

# THE INFLUENCE OF STUDENTS WITH SPECIAL NEEDS INCLUDED IN GRADE-3 CLASSROOMS ON THE LARGE-SCALE ACHIEVEMENT SCORES OF STUDENTS WITHOUT SPECIAL NEEDS

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This study investigates the relationship between the number of students with special needs (designated as exceptional or receiving special education services) in grade-3 classrooms in 1997-1998 and their achievement scores in reading, writing, and mathematics on Ontario's provincial assessment with their peers without special needs. When the variance due to differences in class size and socio-economic status was removed, the correlations between the number of students with special needs and the average class achievement scores were slightly, but significantly, positive (.05 to .07), suggesting that the presence of students with special needs does not adversely affect achievement of other students.

Key words: special education, disabilities, elementary education, inclusive schools

Cette étude porte sur la relation entre le nombre d'élèves ayant des besoins particuliers (désignés comme des élèves en difficulté) dans des classes de 3<sup>e</sup> année en 1997-1998 et leurs résultats scolaires en lecture, en écriture et en mathématiques dans les examens provinciaux de l'Ontario si on les compare à leurs camarades de classe n'ayant pas de difficultés particulières. Lorsque la variance due à la taille de la classe et au statut socio-économique est supprimée, les corrélations entre le nombre d'élèves ayant des besoins spéciaux et chaque score de rendement moyen des classes étaient légèrement mais significativement positive (0,05 à 0,07), ce qui donne à penser que la présence d'élèves ayant des besoins spéciaux n'affecte pas la performance des autres élèves.

Mots clés : éducation de l'enfance en difficulté, déficiences, études primaires, écoles inclusives

A persistent issue in the debate about the inclusion of students with special needs in general education classrooms concerns whether the presence of students with special needs has a negative effect on the academic growth of students without special needs, and on the resources and instructional quality available to students without special needs (Galis & Tanner, 1995; Peck, Carlson, & Helmsetter, 1992; Peltier, 1997; York, 1995). One assertion that is made is that the presence of students with special needs detracts from the instructional time that teachers provide to students without special needs. Although various studies have examined the influence of the inclusion of students with special needs in general education classrooms, most have been limited in scope by the small number of students or classrooms studied, often in the context of small-scale experiments in inclusion, or by failure to control for class size and socio-economic status. The purpose of this study was to extend the previous research, using data collected by Ontario's provincial assessment program for grade-3 students in 1997-1998, to investigate the influence of the number of students with special needs per class on the large-scale achievement scores of students without special needs, while controlling for class size and socio-economic status.

In the literature, the terms *students with disabilities* or *exceptional students* are frequently used to designate students who have been deemed to have a disability that affects their learning. When citing such studies, we will preserve the term used in each study. When discussing the data set of the current study, however, we use the term *students with special needs* to indicate a broader population than is typically the case, consisting of students both formally designated as exceptional and those receiving special education programs and services through an Individual Educational Plan (IEP).

#### REVIEW OF RESEARCH

Kalambouka, Farrell, Dyson, and Kaplan (2005) reviewed 26 studies to address the question: What evidence is there that the inclusiveness of schools affects the outcomes for the students without special needs in those schools? Eleven of the studies assigned students to classes and 15 studied pre-assigned classes. Almost all were conducted with elementary students. Twenty-one studies concentrated on academic

achievement outcomes, while five focused on social outcomes. Kalambouka et al. report that, of 40 findings, more than half (53 per cent) indicated no effects of inclusion and nine (23 per cent) indicated a positive effect, with the remainder reporting negative or mixed effects.

Sharpe, York, and Knight (1994) compared the standardized test scores and report card grades of students without disabilities in inclusive and non-inclusive classrooms in one rural Minnesota elementary school. The standardized test scores and most of the report card grades of the two groups were not significantly different. The report card grades in reading were significantly different, but the authors suggest that this finding may have been a statistical artifact.

