

**THE EFFECTS OF SCHOOL TYPE ON  
ACADEMIC PERFORMANCE-EVIDENCE  
FROM THE SECONDARY ENTRANCE  
ASSESSMENT EXAM IN TRINIDAD**

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## **Abstract**

There is a common perception that private schools achieve higher than public schools. However, recent studies have found that the performance disparity between school types can be accounted for by differences in the population of students attending the different types of schools. Using raw data from the 2015 Secondary Entrance Assessment exam, this paper estimates the effect on academic achievement in Trinidad as a result of attending privately managed public primary schools (assisted schools) relative to traditional public schools (government schools). Controlling for demographic, personnel and administrative differences, the analysis finds no meaningful difference in academic achievement between students in assisted schools versus students in government schools.

**Keywords:** Secondary Entrance Assessment Exam; school type; school denomination; student achievement; performance disparity; performance gap.

## Introduction

Every year since 2001 students in standard five (grade 5) across Trinidad and Tobago have taken the Secondary Entrance Assessment (SEA) exam, the results of which determine the secondary school a student will be assigned to. The 2015 iteration of the exam comprised of two components: 1) A Continuous Assessment Component (weighted 40%) in six subjects<sup>1</sup> administered over the course of standard four and standard five and 2) A final assessment (weighted 60%) in English Language Arts and Mathematics completed under standardized examination conditions on a day (usually in May) designated by the Ministry of Education. The Ministry of Education uses a complex algorithm incorporating SEA scores and school choices to assign students to secondary schools. This mechanism creates a test score “cut-off for each school such that applicants to that school with scores just above the cut-off are admitted while those with scores just below are not admitted” (Beuermann, Jackson & Sierra, 2015, p.10)

Certain patterns of performance have been identified by the Ministry of Education (MOE) and by independent observers. Firstly, girls were found to be outperforming boys in each section of the exam. Furthermore, there is evidence indicating that students attending all-female primary schools have a statistically significant advantage in assessments over those who attend co-educational and all-male schools (George et al, 2009). Secondly, rural schools and inner city schools generally score below the means of their urban<sup>2</sup> counterparts. This differential is compounded in the North Eastern and Port of Spain Districts (George et al, 2009). Lastly,

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<sup>1</sup> The CAC subjects include English Language Arts (ELA) Writing, Character and Citizenship Education (CCE), Science, Visual and Performing Arts (VAPA), Physical Education (PE) and Agricultural Science. Teachers in the respective primary schools grade the CAC while the Caribbean Examinations Council (CXC) marks the final assessment.

<sup>2</sup> Inner city refers to the lower-income residential districts in the city center and nearby areas whereas urban areas are locations characterized by human population density and built up environments in comparison to the areas surrounding it.

students in assisted schools—public schools administered jointly by the Ministry of Education and their respective denominational boards—seem to be outperforming students in government schools—public schools wholly owned by the government (*Education Act of 1966*, 2013). For instance in 2012, government schools accounted for 12% of the top 200 students while 75% came from assisted schools (“Top 200 SEA students 2012”, 2012). Two years later government schools accounted for only 7% of the top 200 students even though it had the highest enrollment in the exam at 30% (“What makes a school successful?” 2014).

I am particularly interested in this third pattern because it directly addresses a long-standing debate about the effects of school type on academic performance. In this study, I demonstrate that 1) school type has no meaningful effect on academic performance when selected characteristics of schools, students and geography are accounted for; 2) demographics variables best explain achievement differentials between school types and; 3) teacher characteristics have negligible effects on student performance. This study is an important milestone for education research in Trinidad because it provides a basis for the scientific study of the relationship between school type and academic performance in the country (which is currently lacking) and it recommends more grounded policy strategies than those currently employed to improve student performance. It also has general significance since it provides a Caribbean perspective on the relationship between school type and academic achievement and contributes to the wider body of literature on the topic.

## **Previous Research**

There is a large and growing body of work that investigates the factors that affect student achievement. Below is a brief overview of some the important studies in the area.

### School Type

Major research into the effects of school type on academic performance has been ongoing since the eighties but the amalgamated results have been far from conclusive. In a landmark study, James Coleman and his colleagues found that students in private schools outperform students in public schools (Coleman & Hoffer, 1987; Coleman et al., 1981, 1982; Bryk, Lee & Holland, 1993). Examining National Education Longitudinal Study (NELS) data a decade later was Dan Goldhaber (1996) who found that there was no private school effect (i.e. achievement advantages from attending private school) once the economic background for the students in the separate schools were accounted for.

Further complicating this discussion is the question of how different *types* of public schools (i.e. traditional public schools vs. privately managed publically schools, also called charter schools in the U.S) affect performance. Results on this front have also been mixed. An American Federation Teachers report indicated that public schools were outperforming charter schools (Nelson et al., 2004; Schemo, 2004). However in the same year, Caroline Hoxby found that charter school status had a positive effect on academic achievement, with students in these schools scoring higher in Math and Reading proficiency than their public school counterparts (Hoxby 2004a, 2004b). In an attempt to coalesce decades of research, Sarah and Christopher Lubienski adopted hierarchal linear modeling to examine the effects of school type across private, public and charter schools. Their data revealed a reversal of the private school effect

with public schools outperforming charter and public schools when demographic and location factors (C. Lubienski & S. Lubienski 2006) were accounted for.

