaureate degree only (Feng & Sass, 2010).

Lauer et al. (2005) suggest that studies of specific mathematics instructional programs demonstrate that teachers that are not comfortable with the content they are teaching are more likely to focus on the given curriculum in an attempt to increase their knowledge of the content and improve their instruction, whereas more confident teachers, with content-area training in mathematics, tend to deviate from the curriculum. Moreover, less confident teachers tend not to make important connections within the content and struggle to convey information to students in less effective ways than more confident mathematics-trained teachers. This is an area for further study to determine the training and licensure requirements of special education teachers who are teaching mathematics in non-inclusive settings. The negative effect of placement in non-inclusive settings may be compounded by the lack of teacher content knowledge and effective mathematics-specific instructional techniques, and fewer mathematics-focused learning strategies (Lauer et al., 2005).

In addition to concerns over the type of licensure that teachers in the study have, there was not a measure of prior academic performance for each student in the study; therefore, not making it possible to conclusively state that placement in inclusion caused the results on the assessments to occur.

Results in mathematics reflect a positive outcome for inclusive settings for students with disabilities regardless of their disability label. The study raises additional questions related to the reason for the difference and whether as suggested by Hocutt (1996) that the outcome is truly related to the instructional delivery model or to the quality of the instruction received within that placement. In addition, no intervention has been identified which has eliminated the impact of having a disability (Hocutt, 1996).

Reading Results

Instructional delivery model in reading does not produce significant results when considering the overall reading proficiency of students. The model showed a coefficient value of .451 with a p value of 0.198. The results suggest that the likelihood of a student scoring proficient on the state reading assessment is not predicted by instructional delivery model. The results of this study for reading supported those of several other studies (Fore et al., 2008; Waldron & McCleskey, 1998; Leinhardt & Pallay, 1992). A possible reason for the lack of a significant outcome in reading is related to teacher preparation. Research indicates that students who are educated in a special education classroom have higher achievement gains when their teacher holds a post-baccalaureate degree, which is especially true in the reading content area (Feng & Sass, 2010). In order to confirm this effect, the years of education for each special education teacher would need to be documented; however, in the state in which this study was conducted, to be fully licensed in special education requires Masters level coursework. National data suggests that the average special education teachers has 12.3 years of teaching experience in the field of special education in addition to any general education experience they may have had. In addition, 90 percent of special education teachers are fully certified for their main teaching assignment, which is almost ten percent higher than the national average for all educators (Friedan, 2004). With regard to reading, the most telling national data may be that 59% of special education teachers hold a Master's degree, compared to 49% of general education teachers (U.S. Department of Education, 2002b). This data combined with Feng and Sass's (2010) assertion that students do better when exposed to a teacher with a degree beyond a bachelor's degree is a plausible explanation for why students in the study district did not display statistically significant differences in reading outcomes under various delivery models.

Additionally, reading has been a stronger focus for several years then its mathematics counterpart. More research has been completed and more strategies are available to target the five components of reading then are available to target weaknesses in math. Results from the Special Education Elementary Longitudinal Study (SEELS) research indicates that students with disabilities tend to perform better on mathematics measures than on reading measures; however, the majority of results are still below levels considered proficient on assessments (U.S. Department of Education, 2007). The study district has had an on-going partnership with the University of Kansas Center for Research and Learning, which makes an instructional coach available in each middle and high school within the district to provide coaching and assistance with implementing a wide range of content enhancement strategies and other strategies that are more suited to the field of language arts and social sciences then to mathematics per se. The availability of the training, coaching, and strategies were equally accessible to all teachers-both special education and general education.

Reading itself differs from mathematics in how we learn it. Reading is a skill that we learn over time. The information we gain from being read to as a small child, from acquiring verbal language and eventually in learning to read for ourselves is learned in many layers over a long period of time. The information learned is organized into patterns or clusters. In addition to gaining information from written text, reading is a skill that we can improve through our senses, through socialization as a child and through prompts, cues and associations (Benjamin, 2007). What this means in practical terms is that throughout life we take information in and organize it. As we are exposed to new information or unfamiliar information, we look for recognizable patterns and connect the new information to prior knowledge. We also learn through our senses-reading aloud activates our auditory receptors, providing visual aids draws in a second sense and any use of a device to color code aids long-term memory (Benjamin, 2007). As cited in Benjamin, The National Council of Teachers of English (NCTE) defines reading as a complex and purposeful social and cognitive process in which readers use their knowledge of spoken and written language along with prior knowledge and knowledge of their culture to construct meaning (2006). NCTE emphasizes that a reader's competence continues to grow through engagement with various texts and reading for different purposes over a lifetime (2006).

