

**EFFECT OF SPECIAL EDUCATION PROPORTION ON SCHOOL-LEVEL
ACHIEVEMENT IN TEXAS ELEMENTARY SCHOOLS**

A Dissertation

by

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ABSTRACT

For almost thirty years researchers have attempted to measure the impact that educating special education students with their regular education peers has on academic achievement. A review of the research literature addressing this broad question indicates that understanding the effect on school level achievement that increasing percentages of special education students within a school has on that school's achievement has not been adequately addressed. Using a main effects model (multiple regression), Texas Administrative Data for over 3800 elementary schools in Texas, 2010-2011, was analyzed using the dependent variable of the percentage of students passing all portions of the Texas Assessment of Knowledge and Skills (TAKS). The independent variables were the percentages of students within a school categorized as the following: Special Education, Limited English Proficient, At Risk, Economically Disadvantaged, White, Black, and Hispanic. The analysis showed that a standard deviation increase in the percentage of special education student within a school resulted in an increase of .056 standard deviation in overall school achievement. The results suggest that at current rates of special education participation, a school's rate of academic achievement is not adversely affected by percentages of special education students within that school. Several intriguing interactions among the independent variables were identified suggesting future research.

DEDICATION

This research would not be possible without the commitment and dedication of my committee, Dr. Willson, Dr. Hall, Dr. McTigue and Dr. Stough. But it is also the continuation of a family project that started over ninety years ago by my grandfather, John W. Grande, continued by my father, Charles W. Grande, and encouraged by my mother, Ann L. Grande. The contribution that this research makes to the community of scholars is in large part due to the efforts of these people.

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CHAPTER I

INTRODUCTION

In the past 45 years, research has established that schools affect the academic achievement of their pupils (Greenwald, Hedges, & Laine, 1996; Reynolds and Creemers, 1990). Beyond the individual ability, beyond the competency of individual teachers, the “school” in all its constituent parts adds or detracts from the individual achievement of students. Students perform better in successful schools than they will in unsuccessful schools. Research indicates that certain characteristics within a school contribute to this effect: racial ethnicity, social economic status, qualifications of teachers and quantity of economic resources available to a school (Greenwald, Hedges, & Rivkin, 1996; Darling-Hammond, 2000; Kao & Thompson, 2003; Adamson & Darling-Hammond, 2012). In addition to the above listed characteristics, Sammons, Hillman and Mortimore writing in 1995 identified eleven professional performance factors associated with effective schools. These factors included the following: professional leadership; shared vision and goals; a learning environment; concentration on teaching and learning; purposeful teaching; high expectations; positive reinforcement; monitoring progress; pupil rights and responsibilities; home-school partnership and a learning organization. There may in fact be other, unidentified characteristics that are also associated with the overall effectiveness of a school. This study will explore the possibility that one such unidentified characteristic, the number or percentage of special

needs students within a school, may affect the overall academic performance of non-special needs students.

However, while this study explores the possibility that the percentage of special education students in a school might be associated with the academic performance of the regular education students as a whole, it has been established that the presence of special education students being educated in a classroom of regular education students is not associated with individual academic performance of regular education students (Hanushek, Kain, & Rivkin, 2002; Friesen, Hickey & Krauth, 2010; Ruijs, Van der Veen, & Peetsma, 2010). This sounds like a contradiction. All indices of academic performance are in some way related to at the foundational level to individual achievement and if individual achievement shows no effect when educating special education students with regular education, wouldn't it then stand to reason that this result be carried through to the next level, the school? This in fact would be the case if schools "didn't matter" and that all components of student achievement could be accounted for within the levels of the personal ability or the classroom. But in fact, research has shown, as cited above, that schools do matter, and that schools do affect the performance of individual students (Reynolds & Creemers, 1990). A recent example of the effect that schools can have on the academic achievement of the individual student is the recently released report (Cremata et al., 2013) on charter school effectiveness by Stanford University's Center for Research on Education Outcomes, June 2013, which matched like-performing students in both public and charter schools and measures their differences over time in academic achievement. The report concluded that there are

measurable differences in academic performance of similarly matched students in public and charter schools. This conclusion suggests that school level characteristics can impact individual student achievement. If this is the case, then although the research literature suggests that the individual, non-special education student's academic achievement is not affected by the inclusion of the special education students in the regular classroom, there exist the possibility that when measured at the school level, increasing percentages of special education students within a school could affect the overall achievement of that school, which would then suggest an effect on individual peer achievement all because of the percentage of special education students within that school.

This study explores whether the percentage of special education students in a school affects the academic performance of regular education students in that school. In other words, is there an association between the percentage of special education students in a school and that school's academic performance?

If this research project does establish a relationship, the purpose of the project will be achieved. However as with the example of the charter school report cited above, just because a relationship has been established does not establish its cause. In fact if a relationship were established, this would suggest additional research into determining its cause. But this possible avenue for future research is beyond the scope of this project and is dependent on first establishing a relationship.

The phenomenon of educating special education students with their typically functioning peers has received significant research in the past 30 years. A key word

search of Google Scholar using the phrase “mainstreaming special education students” indicates 74,500 scholarly works addressing this topic. However the effect that this phenomenon has on the academic achievement of the typically functioning student is less well researched. In fact a recent literature review article on the subject characterizes the literature as limited (Kamalouka, Farrell, Dyson, & Kaplan, 2007). However, even given the limited quantitative research in to this topic, the literature generally supports the position that inclusion of special education students into the mainstream, regular classroom causes little if any negative effects on the achievement of their nondisabled peers (Hanushek et al., 2002; Ruijs, et al., 2010; Friesen et al., 2010). The above referenced research was performed by economists using large data sets and analyzed using structural equation modeling or multiple regression analysis. Other researchers using inferential quasi-experimental designs with nonrandomized controls have found similar results (Sharpe, York, & Knight, 1994).

However not all research into the effect that educating special education students with their non-disabled peers has shown neutral or positive effects on the academic performance of typically functioning students. In one of the earliest investigation into this issue, Brown (1984) concluded that educating special educating students with their typically functioning peers negatively impacts the academic achievement of the typically functioning student. Brown makes this conclusion by surveying a sample of elementary school teachers on their perceptions of the effect that including special education students in the regular education environment have had on the typically functioning peer. Further, in another study by Rouse and Florian (2006) data collected by the researchers

indicated that a high percentage of special needs students (a British term) were associated in one case with low academic achievement within the school. It should be noted that authors were using a very small sample of high schools and actually concluded that the percentage of special needs student within a school did not negatively impact of academic achievement of typical students. Because this study specifically examines school level effects that increasing percentages of special education students within on school has on peer achievement it will be discussed in greater detail in chapter two of this study.

Friesen et al. (2010), also addressed the question of “numbers” of special education students and their effect on academic performance in their study, but it was in the context of determining the effect in individual achievement, within a school environment. The authors used a data set that included 118, 861 seventh grade students situated in 1,206 schools. Their regression model included the following independent variables as percentages of school population: male, aboriginal, Chinese spoken at home, Punjabi spoken at home, other languages spoken at home, ESL, ESD, learning/behavioral disabled, and other disability. And similar to their overall conclusions cited above, Friesen et al. found that there was a small, non-significant, but negative effect on peer achievement when educated in a school with greater percentages of special education students. The authors concluded that this result was so small as to conclude that there was actually no actual impact of increasing percentages of special education students in a school on peer achievement.