Together these studies paint an indistinct picture of the impact of school type on academic performance. However, what they successful do is highlight the necessity of controls, an important recommendation for my own research.

### School Denomination

A recent Pew Research Centre global demographic study found a significant relationship between educational level and religious grouping (Cooperman, Hackett & Schiller 2016). One of the largest intraregional gaps was observed in Sub-Saharan Africa and Melina Platas, assistant professor of political science at New York University-Abu Dhabi, sought to explain this attainment gap in her research (2016). She suggests that the attainment gap can only partly explained by poverty and access to schools, and an alternative explanation is the level of education achieved by parents, as the intergenerational patterns are stronger in Muslim-majority areas where many parents have low educational attainment. Using the Dutch case, researchers Geert Driessen, Orhan Agirdag and Michael S. Merry (2016) showed that after controlling for input differences at pupil and school level no substantive output differences between religious schools and public schools remain except for the case of Islamic schools where there was an evident value-added effect.

In a 2006 study, researchers at the National Centre for Education Statistics examined the National Assessment of Educational Progress (NAEP) Reading and Mathematics scores between public and private schools where selected characteristics of students and/or schools were accounted for. Using grade four (4) data, when all private schools were compared to public

schools, the difference in means for reading was found to be near zero (and not significant) while in mathematics the average school mean was higher in public schools compared to private schools. In both instances, adjustments for student characteristics were included. Using grade eight (8) data, performance disparities between public and private schools were more evident. In both reading and mathematics, results indicated that the average private school mean score was higher (and statistically significant) than the average public means score. However, when selected student characteristics were included in the model, there was a significant reduction in the difference between schools thus again highlighting the importance of controls.

### Class Size

Gene Glass and Mary-Lee Smith found that “reduced class size can be expected to produce increased academic achievement” (Glass & Smith, 1978, p.4) although the effects of even substantive reductions are small (Slavin, 1989). In 1986, Robinson et al concluded that the clearest evidence of positive outcomes from class reductions was at primary level, particularly from kindergarten to third grade, and that reducing class size especially benefited disadvantaged pupils. In a four-year longitudinal study called the Tennessee's *Project STAR* (Student-Teacher Achievement Ratio), pupils in the smaller classes were found to outperform those in larger classes on both standardized and curriculum-based tests (Mosteller, 1995). Rivkin, Hanushek, and Kain used a sophisticated statistical model to examine the effects of natural variation in class size in Texas in the mid-1990s. The correlation between these two variables was not as strong as in previous research, but it was still found to be statistically significant (Rivkin, Hanushek & Kain, 2005).

Due to the different school systems across the world, these U.S. based studies may not be

generalizable. Expanding the scope of investigation, Ludger Wößmann and Martin R. West estimated the effect of class size on student performance in eighteen countries. They concluded that smaller class sizes were only beneficial in countries with relatively low teacher salaries. There was no class size effect in eleven of the countries and in two—Singapore and Japan—class size had the reverse effect on performance with students in larger classes performing better than students in smaller classes. Thus, the effect of class size on performance likely varies from country to country (Wößmann & West, 2002).

### Single Sex Education

Despite years of research investigating the relationship between single-sex education and academic performance, there is still no consensus. In 2005, a systematic review of two thousand, two hundred and twenty studies by the US Department of Education found that there was little evidence of either benefit or harm for single sex-school vs. coeducational schooling for many outcomes. The review, entitled *Single-sex Versus Coeducational Schooling: A Systematic Review*, used statistical controls for socio-economic status of the students and resources of the school. By the same token, Hyndman (2007) observed that there was no conclusive evidence that single-sex classes might be beneficial or disadvantageous to student achievement. In contrast, more recent studies have found that there is correlation between attending same sex schools and high scores. In 2009, researchers from the University of California Los Angeles reported that female graduates of single-sex high schools demonstrate stronger academic orientations than their coeducational counterparts across a number of different categories including levels of academic engagement, SAT scores, and confidence in mathematical ability and computer skills (Sax et al, 2009). Hyunjoon Park, Jere R. Berhman and Jaesung Choi also found that same sex



schooling was associated with higher academic achievement. The data used in this study came from schools in South Korea where by law students were randomly assigned to schools in their district (Choi et al, 2012). More recently though, a theory-driven meta-analysis by Erin Pahlke and colleagues demonstrated that substantive advantages are only found for students in same sex schools when selection effects are not controlled (Pahlke, Hyde & Allison, 2014).

### Student Gender and Performance

The differential performance between boys and girls has become a cause of concern for educators in a number of countries. The issue is no longer whether or not a performance gap exists but to what extent this gap is increasing or decreasing overtime (Younger, Warrington, & McLellan, 2002; Gorard & Salisbury, 1999). In Trinidad and Tobago, girls outperform boys “at all levels of the school system” (George et al, 2009, p.6). A report prepared by the Analysis and Equity Branch of Australia described similar patterns of performance. There, boys on average were achieving lower grades than girls in all areas of the assessed cognitive curriculum throughout their primary and secondary education (Rowe & Rowe, 2000). Collins, Kenway, and McLeod (2000) argue that it is more helpful to consider the “gender jigsaw” instead of the gender gap as males and females are not homogenous groups. The questions should be which males? Which females? What are the specific cohorts within each group that are performing below average?