Reading allows students to explore different content areas and to link new knowledge to information they already have stored in their memory. According to recent research by Neuroscientist Stanislaus Dehaene, which was reviewed by Martha Burns, reading has a huge impact on the brain and how it functions, which can impact multiple subject areas (Zwang, 2011). Burns review indicates that when students learn to read, their "perceptual skills improved, their auditory listening skills improved, and their ability to drive this whole left hemisphere symbolic problem-solving way of synching changed (Zwang, 2011). The major finding from the Burns review is that parents should talk to their children so that they are exposed to language and can begin to build the links in the brain that later make reading easier and the acquisition of skills and materials in multiple subject areas more successful (Zwang, 2011). Mathematics is more difficult to learn and instruct because the terminology used in mathematics is not something that can be figured out through context (a frequent strategy taught to students). Math language is domain-specific to mathematics and requires the reader to understand the vocabulary and relevant definitions before reading them within a mathematical problem (Benjamin, 2007). In addition, according to Dr. Gillespie (Devaney, 2011) the area of mathematics is a core subject that both students with disabilities and their teachers struggle with in particular. Gillespie, also notes that the preparation of special education teachers does not provide a strong content in mathematics, with many teachers taking only one mathematics course in college (Devaney, 2011). Mathematic textbooks are usually constructed using passive voice structure, where the agent of the action is hidden. This is more difficult for struggling readers to understand then active voice structure-which is more familiar to readers and provides a more clear sequence of who (or what) is doing what to whom (or what) (Benjamin, 2007, p46).

Limitations

This study addressed several limitations of prior research. It considered four types of high-incidence disabilities, whereas previous research primarily has been limited to the LD and ID disability classifications (Klingner et al., 1998; Rea et al., 2002; Waldron & McCleskey, 1998). Also, unlike prior research that used curriculum-based or other non-standardized outcome measures (Waldron & McCleskey, 1998; Banerji & Daily, 1995), this study used proficiency of standardized state assessments in reading and mathematics. Finally, whereas other studies could not directly attribute achievement effects to instructional settings because of researcher- or university-provided support or professional development for research participants, or classrooms being restructured in order to implement a specific program (e.g., Manset & Semmel, 1997; Saint Laurent et al., 1998; Waldron & McCleskey, 1998; Wang & Baker, 1985), the present study used existing classrooms.

The present study was limited in the several ways. The study did not know and thus control for type of licensure held by general and special education teachers in the study. It is not known how many teachers had a license specifically in the content being taught (secondary license) or if they had an elementary K-9 license which encompasses all core content areas. In addition, information was not available as to whether teachers were fully licensed, provisionally licensed, or waivered, nor what their status was related to Highly Qualified provisions of NCLB. In addition to lacking a measure of teacher licensure, the study did not know and thus control for the nature and amount of professional development on inclusive education each school provided for its teachers. With regard to student data, the analysis did not include a measure of prior academic performance for each student, therefore making it impossible to conclusively state that placement caused students' academic performance. Finally, for students identified as having a learning disability, it was not known whether their primary deficit area was reading or mathematics.

Conclusions and Recommendations

These limitations notwithstanding, this study provided additional information in the ongoing quest to determine the best placement option for students with high incidence disabilities. Specifically, it sought to answer the following question: What is the impact of placement on reading and mathematics achievement of students with high incidence disabilities? The results of the study indicated that the placement in an inclusive or a non-inclusive setting does not appear to have an impact on the outcomes demonstrated on state assessments for students with disabilities in the area of reading. However, mathematics outcomes are significantly impacted by the placement of a student in an inclusive versus non-inclusive setting. The study looked at four placement options, with general education with no support being the most inclusive. For each increase in restrictiveness, the likelihood of a student scoring proficient on the state assessments decreased by on average 64 percent.

With regard to selection to model, the model demonstrates a good fit for the data. The WaldX^2 indicates the fit between what the expected outcomes for the data would be and for what the actual observed outcomes were for each set of variables. Both mathematics and reading demonstrated that the distributions were significant with a p value of 0.000 and that the actual outcomes did not differ significantly from the expected outcomes.