While there has been little research investigating how the percentage of special education students affects the academic achievement of the school as a whole, there has been research into how “increasing” sub-populations within a school can affect the academic achievement of the “majority” population. Burke and Sass (2013), Schlosser, Paserman and Lavy (2008), Betts and Zau (2004), and Hoxby (2000) have conducted research that shows schools with high concentrations of special populations consisting mostly of non-native language speakers also show a negative effect on the academic achievement of the native language speakers. While not specially addressing the putative impact that special education students may have on a school’s overall academic achievement, it does suggest that special populations can create school level effects.

The existent research can be summarized as follows:

1. The majority of research studies indicate that a typically functioning student’s academic achievement is not affected by presence of special education student’s in the same education environment (Hanushek et al., 2002; Ruijs, et al., 2010; Friesen et al., 2010; Rouse & Florian, 2006; Sharpe, York, & Knight, 1994)
2. There have been few studies specifically looking at the effect that the percentage of special education students within a school has on academic achievement (Rouse & Florian, 2006; Friesen et al., 2010).
3. Studies that have mentioned this effect have suggested little or no effect.

4. There are several studies that indicate that sub-populations of non-majority language speakers within a school can negatively affect the academic achievement of the majority language speakers (Burke & Sass, 2013; Schlosser, et al., 2008; Betts & Zau, 2004; Hoxby, 2000).

Problem

Current research literature is limited on the question of whether educating special education students in the same classroom as their non-special education peers does or does not affect the academic achievement of the non-special education student. Further, research and practice establishes that schools as a unit produce an effect on academic achievement over and beyond the classroom. Additionally, data from a few research studies indicate that the percentage of special education students in a school may impact the academic achievement of the non-special education student. The research literature is equivocal on the impact that greater or lesser numbers of special education students in a school have on the academic achievement of the non-special education student.

Therefore, the question that this research will attempt to answer is as follows: is the academic achievement of non-special education students affected in anyway by the percentage of special education students within a school?

Hypothesis

Given that previous research studies have measured the effect that inclusion of special education students have on the achievement of their peers and that these effects whether negative or neutral are very small I believe there is high likelihood that the

proposed study will report little if any effect at the school level for non-special education student achievement as the percentage of special education student in the school's population increases. If an effect is detected this would indicate a previously unreported potentially causal variable that would then require further exploration in order to determine its causal relevance.

CHAPTER II

LITERAURE REVIEW

Effect of school level achievement on regular education students

Essentially school level effects on the student achievement answers the question: do schools matter? This question is at the heart of this study: implied in the analysis of the magnitude of effect that the numbers of special education students in a school have on their peers' achievement is the assumption that factors operating throughout a school, affecting all classrooms, all teachers and all students at that particular school are best analyzed as a school. In 1966 with publication of the Coleman Report (Coleman, et al., 1966), a study that claimed schools explained approximately 10% of a student's achievement, the education community has debated whether or not there school effects were a significant factor in student achievement (Carver, 1975). Further, while Coleman was the first significant attempt to characterize the factors that impact student achievement, there has been significant debate as to whether the evidence cited supports the conclusions of the report. Bowles and Levin (1968) criticize Coleman for using a statistical analysis (stepwise) that creates biased estimates of each factor's contribution to explained variance. Further, Bowles and Levin (1968) question the decision not report or use the regression coefficients (beta or "b" weights) generated by the regression analysis. Carver (1975) suggests that the use of assessments that maximize individual differences between students significantly under estimates the effect that schools have of student performance and recommends that criterion based assessments give a better

understanding of school's effect on student achievement. Cain and Watts (1970) argue that Coleman, because it did not operate with a clearly identified, a priori, theoretical model of student achievement, allowed its results to be biased. Further, because Coleman used multiple regression as its primary statistical analysis, it is unable to account for the correlations between its independent variables which when combined with a stepwise analysis biases the conclusions it makes on each factor's share of explained variance. Thus while Coleman reported that schools explained only 10% of a student's academic achievement, it is a conclusion that is not universally accepted.

Today however, the proposition that schools affect a student's achievement has been established in the literature as a valid focus of analysis. John Hattie in his book "Visible learning: a synthesis of over 800 meta-analyses relating to achievement" (2008), cited over 2,100 times according to Google scholar, clearly makes the case that factors particular to a school affect the achievement of its students. And if more support is needed, Reynolds and Creemers (1990), simply state, "schools matter, that schools do have major effects upon children's development and that, to put it simply, schools to make a difference." While the principle of school level effects has been established in the literature, there is a growing body of literature that suggests that the percentage of special education students at a school also affects that school's academic performance. In order to better understand the effect that increasing percentages of special education students in a school's population has on total school achievement four areas of research will be examined: first, the research that focus directly on the question of the effect that special education students have on school level achievement; second, because school

level achievement is “nested” within or in other words because it is a summation of classroom achievement, the research literature describing the effect that special education students have on their classroom peers will also be examined; third, because of requirements mandated in No Child Left Behind, school level and classroom effects also include the achievement of special education students, therefore the effect of inclusive education on special education student’s achievement will be examined; and finally, because of the pivotal effect that teachers have on a student achievement, the effect that including special education students into the regular classroom has on the teacher will also be examined.

Effect of special education students on school level achievement

There is limited research on the affect that special education students have on the overall level of school achievement. Only two research studies have addressed this question: Rouse and Florian (2006) and Friesen et al. (2010).

Perhaps the most relevant prior research to date on this proposed study has been conducted by Friesen, Hickey, and Krauth (2010). The authors, using a data set that included 118,861 student scores and 1,206 schools and tracked the change in individual student’s scores between fourth and seventh grade in British Columbia, determined that inclusion of disabled students (learning disabled, behavior and “other” types of disabilities) with their non-disabled peers, had a small negative effect on the scores of the non-disabled peers when taking the mandated, universally administrated (exception being for non-English proficient ESL students whose scores were not included) Foundation Skills Assessment (FSA). The FSA is a criterion-based exam developed by

British Columbia, Ministry of Education. It is given annually to fourth and seventh grade students of publically and provincially funded independent schools. The assessment measures competence in reading comprehension, writing and numeracy. Although the effect that Friesen and company found was negative, it was non-significant and authors concluded that there was no practical, negative effect associated with inclusion. It should be noted that the authors characterize FSA as “low-stake”, which is significantly different the decidedly high stakes testing that characterizes the TAKS.

The methodology of Friesen et al. differs from the proposed current study in several ways. The major difference is that they conducted a regression based on data consisting of the changes in individual students’ scores between the fourth and seventh grade in reading and math. Because this model focuses on the changes in individual student scores over time, it requires data from an assessment that is designed to produced interval data; in other words, scores that reflect a year of growth in a year of schooling. While the FSA may very well be normed data, the authors do not explicitly address this, thus making the reader assume that FSA represent year over year growth. Our proposed study minimizes this confound by using school level passing rates as the unit and level of analysis.

An additional difference between this model and our proposed model is that in their model the authors use the average percentage disabled in the same-grade as an independent variable. The number of disabled students as a percentage of total school population was not included in their regression model. The authors did provide data showing the percentiles of schools in British Columbia in terms of their overall

percentage of enrolled disabled student population, but as stated above this data was not included in the regression analysis. The proposed current study will measure directly the effect that percentage of school level special education students has on the achievement of their non-disabled peers. The focus on same-grade level data will not consider the possible effects that differing rates of disability between grade levels could have on overall school level achievement. In other words an impacted cohort or grade level could unduly bias the results. However, this small point noted, given the size of Friesen et al, study (118,861 students and 1,206 schools) the likelihood that a grade by percent special education study interaction having a significant effect on the overall findings seems low.

