The Probability of a General Education Student Placed in a Co-Taught Inclusive Classroom of Passing the 2014 New York State ELA and Mathematics Assessment in Grades 6-8

This manuscript has been peer-reviewed, accepted, and endorsed by the National Council of Professors of Educational Administration (NCPEA) as a significant contribution to the scholarship and practice of school administration and K-12 education.

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This study examined the influence of placement in a co-taught inclusive classroom on the academic achievement of general education students in grades 6-8 in a suburban New York school district on the 2014 New York State ELA and Mathematics Assessments. Propensity Score Matching (PSM) was utilized for sample selection in order to simulate a more randomized design methodology and to decrease the likelihood of selection bias (Randolph, Falbe, Manuel and Balloun, 2014). Logistic regression was used to determine the influence of gender, socioeconomic status, attendance, past academic performance, ethnicity, and assignment to an inclusive classroom on the probability of a general education student scoring proficient on the 2014 New York State Assessments in ELA and Mathematics in grades 6-8. Results indicated that grade 6 - 8 general education students who were not placed in a co-taught inclusive classroom had a greater probability of being proficient on both the 2014 New York State ELA Assessment, 5 to 1 odds, and New York State Mathematics Assessment, 2 to 1 odds.

NCPEA Education Leadership Review of Doctoral Research, Vol. 2, No. 2 – October 2015
ISSN: 1532-0723

Introduction

Federal mandates have led to an increase of inclusion classrooms from grades K-12 throughout the country (Nichols, Dowdy, & Nichols, 2010). At the same time, No Child Left Behind (NCLB) and Race to the Top legislation has placed increased emphasis on high stakes testing. Student performance on high stakes state assessments are now used to evaluate teachers. Poor evaluations for teachers could lead to consequences, including dismissal and restrictions on returning to the profession. Students with disabilities are held to the same standards as their general education peers in the inclusion classroom, as they are responsible for meeting the same state and national standards, as well as being proficient on the same high stakes assessments. As a result, effectively implementing an inclusion model that promotes high academic achievement for all students is of great importance (Murawski & Swanson, 2001).

One model of inclusion used throughout the country is the co-teaching model. The co-teaching model consists of two teachers, one regular education teacher and one special education teacher working together in one classroom as equals to educate students (Dieker & Murawski, 2003). However, the term co-teaching is also used in a more general sense in research to describe a classroom in which one or more teachers share the instructional responsibilities within the classroom (Park, 2014). To distinguish between the two, the model described by Dieker and Murawski will be referred to as the "co-taught inclusive classroom" throughout this paper.

The goal of the co-taught inclusive model is to improve student performance, educational options, and participation of special education students (Mastropieri et al., 2005; Murawski, 2008). Teachers in the co-taught inclusive model use different approaches like: one teach one assist, station teaching, parallel teaching, alternative teaching, and team teaching (Friend & Cook, 1995; Friend, Cook, Chamberlain, & Shamberger, 2010).

The wide use of the co-taught inclusive model raises questions for educators. Is this model the best way to educate ALL students? Analyzing the co-taught inclusive classroom's influence on the academic achievement of general education students can assist in determining whether the model is a viable solution for complying with inclusion legislation mandates.

The Individuals with Disabilities Education Act (IDEA) requires that students with disabilities have access to and be part of the general education curriculum. This amendment to the law in 1990 led to an increase in inclusion classrooms in public schools (Yell, Drasgow, & Lowrey, 2005). Since that time, a large number of empirical studies were conducted on the impact of inclusion on both special education and general education students.

Current and past research shows that students with disabilities can benefit from inclusion both academically and socially if the inclusion program is effectively implemented (Kavale & Forness, 2000). Effective implementation includes appropriate heterogeneous peer grouping. Past research indicates that classroom peers can have an influence on a student's academic achievement (Burke & Sass, 2011). Research indicates that assignment based on ability, known as between-class ability grouping or "tracking" have little impact on high and low ability learners, but can have a negative impact on low achievers because of the stigma and low expectations placed upon them (Slavin, 1987). More recent research supports Slavin's claims. Hoffer (1992) determined that ability grouping has no benefit in either math or science for students, and that in some cases grouping has a negative impact on academic achievement for low groups. Burke and Sass (2011) recommend tracking for high achievers, but make a point to indicate that this policy would not be best for low achievers.