Huber, Rosenfeld, and Fiorello (2001) examined the effect on reading and mathematics achievement of elementary students without disabilities in classes in which students with a variety of disabilities were included. They compared the achievement results of these students with those of students in non-inclusive classes. They found no differences in the achievement of the two groups of students without disabilities.

Hunt, Staub, Alwell, and Goetz (1994) studied three students with severe disabilities, each assigned to a separate cooperative learning group. They compared the performance on teacher-made tests of the other students in the groups with students in three comparison groups that did not include students with disabilities. They concluded that the presence of students with disabilities did not affect the achievement of the students without disabilities, who performed as well as their peers in the control groups.

In Canada, Saint Laurent, Dionne, Giasson, Royer, Simard, and Pierard (1998) examined the scores on provincial assessments in reading, writing, and mathematics of students without disabilities in 26 grade-3 classes. This study compared classes that were part of a program that fully integrated students at educational risk (those whom the school had identified as special education students, had been retained in a grade, performed in the lowest 3 per cent on standardized tests, or received low ratings of ability from teachers) with classes that included students with disabilities but were not part of the program. The comparison did not find significant differences between the sets of classes.

Cawley, Hayden, Cade, and Baker-Kroczyński (2002) found no effects of the presence of students with problem behaviors on the achievement or behavior of students without disabilities in junior high school science classes. In science classes at the secondary level, Mastropieri, Scruggs, Mantzicopoulos, Sturgeon, Goodwin, and Chung (1998) also found no effects of inclusion, although interpretation of their findings is complicated by differences in the type of instruction across classes.

One British study has used large-scale assessment data to investigate the influence of inclusion on academic achievement at both elementary and secondary levels. Dyson, Farrell, Polat, Hutcheson, and Gallannaugh (2004) found no evidence of a relationship between inclusion and achievement at the school board level. They found a very small negative relationship between inclusion and achievement at the school level, with a slightly stronger negative effect at the secondary than the elementary level. They note, however, that the possibility of a causal relationship seems unlikely. Dyson et al. further compared schools in which inclusion was associated with overall increased achievement levels with schools without increased achievement, to see what factors distinguished them. The results suggest that the highly inclusive and higher-performing schools used flexible groupings of students, tailored programs to meet the needs of individual students, monitored the achievement of individual students, and had school-wide strategies for raising achievement.

#### *Other Influences on Student Achievement*

Research on the effect of the presence of students with special needs in the general education classroom on the achievement of students without special needs in those classrooms is complicated by the effects of socioeconomic status (SES) and class size (Abbott, Joireman, & Stroh, 2002; Achilles, Finn, & Bain, 1998; Caldas & Bankston, 1997). Separating these effects is problematic because identification of students with special needs in some jurisdictions varies with SES and some schools may selectively place students with special needs and/or may set class size based on the number of students with special needs in each class.

Cawley, Parmar, Foley, Salmon, and Roy (2001) studied the effect of SES in three different U.S. locations on the arithmetic performance of students with and without disabilities enrolled in school districts with high and low socio-economic characteristics. They concluded that "the element of socioeconomic status may have a more positive or negative effect than disability status does" (p. 327). Fujiura and Yamaki (2000) agree that "covariation of poverty and disability is well established" (p. 187). Rossi, Herting, and Wolman (1997), examining data from the U.S.'s National Education Longitudinal Study of 1988, reported that a large percentage of teacher-identified students with disabilities came from lower socio-economic quartiles. The influence of socio-economic status on student achievement may also depend on such factors as school size, school location, and length of time in poverty (Abbott, et al., 2002; Caldas & Bankston, 1997; Johnson, Howley, & Howley, 2002; McLoyd, 1998).

Like SES, class size has been considered as a contributor to student achievement. Although class-size studies seem to have influenced policymakers to reduce class sizes (Achilles, et al., 1998; Finn & Achilles, 1999), their validity and generalizability have been questioned (Goldstein, 2000; Hanushek, 1998). Studies of the effect of class size on achievement continue to present mixed results, with some studies indicating advantages of small classes, especially for students who are educationally disadvantaged, while others conclude that reduction in class size does not necessarily lead to achievement gains (Biddle & Berliner, 2002; Hall, 2002).