### Demographic Opportunity Structure (DOS)

This describes the community and the people that make up the school environs. “People with similar backgrounds tend to live in the same neighborhoods or geographic locations (urban or

rural) which are served by a school” Wilkins 1999, p.13). Opportunities at the community level can be characterized by the level of financial capital, human capital (Coleman 1997) and capital related to geographic location (Ghelfi & Parker, 1997). “Financial capital refers to fiscal resources that enable parents to provide food, clothes, and other resources necessary for children to be ready for learning” (Wilkins, 1999, p. 13). Students with greater financial capital tend to be high achieving as they have access educational opportunities that remain unattainable to students with low financial capital. These include a home to study, books and computers. Human capital relates to the level of parent’s education and the presence of educated, engaged parents have been found to predict schools success (Deslandes & Bertrand, 2005). Lastly, opportunities associated with geographical capital—that is living in an urban area versus rural area—are generally found to predict school success though the effects are not as strong as those related with human and financial capital (Wilkins 1999; Logan & Molotch, 1987).

Moreover, the performance gap between students who attend schools in urban areas and students who attend schools in non-urban settings varies among countries (Organization for Economic Development and Cooperation (OECD), 2013). Not all countries exhibit an “urban advantage” due to differences in socio-economic segregation. For instance, in Denmark, “students whose parents have high levels of education and high-status occupations are more likely to attend schools in rural locations or in towns...”(OECD, 2013, p.2).

### Teacher Quality

Recent studies have demonstrated that teacher quality (literary skills and professional experience) have positive teaching outcomes even outweighing the effect of smaller class size on achievement (Rivkin, Hanushek & Kain, 2005). Rivkin and his colleagues discovered that

moving one standard deviation up the teacher quality distribution yielded more achievement gains than reducing class size by ten students. The results for teacher experience also “support the notion that beginning teachers and to a lesser extent second and third year teachers in mathematics perform significantly worse than more experienced teachers” (Rivkin, Hanushek & Kain, 2005, p. 447). Additional gains for subsequent years were small and not statistically significant for both Math and English. The STAR experiment also revealed the importance of teacher quality by noting the very large variation in student performance across individual classrooms within the same school (Hanushek, 1999). Finally, Sanders and Rivers (1996) demonstrated that the effect of teacher quality on performance was additive in that students repeatedly assigned to ineffective teachers scored lower than those repeatedly assigned to effective instructors.

### **Methodology and Materials**

Two datasets were used in the analysis. The first included data sourced directly from the Ministry of Education and was accessed after receiving all the relevant permissions from the Office of the Chief Education Officer. This was a list of students in the schools sampled and their Math and English scores in the 2015 SEA exam. The second was composed of survey data collected from the sampled principals. Both datasets were combined and used in the analysis.

#### Data Collection

Stratified random sampling was employed to sample 106 schools from a population of 437 public schools. (Special schools and youth correction facilities were excluded because their inclusion would unnaturally skew results). Ten strata were created, one for each of the school

denominations represented in Trinidad<sup>3</sup>. To insure that each subgroup of school denomination was included in the sample, the smaller strata were assigned a higher sampling fraction. This was accounted for in the data analysis with the use of probability weights. The resulting sample of 106 schools included 3,964 students from each of the seven educational districts in Trinidad.

The survey was designed to collect school level data and so principals of the individual schools were targeted as respondents. Once the sample was drawn, each principal was contacted over the phone to inform them about the study and solicit their participation. Those who expressed interest were sent an electronic copy of the survey. Principals were contacted at one-week intervals for one month via telephone to remind them about the study after which time the survey was closed.

**Table 1** Sample Sizes and Probability of Selection into the Sample by School Denomination

<i>Denomination</i>	<i>Population</i>	<i>Sample</i>	<i>Probability of Selection</i>	<i>Response Rates</i>
Government	124	29	0.234	0.793
Anglican	44	11	0.250	0.727
Baptist	5	2	0.400	0.500
Hindu	55	13	0.236	0.616
Moravian	2	1	0.500	1.000
Methodists	4	1	0.250	1.000
Muslim	15	4	0.267	0.500
Presbyterian	70	17	0.243	0.706
Roman Catholic	113	26	0.230	0.692
Seven Day Adventists	5	2	0.400	1.000

#### Variables utilized in the analysis

The variables included in the analysis were those that previous researchers highlighted as having a relationship with academic achievement. This includes community level data as well as school

<sup>3</sup> In reality, there are nine denominational school groups in Trinidad but for this analysis, government schools are counted as an additional denomination.

and student-level data. Student level data included in the dataset was limited due to operational difficulties in collecting this type of information. The variables used in the analysis can be grouped into seven main categories: (1) Achievement Measures (2) School Type (3) District (4) Demographics (5) Teacher Characteristics (6) Administration and (7) Perceived Problems (See appendix for variable description).

**Descriptive Analysis** - Of the 106 schools sampled, 76 responses were collected from principals giving a response rate of 72%.