Rouse and Florian (2006) conducted the second major study that discussed non-special education student achievement in relation to level of inclusion of special education students at the school level. Rouse and Florian studied the effect that students with special educational needs (SEN) had on a group of English secondary schools in a single, Local Education Authority (LEA). The authors, using data from national achievement exams, measured the average performance of a cohort of secondary students as progressed through their secondary education. The performance of students attending schools with less than 12% of total student population designated SEN were compared with the performance of students attending schools with an SEN student population of 25% or greater, and an additional group of schools which fell between 12% and 25%. Ten secondary schools and almost 2,500 students' achievement results were analyzed. Using an ANOVA, the authors found no significant difference between the gains in student achievement between the three groups of schools. Based on the

results of the ANOVA, Rouse and Florian concluded that inclusion of SEN students did not cause significant difference in academic achievement of non-SEN students as a function of percent SEN.

While Rouse and Florian's conclusions are based on school level data and support the overall conclusion of Friesen et al., (remember, Friesen et al. found a small, non-significant negative effect which they concluded had no practical effect, on peer achievement), the data presented in their paper suggests that the percentage of SENs in a school may negatively affect peer achievement. The secondary school with the greatest percentage of SEN students, 42+%, showed little to no gain in student performance in a single cohort of students over a five-year period. Without running an analysis to determine if this gain was statistically significant by itself, or conducting a growth by school type interaction analysis, it is apparent that the results of this "outlier" may have been subsumed by the larger gains of the two other schools and their greater number of students thus leading to the "no-difference" result of the ANOVA. The authors did not explore this possible interaction in their conclusions and chose not to discuss the possible causes for the outlier school's results. The results of the relevant research have been summarized below in Table 1.

Table 1: Research on SPED percentage within a school and its effect on peer achievement

Author(s) & Year	Type of Sub-Group	Country	Grade or Age	Findings
Friesen, Hickey & Krauth (2010)	Special Education	Canada	Grade 4 -7	Small, negative, non-significant effect
Rouse & Florian (2006)	Special Educational Needs	England	Secondary	No effect

Classroom effects of special education students on their peers

Although there is a substantial body of research on peer effect at the classroom level for regular education students (reference to recent meta-analysis here), there are still only a handful of studies that focus on the impact of including disabled students in mainstream settings on their non-disabled peers. Two recent studies reported the effects of inclusion of special education students on their peers at the classroom level. Fletcher (2009) and Gottfried (2013) examining classroom level with data from first grade and kindergarten, concluded that non-disabled peers are negatively affected by inclusion of special education students on measures of academic test score, behavior measures, and social skill development. Supporting this research by demonstrating that sub-populations can impact the general population are the studies by Burke and Sass (2013),

Schlosser, Paserman and Lavy (2008), Betts and Zau (2004), and Hoxby (2000). These studies did not directly address the effect that inclusion of special education students have on peers, but simply provided evidence that sub-populations of students can impact the performance of their “majority” peers. While Fletcher and Gottfried’s results are important, they may not be transferable to other age groups.

A recently published study by Gottfried (August, 2013) suggests that social-behavior development of kindergarten and first grade peers are negatively impacted by inclusion of special education students. Using data a set of 20,690 observations developed by the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K) in the 1998-1999, Gottfried reported evidence that peer students are significantly affected by their disabled classmates in the following areas of behavior and social skills: externalizing behavior problems, internalizing behavior problems, levels of self-control, approaches to learning and interpersonal skill.

Again, like Gottfried, Fletcher (2009) focuses his research on the effects of including special education children into the regular education classroom. As with Gottfried, Fletcher uses the ECLS-K data set; Fletcher focuses his analysis on the effect that kindergarten students identified as having emotional and behavioral disorders have on the academic achievement of their kindergarten peers. Using this data set, which contained 10,074 observations, Fletcher found, that having at least one classmate identified with emotional and behavioral disorders had a significant, negative effect on peer achievement in both reading and math (Fletcher, 2009).

Additional studies have directly measured the impact at the classroom level of peer effects. Burke and Sass (2013), Schlosser, Paserman and Lavy (2008), Betts and Zau (2004), and Hoxby (2000) all used methodology that targets the effect of sub-populations on their peers when included in the classroom. Burke and Sass, using State of Florida school data measured the effect low performing students had on their classmates over a six year period from grade 3 to grade 10. The data set covered the school years beginning in 1999 and ending in 2004. Depending on the grade and subject being reported, a range of scores from between 88,181 and 231,082 students were used. The authors found small to non-existent peer effects. Schlosser, Paserman and Lavy using the achievement records of 363,713 students observe that increasing proportions of “low ability students” negatively impact the academic achievement of the typically functioning peers when educated together in the same classroom in Israel. Betts and Zau measured the impact of ability grouping at the classroom level using San Diego public school data. Using a data set containing 74,557 reading scores and 77,897 math scores, Betts and Zau concluded that sub-populations do impact peer achievement. And finally Hoxby, using Texas administrative data from the 1990’s, at the primary school grade (cohort) level (grade 3 cohort n=28,733, grade 4 cohort n=18,536 and grade 5 cohort n=14,899), grades three, four and five, found that for every 1 point increase in an cohort’s reading score (peer), and individual’s reading score increased somewhere between 0.15 to .4 points.

Effect of inclusion on special education students

While the research literature suggests that the inclusion of special education students into the regular education classroom impacts the learning outcomes of regular education students, the effect that inclusion has on the special education students is also important to know in order to develop a more complete picture that inclusion has on the school environment. The literature to date on impact is mixed. A good starting point for this discussion are two reviews of literature, one by Ruijs and Peetsma (2009) and the other by Salend and Garrick-Duhaney (1999), both of which assessed the impact that inclusion of special education student has on the learning outcomes of both special education student and on those of the regular education student.

The studies cited by Salend and Garrick-Duhaney were quasi-experimental. The sample sizes were generally small. Waldron and McLeskey (1998) used groups of 71 and 74 elementary special education students, including both the mild and severely differently enabled (no ethnic data given); Banerji and Dailey (1995), used groups of 13 and 17 of fifth graders in a single classroom (incomplete ethnic data given); and Marston (1996) used mixed grade, elementary special education students in groups of 33 (inclusion only), 36 (combined service) and 171 (pullout) (no ethnic data given). These studies and others cited by Salend and Garrick-Duhaney suggest that a supported inclusion of special education students with regular education results in positive academic effects for the special education student.

Salend and Garrick-Duhaney also reviewed studies that focused on the social-emotional status of special education students in an inclusion setting. Citing research

studies that assessed the impact of inclusion on students with severe disabilities, Salend and Garrick-Duhaney found that these studies generally indicated positive effects for students with severe disabilities on measures of social/emotional well-being (Evans, Salisbury, Palombaro, Beryman, & Hollowood, 1992 as cited in Salend & Garrick-Duhaney (1999); Fryxell & Kennedy (1995); Kennedy, Shukla, & Fryxell (1997); and Vaughn, Elbaum & Schumm (1996). However, Salend and Garrick-Duhaney's report of research that focuses on the social/emotional state of mildly disabled students (learning disabled) indicated different results. Sale and Carey (1995), Bear, Clever, and Proctor (1991), and Roberts and Zubrick (1992) all found that students with mild disabilities, when educated in a regular education environment without targeted interventions, scored significantly lower on social/emotional measures than did their non-disabled peers.