Other possible influences on students' academic achievement have also been studied. For example, Jordan and Stanovich (2001) examined Canadian teachers' assumptions and beliefs about inclusion, and how these related to the quality of teaching practices. They showed that, in schools where teachers believed they had a responsibility to work with students with disabilities included in their classrooms, the quality of instruction was higher. Such teachers were more likely to use effective instructional strategies that engaged all their students, compared to teachers without such beliefs. Indeed, Dyson, Polat, and Farrell (2004) showed that British schools with staff who valued both inclusion and academic achievement produced students with higher average

achievement scores, whether or not the students had special education needs.

#### *Identification of Students in Ontario with Disabilities*

In Ontario, students with disabilities may be formally identified by an Identification, Placement, and Review Committee (IPRC) as being exceptional and as requiring placement with special education support. Exceptional students are usually designated as belonging in one of five categories (behavioural, communicational, intellectual, physical, or multiple) prescribed in the Education Act. At the time of this study, students identified as exceptional may have been eligible for specialized per-pupil funding to receive additional resources and support for at least part of the school day. Ontario legislation states that the regular classroom should be considered first when placing students with disabilities.

Provincial legislation also provides for an alternative to formal identification by an IPRC: Schools can develop an Individual Educational Plan for students, through which special education programs and services are to be delivered. The IEP may specify accommodations and curriculum modifications. It typically prescribes programs and services delivered by special education personnel in the general education classroom or outside the classroom.

Each of the 78 school boards in Ontario sets its own process for delivering special educational services; consequently, boards vary widely in the proportions of students formally identified through an IPRC or served through an IEP alone. In some boards, very few students are formally designated as exceptional, although many receive special education support through an IEP, while in other school systems, formal designation by an IPRC is a prerequisite to developing an IEP.

#### METHOD

In this study we examine the effect of the number of students with special needs per class on the large-scale achievement scores of students without special needs in single-grade (i.e., not split-grade), grade-3 classes, while controlling for SES and class size. Because of the wide variation among school boards in how they administer requirements for

formal and informal identification of students, and the nature of how schools identify such students when returning the provincial assessment materials, as described in detail below, both those students who were reported as having been formally identified by an Identification, Placement, and Review Committee and those reported as receiving special education support through an Individual Education Program are considered to be students with special needs for the purposes of this study.

#### *Measurement of Student Achievement*

Ontario's Ministry of Education requires standardized testing of elementary students in grades 3 and 6 in reading, writing, and mathematics. These assessments are developed by the Education Quality and Accountability Office (EQAO), which is funded by the Ministry of Education. The grade-3 assessment contains both multiple-choice and constructed-response items that are developed by Ontario teachers and EQAO staff and are based on the Ontario curriculum. For the 1997-1998 academic year, the grade-3 assessment was administered over a five-day period with three hours of testing each day. The completed assessments were returned to EQAO, where they were marked by Ontario teachers trained by EQAO to use standard rubrics. Results were reported on a four-point scale, with 3 representing the provincial standard. Reliability checks of the scoring process were conducted during the marking. The reliability data, however, were not available to the researchers.

#### *Participants*

*Exempted students.* All Ontario students registered in grade 3 were required to take part in the provincial assessment, unless granted exemptions. Exemptions could be offered "if the full range of permitted accommodations has been considered and it is determined that the student still would not be able to provide evidence of learning under these conditions" (EQAO, 1997). Students who were exempted did not participate in one or more of the three parts of the assessment (reading, writing, or mathematics); teachers reported this information on the class lists returned to EQAO with the assessment materials. These students were, however, included in the class size data. In 1997-8, approximately

16 per cent of all students in grade 3 were exempted from one or more parts of the test.