Empirical studies regarding the co-taught inclusive classroom yield similar results to inclusion. These studies indicate that the co-taught inclusive classroom can have a positive impact on academic achievement for special education students (Mastropieri, 2005; Murawski & Murawski, 2006; Swanson, 2001). Murawski and Swanson (2001) conducted a meta-analysis on co-teaching, and determined that in some cases the reading scores of students with disabilities improved in the co-taught inclusive classroom. Murwaski (2006) analyzed impact of the co-taught inclusive classroom on students with learning disabilities in an urban high school in Los Angeles. The data showed that students with learning disabilities achieved at a higher rate in the co-taught classroom then in the mainstreaming or self-contained classroom. Mastropieri (2005) used multiple case studies and determined that the co-taught inclusive classroom can be effective for students with disabilities if certain components for implementation like working relationships, co-planning, and levels of differentiated instruction are met.

There is less clarity regarding inclusion's impact on general education students. In fact, results vary on the impact of inclusion on the academic achievement of general education students (Brady, 2010; Brewton, 2005; Brown, 2015; Daniel & King, 1997; Robinson & Babo, 2014). Some studies identified little impact of the inclusive classroom on academic achievement (Brady 2010; Daniel & King, 1997; Harrison, 2011; McLeod, 2007). Other research indicated that general education students perform better in the co-taught inclusive classroom versus the general education classroom (Riedesel, 1997; Rigdon, 2010). More recent research does indicate that general education students in the inclusive classroom do not perform as well as their peers who are not placed in an inclusive classroom environment on high stakes assessments (Brown, 2015; Parker, 2010; Robinson, 2012).

Problem

While the number of empirical quantitative studies on the influence of inclusion on the academic achievement of general education students grows, mixed results create difficulty in determining whether or not the inclusive environment is beneficial to all students (Brady, 2010; Brewton, 2005; Brown, 2015; Daniel & King, 1997; Robinson & Babo, 2014). Specifically, limited empirical research exists on the impact of the co-taught inclusive model on the academic achievement of general education students (McDuffie et al., 2009). District and school leaders must determine if the co-taught inclusive classroom benefits not only the special education student, but also the general education student. The intent of this study was to increase the existing research and address gaps regarding the co-taught inclusive classroom.

Purpose and Research Question

Consequently, the purpose of this study was to examine the influence of the co-taught inclusive classroom on the academic achievement of general education students on the New York State Assessment for English Language Arts (ELA) and Mathematics in grades 6-8 at a middle school in an upper middle socioeconomic school district located in a suburb of New York City. Additionally, the study examined the influence of other student mutable variables such as gender, socioeconomic status, class attendance, past academic performance, and ethnicity on the dependent variable, which was defined as student achievement on the New York State Assessment in ELA and Mathematics in grades 6-8. The overriding research question addressed in this study was: What is the probability of a grade 6-8 general education student passing the

New York State ELA and Mathematics Assessment based on placement in a co-taught inclusive classroom setting when controlling for gender, socioeconomic status, class attendance, ethnicity, and past academic performance?

Methods

Population and Sample

The participants in this study were selected from a suburban upper middle class P-12 school district located 25 miles from New York City. According to the Census Bureau, the district has 84,187 residents, 29,234 households, and 22,186 families.

The school district has over 9,100 students housed in nine elementary schools, one middle school, and two high schools. For the purposes of this study, the sample population was limited to the one middle school in the district.

The middle school in this school district has approximately 2100 students, with about 700 students in each grade level, 6-8. Students used in this study were (1) general education students in grades 6, 7, or 8, (2) placed in a general education or co-taught inclusive classroom in ELA and/or Mathematics, and (3) received a valid score on the New York State ELA and/or Mathematics Assessments during the 2013-14 school year.

General education students were placed in either general education or co-taught inclusive classrooms prior to the start of the study. Although the primary design can be classified as one that is a non-experimental explanatory relational design, Propensity Score Matching (PSM) was used for the purpose of sampling in order to reduce the influence of selection bias and to simulate a randomized design methodology (Olmos & Govindasamy, 2015). PSM pairs like students in the sample population from the control and the experimental groups, also known as "nearest neighbor matching" (Stone & Tang, 2013). This matching is based on similar characteristics. In the case of this study, the independent variables, gender, socioeconomic status, class attendance, ethnicity, and past academic performance were used to generate a propensity score match by creating a single summary score from a number of covariates for each student in the overall sample. The best matches are then delineated from the overall sample population and a subsample is identified and constructed for use in the quantitative analysis. In this case, the sample identified for the 2014 New York State ELA Assessment was 413 with 207 students considered the experimental group (general education students assigned to inclusive classrooms) and 206 students the control group (general education students NOT assigned to inclusive classrooms). For the 2014 New York State Mathematics Assessment, the sample population included 332 students with 166 considered the experimental group and 166 students in the control group.