### Achievement Measures and School Type

**Table 2** SEA 2015 performance in Math and English across school type

School Type	Min	1st Quart	Median	Mean	3rd Quart	Max
<b>Math (Public Schools)</b>	0.00	39.00	61.00	<b>58.51</b>	80.00	100.00
<b>Math (Government)</b>	0.00	29.00	49.00	<b>50.36</b>	72.00	100.00
<b>Math (Assisted)</b>	0.00	43.00	65.00	<b>61.72</b>	83.00	100.00
<b>English (Public Schools)</b>	0.00	48.00	65.00	<b>60.23</b>	77.00	97.00
<b>English (Government)</b>	0.00	36.00	57.00	<b>52.84</b>	71.00	97.00
<b>English (Assisted)</b>	0.00	52.00	67.00	<b>63.15</b>	78.00	96.00

Students in both assisted and government schools averaged higher scores in English than in Math. Observing the mean score, assisted schools outperformed government schools in both the Math and English sections of the 2015 exam. In Math, students in assisted schools scored on average 11 points higher than students in government schools. In English, they averaged 10 points above students in government schools. Data thus confirms past trends of assisted schools performing better than government schools in the SEA exam.

**Table 3.1** SEA 2015 performance in Math across school denomination

School Denomination	Min	1st Quart	Median	Mean	3rd Quart	Max
Math (Public Schools)	0.00	39.00	61.00	<b>58.51</b>	80.00	100.00
Math (Government)	0.00	29.00	49.00	<b>50.36</b>	72.00	100.00
Math (AC)	0.00	38.00	57.00	<b>55.75</b>	76.00	97.00
Math (Baptist)	6.00	30.00	45.00	<b>44.25</b>	55.00	92.00
Math (Hindu)	0.00	58.00	75.00	<b>70.44</b>	87.00	99.00
Math (Moravian)	37.00	39.00	43.00	<b>48.00</b>	58.50	60.00
Math (Methodist)	0.00	32.00	54.00	<b>51.07</b>	72.00	95.00
Math (Muslim)	24.00	56.00	74.00	<b>71.33</b>	90.00	97.00
Math (Presbyterian)	0.00	39.00	64.00	<b>59.62</b>	85.00	98.00
Math (RC)	0.00	44.00	66.00	<b>61.61</b>	81.00	100.00
Math (SDA)	10.00	42.75	59.50	<b>57.42</b>	70.50	91.00

With these analyses it is important to remember that assisted schools constitute a heterogeneous category. Mapping SEA performance across school denomination, there was variation in how different assisted schools compared to government schools. In Math, Baptist and Moravian schools scored lower than government schools while Anglican, Hindu, Methodist, Muslim, Presbyterian, Seven Day Adventist and Roman Catholic schools scored above government schools. The difference between the highest performing school (Muslim) and lowest performing school (Baptist) is average 27.08 points.

**Table 3.2** SEA 2015 performance in English across school denomination

School Denomination	Min	1st Quart	Median	Mean	3rd Quart	Max
English (Public Schools)	0.00	48.00	65.00	<b>60.23</b>	77.00	97.00
English (Government)	0.00	36.00	57.00	<b>53.12</b>	71.00	97.00
English (AC)	0.00	47.00	64.00	<b>52.84</b>	76.00	93.00
English (Baptist)	7.00	41.00	57.00	<b>59.71</b>	66.00	85.00
English (Hindu)	0.00	59.00	72.00	<b>69.30</b>	81.00	96.00
English (Moravian)	44.00	49.25	53.00	<b>56.29</b>	56.75	85.00
English (Methodist)	0.00	44.00	62.00	<b>55.07</b>	72.00	93.00
English (Muslim)	26.00	64.00	74.00	<b>71.59</b>	84.00	94.00
English (Presbyterian)	0.00	47.00	65.00	<b>59.96</b>	78.00	96.00
English (RC)	0.00	52.00	67.00	<b>63.12</b>	78.00	95.00
English (SDA)	18.00	56.75	68.00	<b>64.90</b>	77.00	85.00

Anglican schools were the lowest achievers in English with a mean score of 52.84. They were also the only denomination to score lower than government schools in this section of the exam. Muslim schools again achieved the highest scores with students at these schools averaging 71.59 points. The difference between the highest achieving and lowest achieving school denomination is 18.75 points.

### Demographics and School Type

Of the 77 assisted schools sampled, 54 responses were collected and of the 29 government schools sampled, 22 responses were collected. The assisted schools comprised of 3.74% all-boys' schools, 8.25% all-girls' schools and 74.07% coeducational schools. Of the government schools, 4.55% were all-boys' schools, 9.09% were all-girls' schools and 86.36% were coeducational schools. In terms of gender composition, assisted schools had a majority female population of 51.76% while government schools had a majority male population of 51.90%. Government schools had a higher percentage of schools in low-income neighborhoods (86.36%) than assisted schools (66.67%). However, assisted schools were more concentrated in rural areas (64.81%) than government schools (45.45%).