*Students with special needs.* In this study, students with special needs were those students taking one or more of the three parts (reading, writing, or mathematics) of the provincial grade-3 assessment in the spring of 1998 whom their teachers had designated as exceptional on the class lists for the EQAO test and who qualified for special education support. According to EQAO's guidelines, "a student who has been identified through an Identification, Placement, and Review Committee process – or even one who has not been formally identified but who has special needs – may be considered for accommodations" (EQAO, 1997). According to EQAO's guidelines, allowable accommodations included additional time and assistance in recording responses. When returning the completed assessment materials, teachers reported which students received accommodations. Of the students participating in the assessment or exempted and for whom this information was available, about nine per cent were formally identified as exceptional (not including gifted) and 12 per cent were not formally identified but their teachers designated them as having special needs that resulted in accommodations during the assessment. Because the proportions of students identified formally or simply having IEPs varied considerably from one school board to another. For this study we considered both groups to be students with special needs.

The number of students with special needs per class was the number of students who met the definition of "students with special needs" as described in EQAO's guidelines and were not receiving ESL services, in programs for the gifted, or in French immersion programs. This count of students with special needs for each class is used in the analyses.

Students without special needs were those taking the assessment who did not meet the definition for students with special needs and were not receiving ESL services, in programs for the gifted, or in French immersion programs. The achievement results on the assessment for only the students without special needs in each class were included in the class averages for reading, writing, and mathematics.

*Single- vs. split-grade classes.* In 1997-1998, teachers reported that 128,160 students in 6,838 classes took part in or were exempted from the



grade-3 assessment. About half (51.6 per cent) of those classes were split-grade 2/3 or 3/4. Because the provincial testing was only at grade 3, data were not available about the grade-2 and grade-4 students in those classes; consequently, it was not possible to determine either the number of students with special needs or the class size for the split-grade classes. Split-grade classes were, therefore, not included in this study, leaving about 3,300 single-grade (grade 3 only) classes. About a third of these classes could not be included because of missing data, leaving 2,162 grade-3 classes with adequate data.

*Class size.* Each teacher returned the assessments completed by his or her students, together with a list of students who were exempted. The class size was the number of assessments completed plus the number of students exempted. Class size for grade-3 classes ranged from six to 37 students. The stability of class average achievement scores was analyzed using confidence limits. Due to the large variability around the class averages for the 10 classes of 1-15 students, these classes were dropped from the sample set, leaving 2,152 single-grade classes with 16 or more students.

*Inclusive classrooms.* Because the purpose of this study is to examine the influence of the presence of students with special needs on the achievement of students without special needs, it is important to consider the ratio of students with special needs to students without special needs. Rodriguez and Romaneck (2002) noted that in "a best-practices classroom, the percentage of students with special needs should mirror the natural proportions of the school" (p. 4). They suggested that, if the ratio exceeds one special education student to three typically achieving students, the classroom might be characterized as a special education classroom. Because a review of the literature did not yield a definitive maximum proportion of students with special needs (especially when students with special needs are defined as in this study), a more liberal limit of one-third of the class (or, for classes larger than 30, 10 students) was used. There were 179 classes in which the proportion of students with special needs in the class exceeded 0.33 or the number exceeded 10. These classes were dropped from the analyses, leaving 1,973 classes. Of these classes, 80 (4.1 per cent) had between 16 and 20 students, 709 (35.9 per cent) had 21 to 25 students, 972 (49.3 per

cent) had 26 to 30 students, and 212 (10.7 per cent) had more than 30 students (the largest class had 37 students).

#### *Socio-Economic Status*

The socio-economic status of each school was obtained from the 1996 Statistics Canada Census (Statistics Canada, 1997). The average income of families living within the postal code of the school was computed. Because the average family income variable was positively skewed, for the analyses, the SES variable is the natural logarithm of the average income.

#### *Analyses*

We computed means and standard deviations for each achievement variable (class average reading, writing, and mathematics scores) and for the number of students with special needs in each class, class size, and the SES of the school. Correlations among the variables were computed, as were the partial correlations between the achievement variables and the number of students with special needs, controlling for class size and SES. We used regression analyses to determine the proportion of variance in each achievement variable that could be jointly accounted for by the number of students with special needs, class size, and SES.