The findings of Salend and Garrick-Duhaney are broadly supported by Ruijs and Peetsma (2009), who published another review article ten years after Salend and Garrick-Duhaney. In their article Ruijs and Peetsma cited research published after 1999 that generally showed positive academic effects for special education students educated in the regular classroom. Their findings concerning social/emotional measures were less conclusive due in part to the lack of control groups in many of the studies. The studies did show that when special education students were mainstreamed they generally scored lower on social/emotional measures than did their non-disabled peers (Ruijs & Peetsma, 2009). But as stated above these studies were generally not constructed with a control group comparison, thus making conclusion about the social/emotional effect on inclusion versus other types of special education settings difficult.

Effects of inclusion on the classroom teacher

The final facet in the analysis of effect that educating the special education student in the regular education classroom has is to look at how it affects the classroom teacher. Hattie (2003) suggests that 30% of a student's achievement can be "explained" by the teacher. In fact this is the second greatest source of "explained variance" in a student's academic performance, in addition to pre-existing student characteristics and attributes (Hattie claims that student characteristics explains 50% of his or her achievement). Given the contribution that teacher's make to a student's achievement and thus, by extension, to a school's achievement, understanding the relationship between of increasing numbers of special education students within a classroom and by extension within a school may be a area relevant research. In order to determine if special education students affect teacher performance and thereby possibly affecting the school achievement, two questions must be answered. First, do teachers affect school level performance; and second, does the inclusion of special education students affect teacher performance as measured by student achievement.

Two recent research studies support the idea that teacher effects have significant school level effects. Aturupane, Glewwe & Wisniewski (2013) in a study of student achievement for grade four primary students in Sri Lanka, found that years of teaching experience positively affect school level academic achievement. Almost mirroring this finding is the research published by Ronfeldt, Leob & Wyckoff (2013). Using New York City School's data, this research shows grade level student achievement for grades four and five is negative impacted by high teacher turnover rates within a school. While the

establishing the probability of teacher effects impacting school level achievement, the literature is non conclusive on how inclusion of special education students in a classroom or school may affect teacher performance in regards to student achievement.

Research on the effects of inclusion on the classroom teacher has concentrated on the teacher's attitude. Thus surveys of teacher's attitudes generate the data used to measure the effect. Fortunately, two groups of researchers covering almost fifty years of studies have conducted systematic reviews focusing on the attitudes of classroom teachers towards the proposed or actual practice of inclusion. De Boers, Pijl and Minnaert (2010) surveyed research conducted during the years 1998-2008. Summarizing the research by using the conceptual framework developed by Eagly (1993), de Boer et al. analyzed the impact of inclusion on the regular education teacher from three different effects: effects on the beliefs and knowledge (cognition) of the teacher, effects on the feelings (affective) of the teacher and finally, the effects on the behavior of the teacher (predisposition to act). Using research studies published within this period, the authors found twenty-six studies, which met the following criterion:

Contained empirical data

Published in an international scientific journal

Focused on attitudes of regular primary schoolteachers towards aspects inclusive education

Aimed at inclusion of children with special education needs in regular primary education and more specially towards the social participation of those pupils

Focused on children with one of the following types of disorders; communication disorder, motor skills disorder, sensory disorders, learning disorder, mental retardation, behavior disorder and chronic disease.

Provided convincing empirical evidence was provided regarding factors related to teachers' attitudes. (de Boer et al., 2010)

What is striking about de Boer et al.'s summation is that all twenty-six studies reviewed showed neutral or negative effects. In fact the studies measuring a teacher's actual behavior towards special education students indicated that regular education teachers were adversely impacted by the inclusion of special education students. None of the studies indicated that regular education teachers believed, felt, or behaved in a way that demonstrated that inclusion has had a positive effect on their classroom experience.

Previous to de Boer et al. (2010), Scruggs and Mastropieri (1996) surveyed the research on the effects of inclusion on teachers between the year 1958 and 1995. The author's concluded that regular education teachers were generally open to the idea of inclusion, showed concern about its effect on regular education students, and were desirous of more training in how mainstreaming should be implemented. These conclusions presented teacher's attitudes as generally positive toward inclusion. This is a significant difference from the findings of de Boer et al. This difference in part can be attributed to the changing education environment within the two time periods surveyed by each study. Scruggs and Mastropieri surveyed research conducted as inclusion was being developed conceptual and as an experimental practice. The research cited used

samples of teachers who were generally not practicing education in an inclusion/mainstream classroom. De Boer et al. cited research that includes teachers who were practicing inclusion and therefore were giving their beliefs, feelings and behaviors based on actual experience. Because the research used in de Boer et al. was based more on experience, it appears to be a better indicator of the current effects of inclusion on the regular classroom teacher.

The research into the effect that special increasing numbers of special education students has on the classroom teacher is ambiguous at best. No study has tied teacher perceptions or teacher attitudes towards special education students to increases or decreases in student achievement, special education student or regular student. No study has attempted to understand what effect if any, increasing numbers of special education students within a classroom has on teachers, their attitude towards special education students nor whether this increase has been tied to any demonstrable increase or decrease in student achievement within the classroom. Since the focus of this study is the effect that increasing percentages of special students have on the achievement of regular education students, the research into teacher effects is of limited direct impact.

Conclusion

The Coleman Report established that schools contribute to the academic achievement of students. While the impact that schools have on their students may not be of the same magnitude as other factors such as individual qualities or the effect of the teachers, they can help explain some the achievement that may or not be taking place

within that environment. By studying the effect that schools have on their students, we refine and add to our overall understanding of student achievement.

While the research community may direct part of its attention on a variety of issues affecting the achievement at the school level, there has been relevantly little interest shown in the more narrow study of how and if the inclusion of special sub-populations of students affect the school level achievement. Jensen and Rasmussen (2011), and Szulkin and Jonsson (2007) studied the affect that the percentage of non-native, immigrant populations have on the school level achievement at the secondary level and found that increasing percentages of these sub-population produces negatively impacts school level achievement. Gould, Lavy, & Paserman (2009), studying the effect of increasing sub-populations of non-native, immigrant population, found negative effects on peer and school level achievement in elementary schools. However, these studies do not specially address the focus of this research, which is the affect that special education students have on school level achievement. Fortunately, Rouse and Florian (2006) and Friesen et al. (2010) do address this issue. Rouse and Florian found no school level effects as the population of special-needs students increased limited sample of secondary schools. Friesen et al. studying the affect that the inclusion of special education students have on the academic achievement of their peers found that increasing percentages of special education student did not impact a school's overall academic achievement.

While much of the other cited research literature provides nuances to complete the “picture” of school level achievement, in terms the affect that inclusion has on the

both the special education student and the classroom teacher, it is clear that research up to this point suggests that the effects of special education students on school achievement are neutral to non-significantly negative. Since my research is proposing to directly study the effect of increasing populations of special education students on school level achievement, I expect that my results will mirror the results of previous researchers in showing neutral to non-significant negative results.