### Teacher Characteristics and School Type

Standard five teachers in assisted and government schools tended to be similar on a range of dimensions. 67.53% of educators in assisted possessed a Bachelor's Degree or higher while the figures were only slightly lower (65.58%) for teachers in government schools. Both school types had a majority of female teachers with government schools having a slightly higher majority at 63.77% compared to the 62.39% at assisted schools. Teachers in both schools had high levels of

experience, with teachers in government schools averaging about three years more experience than teachers in assisted schools. Lastly, both schools averaged moderate class sizes with 20 students being the mean class size in government schools while it was 21 in assisted schools.

### Perceived Problems and School Type

Principals in both schools generally disagreed when asked if a lack of qualified teachers was an obstacle to student learning. Only 11.11% of principals at assisted schools “strongly agreed” with the statement, while none of the principals at government schools selected this option. 59.25% of assisted schools and 77.27% of government schools either strongly disagreed or disagreed with the statement. Teacher tardiness was also not deemed to be a serious problem at either school type with only 38.89% of government schools and 36.37% of assisted schools reporting it as a problem.

Student tardiness, student absenteeism, teacher absenteeism and classroom disturbances were found to be challenges faced by both school groups. However, the problems appeared to be more severe in government schools as a higher percentage of principals agreed or strongly agreed when asked if the aforementioned issues were challenges to learning at their school. Over 90% of government schools disagreed or strongly disagreed when asked if they felt government funding was sufficient to meet school needs. This figure was considerably less for assisted schools with 79.63% disagreeing or strongly disagreeing with the statement.

### Administration and School Type

Assisted schools averaged higher turnouts at PTA meetings than government schools. Only 12.96% of assisted schools reported having an attendance of 50% or lower at meetings while this



figure was 27.27% for government schools. Assisted schools also began practicing with past papers<sup>4</sup> in class much later than government schools. By the end of March 2014, 27.77% of assisted schools had begun using past papers in class while 40.91% of government schools had already begun the process.

## **Regression Models**

### Bivariate Regression Analysis

Each of the twenty independent variables used in the analysis was modeled against performance in Math and English to determine their individual empirical relationships with academic achievement (See Table 4.1). In Math, students in assisted schools are expected to score 10.70 points above students in government schools while in English, students attending assisted schools are expected to achieve 9.92 points higher than students attending government schools. Both coefficients were found to be statistically<sup>5</sup> and substantively significant<sup>6</sup>.

As previously observed, there is heterogeneity in performance amongst the different categories of assisted schools. Of the nine school denominations, all performed better than government schools in English though the coefficients for Baptist, Moravian and Methodist schools were not statistically significant and therefore not reliable. In Math, all assisted schools are expected to score higher than government schools except for Moravian and Baptist schools (the coefficient is only statistically significant for Baptist schools).

Examining performance across districts, students in North Eastern, Port-of-Spain, South Eastern, St George East and St Patrick all scored lower in both Math and English compared to

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<sup>4</sup> SEA papers from previous exams

<sup>5</sup> Statistical significance level is set at 0.05.

<sup>6</sup> Even a one point increase in Math or English score can affect a student's overall ranking (and in the case of the SEA exam influence which school they will be placed into)

Caroni. Victoria was the only district outperforming Caroni. (Even though the coefficients were not statistically significant for either subject, they were substantive). These results are consistent with expectations given that Caroni and Victoria have the first and third highest combined total of Muslim and Hindu schools in Trinidad.

Socio-economics and student gender proved to be important sources of variation in performance. The performance gap was 18.25 for Math and 14.25 for English between students attending schools in low-income communities and students attending schools in high-income communities. Male students achieved less in both Math and English. However, the effect of same sex schooling was only statistically significant for students in all-female schools. Relating to geographical area, no evidence was found to suggest that attending a school in an urban area is more or less advantageous than attending a school in a rural area.

None of the measured teacher characteristics had any substantive effect on performance. On the other hand, administrative variables had substantively and statistically significant effects on performance. For every 10-percentage point increase in PTA attendance, performance in Math increased by 1.91 points while in English, performance increased by 1.71. In terms of preparation, students who began practicing with past-papers in class during the January-March 2015 period performed better than students who started the process earlier. Though this may seem counterintuitive these results compare well to studies on the effects of overtraining in athletes. While preparation is important, overtraining can cause performance to plateau or can result in burnout, both of which negatively affect performance (Greenleaf, Gould & Dieffenbach, 2010).