## RESULTS

The class average writing scores had the highest mean ( $M = 2.68$ ,  $SD = 0.28$ ), but smallest range (1.78 to 3.62). The class average mathematics scores had the lowest mean ( $M = 2.52$ ,  $SD = 0.38$ ) and the largest range (1.40 to 4.00). The class average reading scores had a mean of 2.60 ( $SD = 0.31$ ) and range of 1.50 to 3.84. The number of students with special needs per class ranged from 0 to 10, with a mean of 4.06 and standard deviation of 2.28 (as described in the preceding section, classes in which more than one-third of the students had special needs were removed from the sample). The class size ranged from 16 to 37, with a mean of 26.31 and standard deviation of 3.35. The SES variable (the natural log of the average family income for the postal code in which the school was located) ranged from 9.80 to 12.48, with mean of 10.97 and standard deviation of 0.32.

Table 1 presents the correlations among the variables. The zero-order correlations among the achievement scores are uniformly high: between .636 and .795. The correlations between the number of students with special needs in each class and the class average reading, writing, and mathematics scores are very small (-.032 to .010) and not statistically significant. Class size is negatively correlated with all three scores, but only the correlation with the class average mathematics score (-.057) is statistically significant. However, although this correlation is statistically significant, the percentage of the variance in the mathematics achievement score accounted for by class size is only 0.3 per cent ( $R^2 = .003$ ). Not surprisingly, the SES variable is significantly correlated with the achievement variables, with correlations ranging from .187 for mathematics to .284 for writing. In summary, the zero-order correlations with the achievement scores suggest that higher class average scores accompany higher socio-economic status and that, for mathematics, larger class sizes accompany slightly lower achievement scores.

Table 1  
Correlations Among Variables

Variables	Class Average Reading Scores	Class Average Writing Scores	Class Average Mathematics Scores	Number of Students with Special Needs per Class	Class Size
<i>Zero-Order Correlations</i>					
Class Average Reading Scores					
Class Average Writing Scores	.731**				
Class Average Mathematics Scores	.795**	.636**			

*Table 1 (continued)*  
*Correlations Among Variables*

Number of Students with Special Needs per Class	-.024	-.032	.010		
Class Size	-.032	-.016	-.057*	.213**	
Socio-economic Status	.264**	.284**	.187**	-.158**	.159**
<i>Partial Correlations, Controlling for Class Size and Socio-economic Status</i>					
Class Average Reading Scores					
Class Average Writing Scores	.707**				
Class Average Mathematics Scores	.786**	.618**			
Number of Students with Special Needs per Class	.052*	.052*	.074**		

Note.  $N = 1973$ .

\*  $p < .05$ . \*\*  $p < .01$ .

The correlation between the number of students with special needs in a class and the class size (.213) is positive and significant. More surprisingly, class size and SES are positively and significantly correlated (.159), meaning that schools located in postal codes with higher average household incomes had somewhat larger classes. The correlation of the number of students with special needs with SES (-.158) was negative and statistically significant.

The above results illustrating the relationship between achievement and SES, in particular, do not allow us to separate the effect of the number of students with special needs in a classroom from the effects of SES and class size. What is the relationship between the number of students with special needs per class and the achievement scores, when controlling for class size and SES? To answer this question, we computed partial correlations. When the variance in achievement scores due to differences in class size and SES is removed, the relationships between the number of students with special needs and the achievement scores are small, but positive and statistically significant, ranging from .052 to .074. In other words, when these other sources of variance are controlled, students without special needs perform slightly better as the number of students with special needs in their classes increase. The amount of variance in the achievement scores accounted for by the number of students with special needs, when the other sources are controlled, is about 0.3 per cent ( $R^2 = .003$ ) for reading and writing and 0.5 per cent ( $R^2 = .005$ ) for mathematics.

How much of the variance in the class average achievement scores could we account for if we combined the number of students with special needs with class size and SES? The regression of the class average reading scores on these three variables accounted for 7.7 per cent of the variance ( $R^2 = .077$ ). For writing, the percentage of variance accounted for was 8.5 per cent ( $R^2 = .085$ ); for mathematics, 4.7 per cent ( $R^2 = .047$ ).