CHAPTER III

METHODS

In order to determine if and by how much the percentage of identified special education students in a school affects the overall academic achievement of the school, it is necessary to identify the following: the data being used, and the method used to analyze this data. Given that this research study is at its essence a study of a numerical relationship (the gain or loss of students on an achievement test given the percentage of special education students within a school), the methodology being used is empirical and further it will use statistics to determine the nature of this relationship. The following sections will discuss both the data and the statistical analysis being used establishes the relationships in question.

Data

The data used in this analysis is public, and is produced by the Texas Education Authority by request from the researcher. The data at its essence consists of the number and percentage of fourth grade students who were enrolled, who took, and then who passed at a school, the State mandated, achievement tests known as the TAKS – Texas Assessment of Knowledge and Skills. Any school within Texas reporting fourth grade TAKS data was included with the exception of schools reporting less than ten students in the fourth grade. Eliminating these small schools from the study was done in order to eliminate possible effects created by non-standardized grade level/classroom groupings

such as combined grade level instruction. In all 3,826 schools were selected for study with scores of 318,863 fourth grade students analyzed.

Fourth grade was selected as representative of school achievement in an elementary school for several reasons. First, some school districts in Texas have adopted the middle school model of school organization, which means that grades 5 and 6 are housed on separate campus from grades k-4. Not all districts have chosen this model, and still retain a k-5 or a k-6, so in order to capture elementary education grade 4 was selected as the best representative of an elementary school. Second, using grade 4 allows for the best alignment between identified special education students with the regular education student. In Texas schools, students identified in pre-school with a Non-categorical Early Childhood disability (the Texas term for the widely used Pervasive Developmental Disorder), are reclassified in one of the thirteen categories of disability recognized by the United States Department of Education upon entering grade 1. Further, students, who are suspected of having a learning disability, are more likely to have been placed in special education given the evidence of four years of schooling demonstrating the a “gap” between their ability and their achievement. And finally, the curriculum of fourth grade represents of culmination of all previous skills taught and assessed in the school along with some additional concepts. Therefore grade 4 can be seen as capturing all the academic concepts required for students to master and thus by extension all the skills an elementary school is required to teach it students.

The dependent variable or criterion variable used in this study is the number and by extension the percentage of students who “pass” the reading and mathematics

sections of the fourth grade TAKS exam. The TAKS exam is essentially a “criterion” based exam in which the “passing” result/score is determined by state educational authority. Questions concerning how the “passing scores” were determined or what the “passing scores” are, are not the focus of this research. This study concerns itself with “passing” scores as defined by the State of Texas.

Methodology

The model being used in this study posits that a school’s “passing scores” are dependent upon the following independent variables: the number and or percentage of African American students in the school; the number and or percentage of Hispanic students in the school; the number and or percentage of White students in the school; the number and or percentage of Texas defined “at-risk” students in the school; the number and or percentage of “economical disadvantaged” students in the school; the number and or percentage of students identified as “limited English proficient” in the school; and the number and or percentage of identified “special education” students in the school. Further, when these independent variables are added together it is posited that they “explain” or “account” for the dependent variable, which is the number and or percentage of a school’s fourth grade students passing the reading and mathematics portion of the TAKS examination. A generic symbolic equation of the above model appears below. “ A_s ” is the symbol for a school’s achievement; “ AAs ” is the symbol used for percentage of African Americans in the school; “ HS ” is the symbol used for the percentage of Hispanics in the school; “ Ws ” is the symbol used for the percentage of Whites in the school; “ ARs ” is the symbol used for the percentage of “at-risk” in the

school; " ED_S " is the symbol used for the percentage economically disadvantaged students in the school; " LEP_S " is the symbol used for the percentage of limited English proficient students in the school; and finally " $SPED_S$ " is the symbol used for the percentage of special education students in a school.

$$A_S = AA_S + H_S + W_S + AR_S + ED_S + LEP_S + SPED_S$$

The above equation is a simplified model that will be developed and expressed as a statistical model. Further this model assumes that there will be limited or no correlation between independent variables. If this assumption is true and if the relationships between the dependent variable and the independent variables are approximately linear, then each of the independent variable's contribution to the overall achievement of a school can be measured using multiple regression.

In order for multiple regression to produce reliable results certain assumptions have to be met. Thompson (2006) identifies five assumptions that underlie multiple regression: scale; model specification; error score; homoscedasticity; and predictors imperfectly correlated. The trustworthiness of the results produced in this study will in large part rest with how well the data meets these assumptions (Thompson, 2006). Given this importance I will more fully discuss the data and its suitability in meeting these basic assumptions.

Regression requires that the scores for dependent variables be interval scaled. Thompson (2006) states that the independent variables maybe either dichotomous or at least interval scaled. The data set being used in this study fit this standard. Dependent scores are the percentage of a school's fourth grade students passing the TAKS exam.

The independent scores in the data set is the percentage of a school's student population that is categorized as Limited English Proficient, Economically Disadvantaged, At-Risk, White, Hispanic, African-American or Special Education.

Model specification requires that the independent variables and the dependent variable be correctly identified and that their relationship is being correctly modeled which in this analysis is modeled as a linear relationship (Thompson, 2006). The independent variables chosen to predict the dependent variable are the administrative categories of interest as defined by the State of Texas.

The third assumption for regression is that error scores are normally distributed in the population (Thompson, 2006). Basically this means that the error contained within any score is the result of factors occurring in the population, not from an "artifact" within the measuring instrument, and that these scores will be normally distributed and will not occur in a systematic pattern. This assumption will be verified in the results section of this analysis by examining the distribution shape of the standardized residual scores.

The fourth assumption in regression is that the variance in error scores for the different independent variables will be equal (Thompson, 2006). Given the large sample size being used in this analysis, there is a reasonable probability that this assumption will be met. As with assumption three, assumption four, also known as homoscedasticity, will be verified in the results section of this analysis. To verify homoscedasticity, an examination of the studentized residuals will be performed.

The final assumption underlying the use the multiple regression is that the independent variables are not perfectly correlated with each other (Thompson, 2006). Using the present data as an example, some students who are classified as Limited English Proficient (LEP) could likely be counted as Hispanic, thus creating a correlation between LEP and Hispanic. This correlation is acceptable as long as all members of the LEP and Hispanic category are not completely the same, in other words perfectly correlated with each other. Further, the vast majority of students who are categorized as special education, limited English proficient, at risk or economically disadvantaged will also be categorized as black, white or Hispanic. This will create multi-collinearity between the independent variables. Given the strength of the collinearity, Thompson (2006) suggests that significance of the beta weights maybe affected but since the advent of modern computers the calculation of a variable's beta weight should not be impacted. The strength of the collinearity between independent variables will be assessed by examining the variance inflation factor (VIF) number and the significance of the respective beta weights.

In order to determine the importance and the contribution that the percentage of special education students have on a school's academic achievement rate, the data set will be analyzed using IBM SPSS Statistics, Version 21 (2012). Consideration will be given to the independent variable's beta weight and corresponding structural coefficient. Thompson (2006) recommends that both these measurements be analyzed in order to detect "suppressor" variables. Independent variables whose values on these two measures remain in the same relative rank order will most likely contributed directly to

the total model effect. Further, in order to more directly establish the unique contribution that each independent variable makes to total model effect, commonality coefficients will be determined for each independent variable along with the percentage that the variable's commonality coefficient to total model effect (Nathans, Oswald & Nimon, 2012). The commonality analysis will be performed using an SPSS solution developed by Nimon (2010).