Propensity Score Matching (PSM) is a unique sampling device that has been rarely used the field of educational research but more widely used in the field of medicine. However, it has been gaining wider acceptance among social science researchers in recent years since true experimental designs are rarely if ever used for reasons of both ethical considerations and organizational limitations. Researchers have found that the use of PSM has been proven to lead to more stable results and reduce the rate of Type I error in many types of designs associated with social science research because it diminishes the effects of selection bias (Adelson, 2013). In our case, the PSM technique was able to reduce selection bias by 99% for both the ELA and Mathematics assessment analyses.

Results

Binary logistic regression was the primary statistical analyses used to determine the amount of influence the independent variables, gender, SES, attendance, past performance, and placement in a co-taught inclusive ELA & Mathematics classroom had on grade 6-8 general education students who achieved a score of proficiency or advanced proficiency on the 2014 New York State ELA & Mathematics Assessment. Binary logistic regression is used when the dependent variable is dichotomous (Leech, Barrett, & Morgan, 2011). The purpose of this type of analyses is to calculate odds ratios for each of the predictor variables in the regression model for the purposes of providing the probability ratio for the outcome variable occurring, in this case whether a student scored proficient or not proficient on the respective assessment. Typically, only those odds ratios for predictor variables found to be statistically significant contributors to the model are reported; however, all results were reported here to provide transparency. The independent variables were coded as follows: placement in an ELA or Mathematics co-taught inclusive classroom (0= general education classroom, 1= co-taught inclusive classroom), gender (0=male, 1=female), SES (0= no free and reduced lunch, 1=free and reduced lunch), attendance (scale), past performance (scale score from 2013 New York State ELA Assessment). Both dependent variables, 2014 New York State ELA and Mathematics Assessment Proficiency rating, were coded dichotomously (0= not proficient, 1= proficient).

2014 New York State ELA Assessment

The first binary logistic regression performed determined the probability of a grade 6-8 general education student achieving proficiency on the 2014 New York State ELA Assessment when controlling for the influence of gender, SES, attendance, past academic performance (Ela_ 12-13), and placement in a co-taught inclusive ELA classroom (incela). Although the primary variable of interest was placement in a co-taught inclusive ELA classroom the other independent variables previously listed were deemed important control measures due to their potential influence on the dependent variable (Robinson & Babo, 2014). The dependent variable, the 2014 New York State ELA Assessment proficiency score, was coded dichotomously (0= not proficient, 1= proficient).

The fitted model Chi-square test for the logistic regression analysis was statistically significant (χ^2= 200.917, p <.001), thus indicating that the overall fitted model was able to better predict what students were proficient and those who were not proficient on the 2014 New York State ELA Assessment then what might be expected by chance prediction.

The Cox & Snell and the Nagelkerke statistics, which provide "pseudo" R^2 estimates for the model, were .385 and .514, respectively. These values give a rough estimate of the variance that can be predicted from the combination of independent/predictor variables used in the model with the Cox & Snell statistic being the more conservative estimate of the two (Leech, Barrett, & Morgan, 2011). These two values indicated that approximately 38.5% to 51.4% of the variance of whether students scored proficient on the 2014 New York State ELA Assessment can be predicted from the combination of predictor variables used in the model.

Table 1 presents the findings of the binary logistic regression analysis. Only two variables, placement in a co-taught ELA inclusive classroom (incela) and past performance (Ela_12-13) were found to be statistically significant predictors in the model. In order to make the interpretation easier to understand the dichotomous coding for the predictor variable

placement in a co-taught ELA inclusive classroom (incela) was reversed for the purposes of this logistic regression analysis.

The strongest predictor of proficiency on the 2014 New York State ELA Assessment was placement in a co-taught ELA inclusive classroom (incela), which had an odds ratio of 5.456 (5.5) to 1, (95% CI= 3.169-9.393). This means that general education students who were NOT placed in a co-taught ELA inclusive classroom had 5.5 to 1 greater chance, or 454% increase in the probability of scoring proficient on the 2014 New York State ELA Assessment than general education students who were placed in a co-taught inclusive classroom.