Educational outcomes for all students will likely continue as a focus of educational policy beyond the 2014 requirement of NCLB that all students are proficient in both reading and mathematics. This research supports the idea that students with high-incidence disabilities should be held to high expectations and exposed to the same general education curriculum as their nondisabled peers. The positive effects of inclusive placements on mathematics achievement reinforce the call for responsible inclusion in which each child participates the greatest extent possible in general education. The wide range of disability-related needs in schools makes it important to maintain a continuum of services, and to consider the individual needs of each student when making placement decisions. However, it is clear from the present research that students in the high-incidence disability classifications of LD, ED, ID, and OHI achieve more in mathematics in inclusive settings. Although it is important to remember that the needs of students vary within each disability category, it is reasonable to recommend greater efforts to support students with high-incidence disabilities in general education classrooms for mathematics instruction.

In addition to continuing to offer a full continuum of services while provide more opportunities for students with high-incidence disabilities to receive mathematics instruction in general education classrooms, this study also aligns with the concept of Response to Intervention, or a three tiered model of support. In a tiered system, the hope is that students' can receive the support and instruction they need in the core or through general education. If the core is able to meet the needs of more students, then students will not need be identified as disabled and placed in special education as frequently, which historically has taken a "wait to fail" approach. The results of this study show that, at least for mathematics, student with mild to moderate high-incidence disabilities can be taught successfully in general education settings with adequate indirect or direct support.

Finally, additional research needs to be done in order to examine why disability classification did not predict students' proficiency level on assessments. In the area of reading, a review of other explanations for why placement did not affect proficiency also would benefit the field. In addition, any future research should control for individual teacher licensure and competence in the content area.

Appendix A

Human Subjects Approval

KU RESEARCH & GRADUATE STUDIES
The University of Kansas

4/2/2009
HSCL #17906

Jennifer Harrington
3340 SE Starlite Dr.
Topeka, KS 66605

The Human Subjects Committee, Lawrence Campus (HSCL) has received your response to its expedited review of your research project

17906 Harrington/Saatcioglu (ELPS) Impact of Placement on Achievement

and approved this project under the expedited procedure provided in 45 CFR 46.110 (f) (7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Since your research presents no risk to participants and involves no procedures for which written consent is normally required outside of the research context HSCL may waive the requirement for a signed consent form (45 CFR 46.117 (c) (2). Your information statement meets HSCL requirements. The Office for Human Research Protections requires that your information statement must include the note of HSCL approval and expiration date, which has been entered on the form sent back to you with this approval.

1. At designated intervals until the project is completed, a Project Status Report must be returned to the HSCL office.
2. Any significant change in the experimental procedure as described should be reviewed by this Committee prior to altering the project.
3. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at http://www.rcr.ku.edu/hscl/hsp_tutorial/000.shtml.
4. Any injury to a subject because of the research procedure must be reported to the Committee immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity. If you use a signed consent form, provide a copy of the consent form to subjects at the time of consent.
6. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.

Please inform HSCL when this project is terminated. You must also provide HSCL with an annual status report to maintain HSCL approval. Unless renewed, approval lapses one year after approval date. If your project receives funding which requests an annual update approval, you must request this from HSCL one month prior to the annual update. Thanks for your cooperation. If you have any questions, please contact me.

Sincerely,

Mary Denning

Mary Denning
Co-Coordinator
Human Subjects Committee Lawrence

cc: Argun Saatcioglu

Human Subjects Committee Lawrence
Youngberg Hall | 2385 Irving Hill Road | Lawrence, KS 66045 | (785) 864-7429 | Fax (785) 864-5049 | www.rcr.ku.edu/hscl

Appendix B

MATH_TEACHER_NUMBER * MathInstrDelivery * SCHOOL_ID_NEW Crosstabulation

Count

SCHOOL_ID_NEW			MathInstrDelivery Gen Ed No Support	MathInstrDelivery Gen Ed With Support	Total
23472	MATH_TEACHER_NUMBER	7	0	4	4
		21	12	8	20
		31	0	4	4
		36	0	4	4
		121	0	6	6
	Total		12	26	38
23521	MATH_TEACHER_NUMBER	2	2	4	6
		4	1	3	4
		14	1	7	8
		28	0	8	8
		45	9	2	11
	Total		13	24	37
23544	MATH_TEACHER_NUMBER	20	0	5	5
		42	1	6	7
		44	0	6	6
		46	7	2	9
		97	0	5	5
		125	0	5	5
	Total		8	29	37
23550	MATH_TEACHER_NUMBER	3	3	0	3
		41	0	2	2
		74	0	6	6
		85	1	0	1
		104	9	0	9
		123	2	7	9
	Total		15	15	30
23552	MATH_TEACHER_NUMBER	71	0	9	9
		73	0	10	10
		108	1	0	1
		122	0	7	7
	Total		1	26	27
23553	MATH_TEACHER_NUMBER	8	1	3	4
		9	0	7	7
		29	0	2	2