Given the above analysis model and the meeting of the assumptions essential for regression, the essential suitability of the data set for regression analysis has been established. Further, given the use of multiple measures of variable importance and their contribution to total model effect, the procedures described above should yield an accurate depiction of the importance and contribution that the percentage of special education students play in the determining the percentage of students passing the TAKS exams at a school.

CHAPTER IV

RESULTS

The multiple regression of the Texas Administrative data set indicates that when the percentage of special education students in a school increases by one standard deviation the percentage of fourth grade students passing all sections of TAKS tests at that school increases by .056 standard deviations (this is statistically significant at $p < .000$). The following sections will more completely describe both the results of the regression by examining the following: the basic descriptive statistics of the overall model; an in depth analysis of the effects present in the data; and finally an analysis and determination of model assumptions

The model of the Texas Administrative data being used in this analysis shows that the independent variables statistically predicts the percentage of a school's fourth grade students passing all sections of the TAKS tests, $F(7, 3819) = 230.035$, $p < .000$. The average percentage of students at a school passing all portions of the TAKS was 82.5% with a standard deviation of 12.1 ($n=3827$). Further, the coefficient of determination is $R^2 = .297$ or Adjusted $R^2 = .295$ with a standard error of the estimate of 10.2. The standard error of estimate, which is the standard deviation of the regression line, can be considered high by some researchers who use the threshold of 10 as a benchmark. This result is most likely due the high degree of multi-collinearity between the independent variables. Table 2 shows the Pearson's correlations of each independent

variable (LEP, Economically Disadvantaged, At Risk, White, African American, Hispanic and Special Education) with the dependent variable.

The correlation between the percentage of special education students in a school and the percentage of fourth grade students passing all portions of the TAKS exam is smallest of the seven independent variables. But it is the “direction” of the relationship which is significant: the relationship is “positive” meaning that when as the percentage of special education students increase in a school so does the percentage of students passing all portions of the TAKS. This was not the direction of the relationship presented in the majority of the literature.

Table 2: Pearson’s Correlation

	Passing All Test	SPED	LEP	Econ Dis	At Risk	White	African American	Hispanic
Pass All	1.000	.055	-.185	-.506	-.369	.353	-.229	-.259
SPED	.055	1.000	-.276	-.066	-.184	.205	-.039 (.008)	-.160
LEP	-.185	-.276	1.000	.583	.810	-.675	-.098	.709
Econ Dis	-.506	-.066	.583	1.000	.759	-.733	.208	.670
At Risk	-.369	-.184	.810	.759	1.000	-.731	.024 (.068)	.725
White	.353	.205	-.675	-.733	-.731	1.000	-.277	-.797
AA	-.229	-.039 (.008)	-.098	.208	.024 (.068)	-.277	1.000	-.317
Hispanic	-.259	-.160	.709	.670	.725	-.797	-.317	1.000

*All relationships significant to $p > .0001$ except when noted in parenthesis; $n=3827$

Although the data shows a relatively high standard error of estimate, the literature suggests that measures of the effects are robust to the “flukiness” (Dr. Thompson’s informal description of standard deviation) within data. Table 3 shows the standardized coefficients (β) for each independent variable along with their corresponding structural coefficient (r_s). While the inclusion of structural coefficients has generated controversy, Thompson (2006) argues that researchers using regression, should always consider the information contained within both statistics when evaluation the effect of the independent variable on the dependent variable. Table 3 also includes

measures of multicollinearity, which demonstrate the large degree of correlation between the variables of race and condition (LEP, EconDis, AtRisk, SPED). This was suggested in the methods section.

Table 3: Beta weights, structure coefficients, significance and VIF for school level data

Independent Variable	Beta Weight β	Structure Coefficient r_s	Significance	Variance Inflation Factor
SPED	.056	.101	.000	1.122
LEP	.264	-.339	.000	3.591
EconDis	-.465	-.928	.000	4.121
AtRisk	-.222	-.677	.000	4.655
White	-.117	.648	.073	22.969
Black	-.166	-.420	.000	11.338
Hispanic	-.110	-.475	.129	28.602

As discussed in methods section a commonality analysis was used to more fully understand the unique contribution of the independent variable to the dependent variable and further if warranted, the amount variance explained by sets of independent variables. But in order to focus the examination on the relationship of the special education students within the school, the correlations between the percentages of special education students and the six independent must be examined for possible relationships of interest. Table 4 shows these relationships.

Table 4: Pearson's correlation between % of SPED and other IV

Independent Variables	Pearson's Correlation with % of Special Education Student in Schools
LEP	- .276
Econ Dis	- .066
At Risk	- .184
White	.205
Black	- .039
Hispanic	- .160

The only positive relationship shown in Table 4 is the one between percentage of special education students in a school and the percentage of white students in a school. All other relationships are negative meaning that as the percentage of special education students increase in a school there is a corresponding decrease in the percentages of the other identified students. This relationship can also be restated by saying as the percentage of other categories of students increase (the exception being white students) the percentage of special education student's decrease.

While showing an interesting relationship, a correlation between independent variables does not explain the contribution that each variable makes to the total variance explained by the model. Given the high degree of multicollinearity between the independent variables, a commonality analysis was performed on the data. This analysis shows that the percentage of special education students in a school explains .928% of the

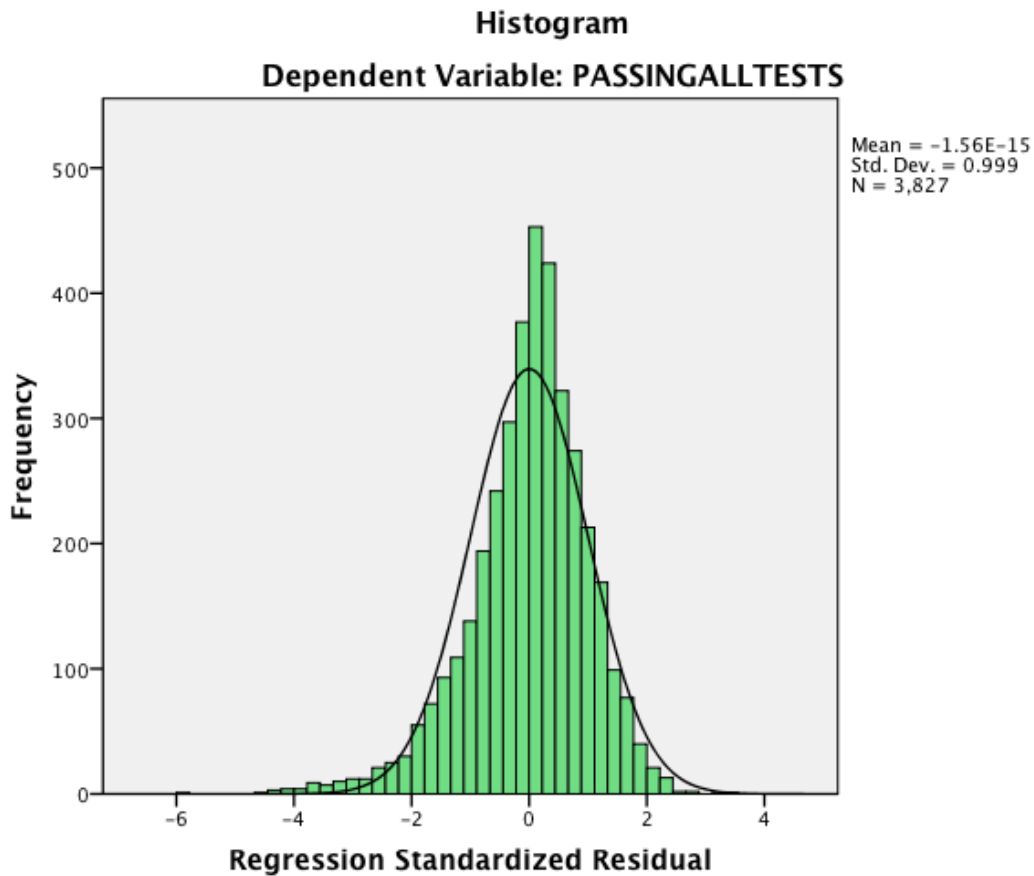
model's R^2 . Table 5 shows each independent variable's contribution coefficient and its percentage to the model R^2 .