Additionally, past performance as measured by the student's performance on the 2013 New York State ELA assessment was also found to be a statistically significant predictor variable in the model. A one unit increase in a student's 2013 New York State ELA assessment score would equate to an increase in odds of 1.1 (1.095) to 1 or a 10% increase in the probability of the student scoring proficient on the 2014 New York State ELA assessment.

Table 1

Logistic Regression Analysis: Proficiency on 2014 New York State ELA Assessment

Predictor Variables	B	Wald Chi-square	P	Exp(B)* Odds Ratio	Lower	Upper
incela(1)	1.697	37.469	<.001	5.456	3.169	9.393
gender	-.291	1.265	.261	.748	.450	1.241
ses	-.144	.075	.784	.866	.310	2.418
attendance	-.005	.096	.757	.995	.964	1.027
Ela_12-13	.091	89.016	<.001	1.095	1.074	1.116
Constant	-29.371	90.399	<.001	.000		

Based on this analysis, placement in a co-taught inclusive classroom setting for ELA has a statistically significant influence on the probability of grade 6-8 general education students passing the 2014 New York State ELA Assessment when controlling for gender, SES, attendance, and past academic performance. General education students NOT placed in an ELA inclusive classroom setting had a significantly higher probability (5 to 1) of passing the 2014 New York State ELA Assessment than those placed in an inclusive classroom.

2014 New York State Mathematics Assessment

The second binary logistic regression performed determined the probability of a grade 6-8 general education student achieving proficiency on the 2014 New York State Mathematics Assessment when controlling for the influence of gender, SES, attendance, past academic performance (Math_ 12-13), and placement in a co-taught inclusive Mathematics classroom (incmath). Although the primary variable of interest was placement in a co-taught inclusive Mathematics classroom the other independent variables previously listed were deemed important control measures due to their potential influence on the dependent variable (Robinson & Babo, 2014). The dependent variable, the 2014 New York State Mathematics Assessment proficiency score, was coded dichotomously (0= not proficient, 1= proficient).

The fitted model Chi-square test for the logistic regression analysis was statistically significant (χ^2= 119.310, p <.001), thus indicating that the overall fitted model was able to better

predict what students were proficient and those who were not proficient on the 2014 New York State Mathematics Assessment then what might occur if predicted by chance.

The Cox & Snell and the Nagelkerke statistics, which provide "pseudo" R^2 estimates for the model, were .301 and .437, respectively. These values give a rough estimate of the variance that can be predicted from the combination of independent/predictor variables used in the model with the Cox & Snell statistic being the more conservative estimate of the two (Leech, Barrett, & Morgan, 2011) These two values indicate that approximately 30.1% to 43.7% of the variance of whether a student scored proficient on the 2014 New York State Mathematics Assessment can be predicted from the combination of predictor variables used in the model.

Table 2 presents the findings of the binary logistic regression analysis. Only two (2) variables, placement in a co-taught Mathematics inclusive classroom (incmath) and past academic performance (Math_12-13) were significant. Past academic performance was measured using the 2013 New York State Mathematics Assessment. In order to make the interpretation easier to understand the dichotomous coding for placement in a co-taught Mathematics inclusive classroom (incmath) was reversed for the purposes of this logistic regression analysis.

The strongest predictor of proficiency on the 2014 New York State Mathematics Assessment was placement in a co-taught Mathematics inclusive classroom (incmath), which had an odds ratio of 1.921 to 1, (95% CI= 1.039-3.552). This means that general education students NOT placed in a co-taught Mathematics inclusive classroom had almost a 2 to 1 greater chance, or a 92% increase in the probability of scoring proficient on the 2014 New York State Mathematics Assessment than did general education students who were placed in a co-taught inclusive classroom.

Additionally, past performance as measured by the student's performance on the 2013 New York State Mathematics assessment was also found to be a statistically significant predictor variable in the model. A one unit increase in a student's 2013 New York State Math assessment score would equate to an increase in odds of 1.1 to 1 or a 10% increase in the probability of the student scoring proficient on the 2014 New York State Mathematics assessment.