**Table 4.1** Showing relationship between selected variables and performance

<b>Variables</b>	<b>Math</b>	<b>English</b>
Assisted	10.70***	9.92***
cons	50.37***	52.84***
Anglican	5.39***	6.87***
Baptist	-6.11*	0.28
Hindu	20.08***	16.46***
Moravian	-2.36	3.45
Methodist	0.71	2.23
Muslim	20.97***	18.76***
Presbyterian	9.26***	7.12***
Roman	11.25***	10.28***
Seven Day Adventist	7.06*	12.06***
cons	50.36***	52.84***
NE District	-23.31***	-20.02***
POS District	-12.00***	-10.65***
SE District	-9.50***	-9.37***
SGE District	-11.27***	-9.17***
STP District	-7.69***	-7.81***
VIC District	3.04	2.62
cons	64.63***	65.91***
Middle-income	8.23***	8.69***
High-income	18.25***	14.25***
cons	53.92***	55.84***
Coed School	-6.47***	-4.05*
Girls' School	1.74	5.24**
cons	62.83***	62.38***
Male Student	-5.90***	-9.81***
cons	60.70***	64.56***
Urban Areas	-1.22	-0.13
cons	59.73***	59.94***
Teacher Education	0.06***	0.06***
cons	53.85**	55.55**
Teacher Gender	-0.12	-0.00
cons	58.57***	59.74***
Teacher Experience	-0.30***	-0.21***
cons	63.39***	63.61***
Class Size	0.33***	0.34***
cons	49.99***	51.62***
PTA meeting attendance	1.91**	1.71***
cons	50.27***	53.05***
SEA prep: Jan-March 2014	0.78	-0.58
SEA prep: Jul-Sep 2014	6.61**	4.23*
SEA prep: Oct-Dec 2014	1.49	-1.53
SEA prep: Jan-March 2015	10.11***	6.35***
cons	52.94***	57.52***
Lack of qualified teachers	2.25***	1.55***
cons	52.18***	55.85***
Students arriving late for school	-0.23	-0.11
cons	58.57***	60.11***
Teachers arriving late for school	1.63***	1.23***
cons	52.76***	55.93***

\* p<.05 \*\* p<.01 \*\*\* p<.001

*Table 4.1 Cont'd*

<i>Variables</i>	<i>Math</i>	<i>English</i>
Student Absenteeism	-1.54**	1.23***
cons	64.27***	55.93***
Teacher Absenteeism	0.12	0.22
cons	57.33***	58.92***
Classroom disturbances	-0.19***	-0.54
cons	58.49	61.75***
Insufficient Government Funding	-3.65**	-2.78***
cons	72.44***	70.88***

\* p<.05 \*\* p<.01 \*\*\* p<.001

An interesting phenomenon was observed when problems related to teacher performance were considered. As the problems related to teacher qualification, tardiness and absenteeism became more intense, achievement increased. These results run contrary to logic. However, one explanation could be that principals gave biased assessments of their staff. Since performance increased as problems worsened, results suggest that principals of high achieving schools are likelier to be critical of teacher efficiency. Of the perceived problems measured, government funding was the only variable that produced conclusive results. It showed that student achievement for both Math and English decreased as issues with government funding increased.

#### Multiple-linear Regression (MLR) Analysis: School type and Performance

A series multiple linear regression models<sup>7</sup> were run in order to isolate some of the factors which could explain the performance gap between assisted and government schools. The aim was to distinguish the institutional effects of school type from other confounding variables. These variables were grouped into the following categories: district, demographics, teacher

<sup>7</sup> Seemingly Unrelated Regression (SUR) Models were initially used with the dependent variables Math and English but both models used all the same covariates so there was no increase in efficiency with the use of SUR. Furthermore, a fixed effects approach was employed instead of multilevel modeling because the goal was to control for district level variation as opposed to explain that variation.

characteristics, administration and perceived problems. The analysis conducted in this paper differs from the studies reported earlier in that it not only controls for demographic and geographic variables but it measures and accounts for unique problems that each school encounters.

The first set of MLR models was used to determine the effect of school type on Math achievement. Table 5.1 presents the results. First, a baseline model was run to determine the size of the effect without control variables. Here the regression coefficient for assisted schools was 11.36. Next, new models were generated for each variable category. Comparing these models, demographics appear to have the most significant effect on performance as it explained 40.32% of the difference in performance from the baseline. In the final model when all considered variables were accounted for, the performance gap was only 0.91 and this was not statistically significant. Confounding variables measured in the study therefore explained 91.97% of the difference between school types and the resulting achievement disparity was negligible.

A second set of models was used to examine achievement in English by school type. In the baseline regression where school type was run against English, achievement in assisted schools was projected to be 10.31 points higher than in government schools. Of the following models generated, Model 3 best explained the performance disparity across school type as it accounted for 41.22% of the difference. All aforementioned coefficients were statistically and substantively significant. When Model 7 added all of the variables used in the analysis to the regression, the coefficient for assisted schools was 0.26 and was not statistically or substantively significant.

*Table 5.1 showing the relationship between school type and Math performance*

<i>Variables</i>	<i>Baseline Model1</i>	<i>Model2 Baseline+ District</i>	<i>Model3 Baseline+ Demographics</i>	<i>Model4 Baseline+ Teacher Characteristics</i>	<i>Model5 Baseline+ Administration</i>	<i>Model6 Baseline+ Perceived Problems</i>	<i>Model7 Baseline+ District+ Demographics+ Teacher Characteristics+ Administration+ Perceived Problems</i>
Assisted	11.36***	9.11***	6.78***	11.08***	7.89***	8.65***	0.91
NE District		-22.52***					-20.57***
POS District		-11.30***					-19.66***
SE District		-12.34***					-3.33
SGE District		-11.74***					-1.92
STP District		-9.68***					-9.66***
VIC District		-0.96					-3.09
Middle-income			7.84***				9.34***
High-income			26.13***				16.93***
Coed School			4.87				-6.85
Girls' School			9.37**				0.84
Male Student			-5.54***				-5.26***
Urban			-5.74***				-6.89***
Teacher Education				0.04**			0.01
Teacher Gender				-0.02			-0.01
Teaching Experience				-0.20*			-0.16
Class size				0.31***			0.55***
PTA attendance					0.97***		-0.64
SEA-prep: Jan-Mar 2014					2.56		6.90**
SEA-prep: Jul-Sep 2014					0.03		9.69**
SEA-prep: Oct-Dec 2014					2.71		1.57
SEA-prep: Jan-Mar 2015					8.94***		10.82***
Lack of qualified teachers						0.77	-1.12
Students arriving late for school						-1.39*	-2.44***
Teachers arriving late for school						3.23***	5.76***
Student Absenteeism						-1.68**	0.18
Teacher Absenteeism						-1.51**	-2.06
Classroom disturbances						0.57	-1.66**
Insufficient Government Funding						-2.30***	-1.23*
_cons	50.36***	59.73***	56.29***	45.06***	44.08***	64.89***	77.38***