Table 5: Results of commonality analysis

Independent Variable	Contribution Coefficient	Percentage that Each Variable Contributes to Model's R^2
SPED	.0027	.9268%
Econ Dis	.0524	17.6840%
At Risk	.0105	3.5546%
LEP	.0194	6.5280%
White	.0006	.2000%
Black	.0024	.8217%
Hisp	.0004	.1429%

The assumptions underlying this regression, as examined in the methodology section makes it clear that assumption one, interval data, and assumption two, model fit, are by definition accepted. Assumption three, the normal distribution of error scores, the difference between the actual score and predicted score (the regression line) is shown to be correct by examining a histogram chart comparing the frequency of schools passing all tests (y axis) to the “regression standardized residual” scores (x axis) (Figure 1). This chart shows a normal distribution, confirming that error scores are normally distributed and thus the data set satisfies assumption three.

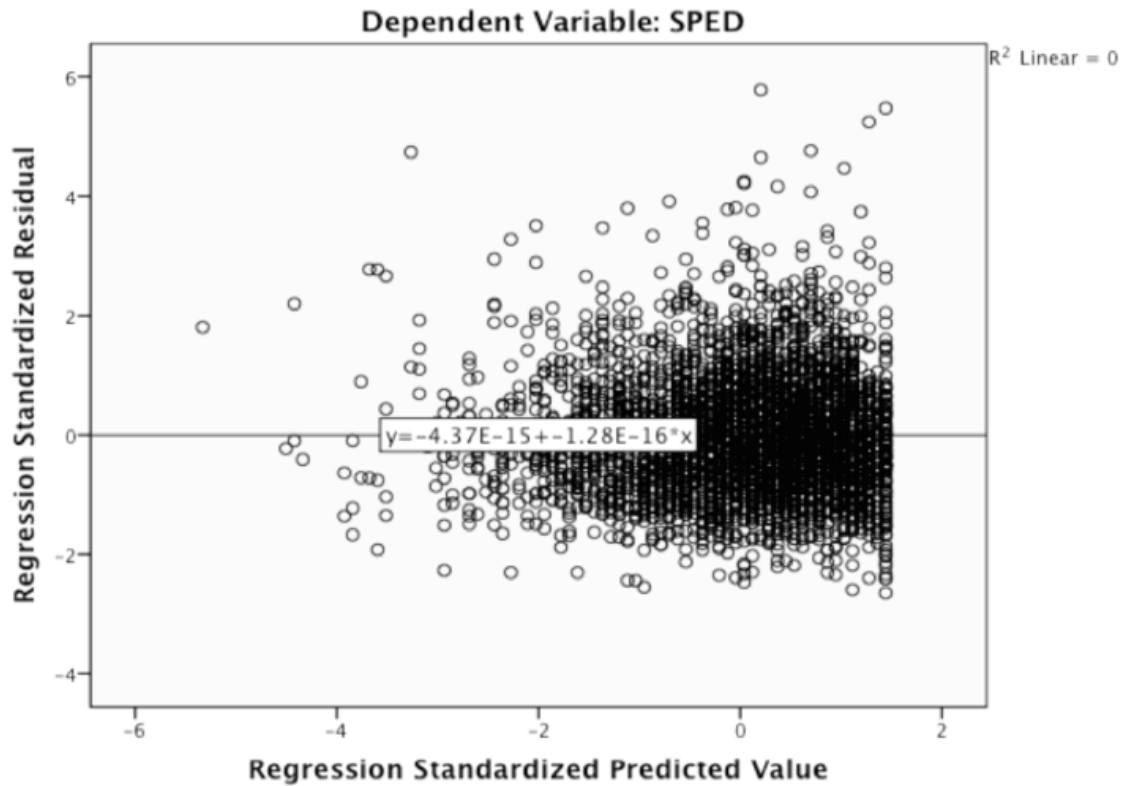
Figure 1: Assumption 3 – normality of error scores



Assumption four is that the independent variables are homoscedastic. In other words in the population, error scores show equal variance for varying values of the independent variables (Thompson, 2006). Osborne and Waters (2002) state that homoscedasticity can be tested by examining the plot of standardized error scores (residuals) by the regression of standardized predicted value. This test was performed on all independent variables. All independent variables were homoscedastic. Figure 2 is the scatterplot with a fitted regression line for the regression standardized residual scores of

the independent variable Percentage of Special Education Students in a School to that of its regression standardized predicted value.

Figure 2: Assumption 4 – test for homoscedasticity in SPED variable



The fifth assumption underlying the use of multiple regression is that no single independent variable is perfectly correlated with another variable. This assumption is met before any analysis was completed since the vast majority of students identified as Limited English Proficient, At Risk, Economically Disadvantaged or Special Education would also be most likely identified as White, Black or Hispanic. In fact the analysis

showed strong collinearity in the independent variables of White, Black and Hispanic with respective Variance Inflation Factor Statistics of 22.969 (White), 11.338 (Black) and 28.602 (Hispanic).

Thompson (2006) states that a high degree of multiple collinearity between independent variables can present calculation problems in determining β , but that this problem is minimized by use of modern computers. The regression analysis performed in the analysis was done with IBM SPSS Statistics, Version 21. Further, Thompson (2006) suggests that large correlations between independent variables can lessen the chance that the beta weights (or b weight if using un-standardized scores) will be statistically different from zero. This was the case was the case with the independent variables of White and Hispanic students. Neither category reached significance at $p < .05$. However I do not see the high degree of collinearity disqualifying the use of multiple regression on this data set for two reasons: first, since the independent variable of interest is Special Education, the collinearity present in the data impacts any conclusions made of effect of White and Hispanic students which are not the direct focus of this analysis; and second, Thompson (2006) does not state that multi-collinearity effects the structure of the data set; in fact it can be inferred from Thompson that the structure coefficients are unaffected by the multi-collinearity and therefore can be used to determine the contribution that each independent variable makes to the explained variance of the model (R^2).

Given the large amount of collinearity in data set, the data does not present a problematic free analysis. However as stated above, given that the data fits the

assumptions for valid use of multiple regression, multiple regression is a valid analytical tool for measuring the effect that special educational students have on school level achievement.

Thompson (2006) states that results from a regression must be compared with other similar research. Given this admonishment, a comparison of findings between published research and the current analysis is in order. Friesen, Hickey and Krauth (2010) state that educating a typical enable student with disabled peers in the grades four through seven will decrease the typically enable student's math achievement score by .017 of standard deviation. No estimate was given for an effect on a typically enable student's reading score. It should be noted the above effect was non-significant in a population of over 105,000 observations.