		84	1	6	7
		114	0	9	9
		126	0	6	6
	Total		2	33	35
23556	MATH_TEACHER_NUMBER	25	3	4	7
		37	3	4	7
		55	3	0	3
		66	1	2	3
		78	1	0	1
		96	1	0	1
		112	0	4	4
	Total		12	14	26
23558	MATH_TEACHER_NUMBER	15	1		1
		19	1		1
		22	4		4
		34	4		4
		56	1		1
		61	1		1
		70	1		1
		78	1		1
		101	3		3
	Total		17		17
23560	MATH_TEACHER_NUMBER	16	9	3	12
		17	0	2	2
		24	3	1	4
		49	0	5	5
	Total		12	11	23

READING_TEACHER_NUMBER * ReadInstrDelivery * SCHOOL_ID_NEW Crosstabulation

Count

			ReadInstrDelivery		
SCHOOL_ID_NEW			Gen Ed No Support	Gen Ed With Support	Total
23472	READING_TEACHER_NUMBER	219	2	6	8
		240	0	3	3
		242	3	12	15
		250	3	2	5
		310	3	7	10
	Total		11	30	41
23521	READING_TEACHER_NUMBER	237	1	0	1
		258	1	0	1
		264	2	0	2

		289	0	5	5
		293	0	7	7
		312	0	10	10
	Total		4	22	26
23544	READING_TEACHER_NUMBER	245	7	10	17
		246	0	19	19
		322	0	15	15
	Total		7	44	51
23550	READING_TEACHER_NUMBER	203	0	4	4
		232	5	0	5
		268	1	0	1
		294	1	11	12
		313	4	0	4
		315	2	0	2
		332	1	0	1
	Total		14	15	29
23552	READING_TEACHER_NUMBER	249	8	0	8
		292	2	6	8
		296	1	0	1
		339	1	11	12
	Total		12	17	29
23553	READING_TEACHER_NUMBER	224	2	0	2
		226	0	7	7
		246	0	5	5
		266	1	4	5
		273	1	5	6
		276	0	2	2
		284	2	3	5
		287	3	0	3
	Total		9	26	35
23556	READING_TEACHER_NUMBER	211	2	0	2
		252	1	0	1
		259	1	4	5
		317	3	3	6
		320	0	2	2
		328	6	3	9
	Total		13	12	25
23558	READING_TEACHER_NUMBER	205	1		1
		227	2		2
		255	1		1
		260	3		3
		262	2		2
		279	1		1
		288	1		1

	Total		11		11
23560	READING_TEACHER_NUMBER	212	2	0	2
		216	0	12	12
		225	1	0	1
		261	1	0	1
		274	1	0	1
		275	8	5	13
		339	4	1	5
	Total		17	18	35

Appendix C

Multinomial Regression Results

```
. mlogit dvry  ed ld mr if au==0, rrr base(4)

Iteration 0:   log likelihood = -543.58169
Iteration 1:   log likelihood = -514.71239
Iteration 2:   log likelihood = -496.05645
Iteration 3:   log likelihood = -495.75005
Iteration 4:   log likelihood = -495.74922
Iteration 5:   log likelihood = -495.74922

Multinomial logistic regression                   Number of obs   =        430
                                                  LR chi2(9)      =      95.66
                                                  Prob > chi2     =     0.0000
Log likelihood = -495.74922                       Pseudo R2       =     0.0880

------------------------------------------------------------------------------
        dvry |        RRR   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
1            |
          ed |    .145749    .085122    -3.30   0.001     .0463956    .4578617
          ld |          6   4.530598     2.37   0.018      1.36587    26.35683
          mr |   .1578947   .2070348    -1.41   0.159     .0120852     2.06291
-------------+----------------------------------------------------------------
2            |
          ed |   .1683992   .0873718    -3.43   0.001     .0609123    .4655595
          ld |   5.837838    4.27514     2.41   0.016     1.389645    24.52451
          mr |   .2432432   .2465084    -1.39   0.163     .0333744    1.772835
-------------+----------------------------------------------------------------
3            |
          ed |   .1993007   .1097447    -2.93   0.003     .0677323     .586438
          ld |   5.818182   4.358123     2.35   0.019     1.340271    25.25701
          mr |   3.272727   2.841413     1.37   0.172      .596882    17.94449
-------------+----------------------------------------------------------------
4            |  (base outcome)
------------------------------------------------------------------------------
```

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