## DISCUSSION

The central question of this study was whether the number of students with special needs in grade-3 classrooms has an effect on the academic achievement of students without special needs. The results provide empirical evidence supporting previous findings that the performance of students without special needs educated in single-grade, inclusive, grade-3 classrooms seems not to be compromised by the number of students with special needs in the classroom, taking into consideration class size and the socio-economic status of the school. Overall, the evidence refutes the widely-held belief that the number of students with disabilities who are present in classrooms adversely affects the academic achievement of students without disabilities. This finding holds despite

the fact that the number of students with special needs comprised up to one third of the total class size in the classes studied.

The ideal class size has been the topic of extensive research. The results of this study indicate that class size, in combination with other factors, does contribute to predicting the achievement of students without special needs. However, its effect is small when compared to the effect of socio-economic status.

The dataset had a number of limitations. The assessment administered to Ontario grade-3 students in the spring of 1998 was only the second such assessment and was based on *The Ontario Curriculum, Grades 1 – 8*, introduced in September of 1997. The teachers had less than one school year to develop classroom programs that incorporated the new curriculum before their students were assessed (EQAO, 1998). Also, the grade-3 students participating in the assessment had not had the benefit of working towards the grade-1 and grade-2 expectations of the new curriculum.

The policies of EQAO regarding accommodations and exemptions were similarly in their earliest stages of implementation. Therefore, teachers may have interpreted them with more latitude than was intended. The granting of accommodations might bring into question the validity of the inferences made from the test results. The greatest number of accommodations was offered in mathematics, while the greatest number of exemptions was in reading.

As noted above, special education legislation in Ontario endorses inclusion for students with special needs in the regular classroom by requiring that this placement be given first consideration when a decision is made about where to place a student identified as exceptional. Weber and Bennett (1999) note that, in Ontario, an exceptional student is considered to be a full-time student for administrative purposes. All students in this data set were registered as members of their grade-3 classrooms. However, special education services may be provided in a range of settings, which include total inclusion in a regular classroom, part-time regular classroom instruction with withdrawal for resource support, or even placement in a special education classroom for the majority of the school day. The practices of schools may vary in placing students with special education needs on a

regular class register, particularly for students with complex or severe disabilities. This information was not available for this study. The inferences made about the inclusion of students with special needs in general education classrooms must be interpreted with caution because the extent to which these students were included for instructional purposes will have varied from school to school, and from one school board to another.

The amount of variance explained by all the predictor variables together was relatively small. This suggests that more important variables affect academic achievement that have not been taken into account in this study. Inclusive education has long been resisted by some sectors of the education system on the grounds that it reduces the opportunities for students without disabilities to learn, in part by making the teacher less accessible to them. This argument hinges on the assumption that effective teachers focus on those students who will be successful. It implies that teachers gear their teaching to a homogeneous group representing the average and above average students in the class, and that the introduction of students with achievement levels well below this average will reduce the effectiveness of the teacher. Yet, recently there has been some suggestion that the quality of teaching is increased when teachers are skilled at meeting diverse needs. Dyson et al. (2004) observed that British schools with teaching staff who collectively valued inclusion were able to raise the achievement levels of all their students. Jordan and Stanovich (2004) also showed that teaching techniques that meet a diversity of needs result in high levels of student engagement, leading to higher academic self concept and achievement in students both with and without disabilities. As a result, Stanovich and Jordan (2004) claim that inclusive education is an effective form of professional development for teachers by expanding their repertoire of instructional skills to the benefit of all students in the class. These studies, coupled with the results reported here, suggest that the link between the inclusion of students with special education needs and the achievement of their peers without special needs is influenced in part by the effectiveness of teachers, and is not directly the result of class size and the placement of students with special needs in the class. This possibility

could serve as a starting point for further exploration of the variables that interact to affect student achievement in inclusive classrooms.

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