Rouse and Florian (2006) used an analysis of variance to determine statistical differences in school level achievement between school with high numbers of special need students and schools with relatively low number of special need students. No estimates of effect were reported.

Jensen and Rasmussen (2011) report that native Danish high school students when educated in schools with a predetermined threshold of immigrant students show negative coefficients of $-.71$ in math achievement and $-.21$ in reading achievement. Both results were significant.

Szulkin and Jonsson (2007) reporting on the school level effects for the achievement in Swedish high schools with immigrant populations ranging between 21%

to 30% of a school's populations showed a non-significant b-coefficient of $-.067$. The number of high school in the analysis was 1,043.

Gould, Lavy and Paserman (2009) examined the effect of educating native Israeli 5th grade students with their non-native, immigrant peer. The researchers found a negative effect on high school graduation rates of the native Israelis identified in 5th grade as being educated in schools with high immigrant populations. The authors cite a coefficient of $-.037$ for high graduation rates. This result was significant at $p > .05$ with 42,346 observation.

In comparing the coefficient results of the previously published research with the coefficient found in this analysis there is general similarity in magnitude with except of the Jensen and Rasmussen study. The significant difference between the existing research and this study is the direction in the effect. The Texas Administrative data set clearly shows that school achievement is not negatively affected by increasing numbers of special education students.

CHAPTER V

DISCUSSION AND CONCLUSIONS

As stated above the major finding of this analysis shows that there is small but significant positive effect on school wide achievement when the proportion of special education students increases at a school. The size of the effect is consistent with previously published results although it “direction”, a positive effect, is not. The data set appears, when analyzed by several statistical tools, to be robust with few problematic confounds. However, perhaps the single greatest confound in the analysis is the “low” model fit. But low model fit while disappointing is not unexpected given the previous research. This research suggests that while school wide effects can impact the student achievement, it is secondary to other variables. In a sense this analysis confirms the results of existing research while adding an interesting, yet not fully explained, “twist” in the data.

The purpose of this study was to determine the effect that an increasing percentage of special education students has on the school wide achievement of fourth grade students. The results indicate that there is a small but significant effect. Given the sample size of over 3800 schools, it would have been surprising if the effect had not been significant. In fact the only effects of the seven independent variable tested that were not significant were White and Hispanic students. This result is not surprising given that these two variables had the highest amount of collinearity of the seven

variables and high degrees of collinearity are associated with low occurrences of statistical significance.

The most interesting finding in the current study is the positive relationship between increases in special education students and the overall achievement of the fourth grade students. The research literature, especially the studies that most closely match the statistical analysis used in this study, suggested that the effect of special education students would produce a negative effect; but clearly in Texas at fourth grade the increasing numbers of special education students in a school does not mean that school level achievement rates will be negatively impacted.

Limitations

While this study suggests an intriguing relationship, which is at odds with much of the previous research into school effects of special populations, it has its limitations. This study cannot tell us what programs, what qualities of leadership, what instructional strategies are being used by the schools to meet the challenges of including special education students into the instructional environment. In other words this study suggests that while a school's achievement is not affected by increasing numbers of special education students, it does not tell us how this is accomplished. The "how" is important. Given that much of the large-scale data modeling of previous research suggests a negative effect of special populations on overall school achievement, how do Texas compensate? Could Texas schools be doing something that should be copied or modified by other schools around world?

In addition to the study's inability to determine how the demonstrated effect has been achieved, another limitation of the study is its focus on data from a single grade. While several of the relevant research studies reviewed focused on school achievement at the primary school level, because of this study's novel effect it is uncertain whether its demonstrated effect would replicate at the secondary level.

Another limitation to this study is the fact that it did not investigate the interactions between the independent variables. And while these interactions are most likely the source of the model's relevantly high standard error, it should be noted that the other relevant research cited above also did not analyze these presumed interactions (the cited research did not mention possible interactions so I am making a presumption that they were present but not cited). This is clearly an area for further research

Future directions for research

The constrained nature of this study, measuring the effect that the numbers of special education students in a school has on that school's achievement rates by the proxy of fourth grade passing rates, suggests future areas of investigation. The first possible areas for consideration would be to research the same question but in schools that have both significantly different organizational structure and different student populations, in other words the middle and secondary schools. Additionally, in an attempt to increase the model fit the addition of another independent variable should be considered. The model used in this study and in studies reviewed for this research did not include a variable measuring the effect that teacher competency has on student achievement. Research, beginning with Coleman et al. (1966), suggests that teacher

effectiveness plays a significant role in student success. By establishing a measure of average teaching competency at a school, such as average years of teaching experience or average professional rating on yearly performance appraisals, and adding this to the model of school achievement, a better model fit to the data could be achieved.

Additionally, further relationships between independent variables could also be identified.

Another possible area for further study is to more completely analyze the interactions between independent variables. In fact it is these interactions that lead to one of the more interesting correlations present within the study: as the percentage of special education students increase in school so does the percentage of white students. The data set showed no other positive correlations between special education students and other types of students. Further, the variable that contributes the most to the explained variance of the model is the negative effect of students identified as economically disadvantaged ($\beta = -.465$). As the percentage of these identified students increase so does the decline in school level achievement. And further when the percentage of economically disadvantaged students is correlated with the other independent variable there is a small but negative correlation with the percentage of special education students ($r = -.066$) and a strong and negative correlation with the percentage of white students in a school ($r = .733$). All other correlations between economically disadvantaged and the other variables are positive. Special education because of its positive correlation to increasing percentages of white students and its small but negative correlation to economically disadvantaged students suggests that as the number of white students

increase in a school so does the percentage of special education students and further since economic advantage (or the lack of it) seems to be greatest single predictor of school wide success, special education is a status that is positively related to the economically advantaged white student.

Another result contained within the data set is shown by the commonality analysis. This finding is not part of the original question, but is important because of the sociological implications. The commonality analysis showed that the variables of race – white, African-American and Hispanic – contributed very little to the explained variance of the model. If these results are correct then race as a single explanatory factor is of minimal importance and is perhaps important only in conjunction with other variables. But because race is generally assumed to be a factor in school achievement, further study of this putative interaction is in order.

The final area of concern in the analysis of this data set is the poor model fit. The independent variables contain less than 30% of the accounted variance contained within the data set. This is important for the stakeholders of the Texas public education system. The independent variables used in this analysis are the standard variables used by Texas Administrators to understand the factors impacting the achievement of schools. Clearly these factors are not the only factors at “play” in understanding the determinants of a school’s achievement. As a result any administrative decision made on the basis of these factors will be incomplete. However, adding new data categories is an administrative decision and is beyond the scope of a typical researcher.

Finally, given the significant limitations of the model to account for the explained variance of the data set, there is a positive for the education community. Much of the existing research into the effects of special education students on the achievement of their peers has been by researchers in disciplines outside of education. Their findings as shared above suggest that special education students have a small negative effect on the achievement of their typically functioning peers. As a classroom teacher, twenty years in the k-12's and another eight years as developmental education instructor at the community college, I am pleased to find that my colleagues and my schools make a positive, significant impact on their students when measured on variables they can control. The only positive beta weights in this analysis were for the independent variables of special education students ($\beta = .056$) and the percentage of Limited English Proficient ($\beta = .264$). In other words, given educational challenges situated clearly within the technical domain of educating students, the public schools make a difference. However, factors that are conditions of the society at large – At Risk and Economic Disadvantaged – are not well remedied by the schools. We can educate students what we can't do is fix society.

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