^Note: Baseline Regression is a simple linear regression of school type against Math performance

\* p<.05 \*\* p<.01 \*\*\* p<.001

*Table 5.2 showing the relationship between school type and English performance*

<i>Variables</i>	<i>Model1</i> <i>Baseline</i>	<i>Model2</i> <i>Baseline+</i> <i>District</i>	<i>Model3</i> <i>Baseline+</i> <i>Demographics</i>	<i>Model4</i> <i>Baseline+</i> <i>Teacher</i> <i>Characteristics</i>	<i>Model5</i> <i>Baseline+</i> <i>Administration</i>	<i>Model6</i> <i>Baseline+</i> <i>Perceived</i> <i>Problems</i>	<i>Model7</i> <i>Baseline+</i> <i>District+</i> <i>Demographics+</i> <i>Teacher</i> <i>Characteristics +</i> <i>Administration+</i> <i>Perceived Problems</i>
Assisted	10.31***	8.89***	6.06***	10.14***	7.13***	8.37***	0.26
NE District		-19.57***					-14.20***
POS District		-9.85***					-16.55***
SE District		-12.47***					-1.84
SGE District		-9.61***					-0.63
STP District		-9.84***					-10.05***
VIC District		-1.16					-1.14
Middle-income			7.73***				10.10***
High-income			21.94***				14.84***
Coed School			3.02				-7.96**
Girls' School			6.17*				-1.06
Male Student			-9.66***				-9.22***
Urban			-4.37***				-5.33***
Teacher Education				0.04***			0.01
Teacher Gender				-0.00			-0.01
Teaching Experience				-0.1053			-0.19*
Class size				0.3286***			0.46***
PTA attendance					0.89***		-0.57
SEA-prep: Jan-Mar 2014					0.74		4.48*
SEA-prep: Jul-Sep 2014					-2.95		6.79*
SEA-prep: Oct-Dec 2014					-0.53		-4.03*
SEA-prep: Jan-Mar 2015					5.42***		6.27***
Lack of qualified teachers						0.28	-1.60***
Students arriving late for school						-0.76	-1.39*
Teachers arriving late for school						2.42***	3.96***
Student Absenteeism						-1.86***	-0.39
Teacher Absenteeism						-0.77	-0.69
Classroom disturbances						0.22	-1.36*
Insufficient Government Funding						-1.49***	-1.33*
_cons	52.84***	61.01***	60.50***	44.21***	49.46***	64.52***	83.84***

^Note: Baseline Regression is a simple linear regression of school type against English performance

\* p<.05 \*\* p<.01 \*\*\* p<.001

## Math vs. English

With Math as the dependent variable, the coefficient for assisted schools in the baseline model was 11.36. When English was the dependent variable, the coefficient in the baseline model was 10.31. This indicates that the performance gap between government and assisted schools is larger for Math than it is for English. However, looking at the final models in each set of analysis, 40.32% of the difference between schools was explained for Math while 41.22% of the difference was explained for English suggesting that the factors under consideration are slightly better at explaining the performance gap between schools types in English than Math.

## **Summary**

The findings in this report reaffirm the Lubienski findings that demographic differences help account for the performance disparity between school types. However, unlike the Lubienski report, demographics alone did not account for all of the differences in performance but this could be because the Lubienskis used a combination of student level and community level demographic indicators while most demographics measures used in this study were at the community level. In addition to demographic differences, administrative practices were found to be strong predictors of academic achievement as controlling for such differences reduced the performance gap. Surprisingly, teacher characteristics had minimal effect on performance while perceived problems only had a modest effect on achievement. **After controlling for district, demographics, teacher characteristics, administrative practices and perceived problems, assisted schools' achievement means were no longer statistically or substantively different than achievement means in government schools for either Math or English.**



## **Limitations**

The data used in this study is cross-sectional, meaning there is no way to track student's progress over time. Moreover, this analysis constitutes an observational study rather than a randomized experiment and there may be systematic differences between students in government schools and assisted schools “that are not captured by the student characteristics available for analysis” (Braun 2006 p.4). If these characteristics are correlated with achievement then the estimated achievement gap between assisted schools and government schools “will be confounded to some degree with the unobserved differences” (Braun 2006 p.4).