Table 2
Logistic Regression Analysis: Proficiency on 2014 New York State Mathematics Assessment

Predictor Variables	B	Wald Chi-square	P	Exp(B)* Odds Ratio	Lower	Upper
incmath(1)	.653	4.332	<.037	1.921	1.039	3.552
gender	.394	1.643	.200	1.483	.812	2.711
ses	-.115	.065	.799	.891	.367	2.164
attendance	-.009	.159	.690	.991	.950	1.035
Math_12-13	.096	56.413	<.001	1.100	1.073	1.128
Constant	-30.681	60.684	<.001	.000		

Based on this analysis, placement in a co-taught Mathematics inclusive classroom setting has a statistically significant influence on the probability of grade 6-8 general education student passing the 2014 New York State Mathematics Assessment when controlling for gender, SES, attendance, and past academic performance. General education students NOT placed in an

inclusive classroom setting have significantly higher probability (2 to 1) of passing the 2014 New York State Mathematics Assessment than those placed in an inclusive classroom.

Conclusions and Recommendations

Results of this study indicated that placement in a co-taught inclusive classroom had a statistically significant negative influence on the performance of grade 6-8 general education students on both the 2014 New York State ELA Assessment and 2014 New York State Mathematics Assessment. Grade 6-8 general education students who were NOT placed in a co-taught inclusive classroom had a greater probability of being proficient on both the 2014 New York State ELA Assessment, 5 to 1 odds, and the New York State Mathematics Assessment, 2 to 1 odds.

Evidence is mounting that inclusion influences the academic performance on general education students as well as special education students, in fact, increasingly results like those posited here seem to suggest a negative influence on general education students (Robinson, 2012; Brown, 2015). This impact on general education students must be further explored and evaluated, as the co-taught inclusive classroom may not be the best placement for ALL general education students.

The practice of inclusion, especially the co-taught inclusive model, continues to grow nation-wide (Murawski, 2012). Some research indicates that the co-taught inclusive model can have a positive impact on the academic achievement of general education students (Riedesel, 1997; Rigdon, 2010) but point to the importance of proper implementation including professional development, adequate common planning time for teachers to collaborate, and careful selection of teacher participants in the model. Other studies have found conflicting results indicating potentially negative effects on general education students assigned to inclusive settings, such as what we discovered here in one upper middle class suburban New York school district (Brown, 2015; Robinson, 2012; Robinson & Babo, 2014). Consequently, these conflicting findings necessitate the need for school leaders to evaluate the specific co-taught inclusive model in their own setting to determine its overall efficacy for all students.

Implications for School Leaders

School district and building leaders need to be sure to follow the guidelines developed by Friend and Cook (1995) on the proper implementation of the co-taught inclusive model. This includes providing professional development on the various co-taught approaches and how to assist co-teachers in defining their roles. Leadership must also determine if teachers are the "right fit" by analyzing teacher perceptions of the co-taught inclusive model (Isherwood & Barger-Anderson, 2008). Combining these components with an equitably and properly selected heterogeneous student population for participation in an inclusive model might ensure a more adequately distributed level of student achievement for all students assigned to co-taught inclusive classrooms (Robinson & Babo, 2014).

Determining the "right fit" can be difficult, especially since scheduling may require teachers to co-teach without volunteering for the job. Murawski (2008) suggests that administrators can improve their chances of creating an ideal "professional marriage" by sending out surveys, allowing teachers to choose their co-teaching partner, and following similar

guidelines as Friend and Cook (1995) including providing adequate common planning time and professional development on the co-taught inclusive model.

One important suggestion would be for schools to examine scheduling and the process for which students are recommended and selected in the co-taught inclusive classroom. Creating homogenous groupings of low achieving students, both general education and special education can lead to poor academic performance (Slavin, 1987). Therefore, administrators should not overload their co-taught inclusive classrooms, or any of their classrooms for that matter, with too many low achieving students. A balance of high and low achieving students can promote greater achievement among the struggling learners in the classroom (Burke & Sass, 2011).

In closing, the results reported here suggest that at the very least, school and district leaders craft a well-developed implementation strategy when attempting to employ the co-taught inclusive model in their building(s), which includes being cognizant of teacher selection, and developing sustainability through common planning time. Failure to take these factors into consideration, along with the importance of student selection and assignment to co-taught inclusive classrooms, could lead to a flawed inclusive model design and possibly negatively influence the academic performance of all students.

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