The different response rates across the different denominations means there is a possibility of self-selection bias<sup>8</sup>. It is possible that the schools that did not respond to the survey were systematically different than those that did respond and if that were the case, the bias would persist even after adjusting for non-response based on observed characteristics. Lastly, since most of the variables used in the data measured school level characteristics, the study only considers between-school variation and does not account for differences in performance within schools. Further research should therefore be conducted using more micro-level variables to test the occurrence of school fixed effects.

## **Policy Implications**

From a policy perspective, the findings in this report are relevant to the Trinidad and Tobago government, schools boards and school administrators. Evidence suggests that student gender, community income level, PTA attendance, SEA preparation and government funding are the

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<sup>8</sup> In this case, selection bias describes the systematic difference in characteristics between those who respond to the study versus those who do not. This affects the external validity (generalizability) of the study.

specific variables that should be tackled in order to encourage better educational outcomes in the SEA examination (and student performance in general).

### Student Gender

The government of Trinidad and Tobago has recognized that there are gender differentials in achievement (*Education Policy Paper*, 1994). In a review of 39 policy documents and government reports related to the gender achievement gap, George et al. found that considerable emphasis was placed on the “provision of quality teachers” (George et. al, 2009, p.34) to achieve equity in achievement outcomes regardless of student gender and other considerations. Government concerns about the shortage of male teachers in the education system has lead to documents such as the *Education Policy Paper* (1994) and the *Draft Policy Framework for Transforming and Restructuring Teacher Education and Development in Trinidad and Tobago* [Framework, 2005] which stress the need for balance through diversification of selected school personnel.

Contrary to current government policy, results from this study suggest that teacher characteristics do not have significant effects on performance. Consequently, employing more male teachers *would not* narrow the performance gap between boys and girls. Since this study focused on explaining performance disparity across different school types, more research needs to be conducted in order to determine the exact source(s) of gender differentials in achievement before more specific policy recommendations can be made in this area.

### Community Income Level

The performance disparity between students from economic backgrounds is one of the most conspicuous features of this report. Though the Ministry of Education recognizes the rights of all children regardless of socio-economic background (Education Policy Paper 1994; National Youth Policy, 2005), the problem of performance disparities between students of different socio-economic background persists. To achieve equity in this area, reform efforts should target inequities among students to facilitate improved performance.

### PTA Attendance

This study confirms generally held knowledge that parent engagement encourages student success. High parent turnout at PTA meetings is associated with strong academic performance in the SEA. As such, parents should be encouraged to be more diligent as it pertains to attending meetings. Since general meetings are held at the discretion of the Executive Committee of each school's Parent Teacher Association, each committee has a responsibility to address issues of low-attendance. Recommendations to improve attendance include: 1) encouraging attendance as a responsibility; 2) holding shorter meetings to accommodate parents' schedules; and 3) inviting parents to attend meetings via a personal initiation and/or phone call.

### Exam preparation

Data from this study suggests that performance increases as the timeline for preparation with past papers moves closer to exam. However, because these are unusual results, more research should be conducted in the area. If results can be replicated, it would mean that policy makers and educators would have to begin rethinking exam preparation strategies for the SEA examination

(and perhaps other standardized exams).

### Government Funding

This analysis does not account for year-to-year constraints on national budget nor does it consider how different schools allocate government money. However findings indicate that there is a positive relationship between government funding and student achievement, which suggests that an increase government funding towards primary schools could have a positive effect on student achievement.

### **Conclusion**

The results of this study suggest that school type does not influence academic achievement in the Secondary Entrance Assessment exam in Trinidad when district, demographics, teacher characteristics, administrative practices and perceived problems are controlled. In fact, some of the controlled variables used in the analysis—specifically, demographic factors and administrative practices—proved to be better predictors of academic achievement than school type. Not only do these findings have important implications for education policy in Trinidad, they contribute to the growing body of research that demand a more nuanced understanding of the effects of school type on performance.

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## **Appendix A**

### Variable Description

#### *Achievement Measures*

- Students' raw scores in the Mathematics and English Language Arts component of the exam were used as dependent variables. Both are scored out of 100.

#### *School Type*

- Binary variables were used to distinguish between assisted schools and government schools.

#### *School Denomination*

- Binary variables were used to distinguish between the ten classes of school denomination.

#### *District*

- Binary variables were used to distinguish among schools in the seven educational districts in Trinidad. These districts are Caroni (CAR), North Eastern (NE), Port-of-Spain (POS), St. George East (SGE), South Eastern (SE), St Patrick (STP) and Victoria (VIC).

#### *Demographics*

- Student Gender: This was a binary variable that coded students as either male or female.
- School Gender: Binary variables were used for coeducational schools, all-male schools and all-female schools.
- Community Income Level: Binary variables were used for low-income, middle-income and high-income communities. Ideally, census data would have been used but there was no

perceivable measure of micro-level community income in any of the last two census reports (Population and Housing Census, 2011; National Census Report, 2000). Instead, this information had to be sourced directly from principals. This may introduce some form of bias since it is a measure of what the principals perceive the income classification of their communities to be and not a direct statistical measure of median household income.

- Geographical Area: Binary variables were to distinguish among schools located in rural areas versus schools in urban areas (towns or cities). Rural populations were those living in areas defined as rural by the statistical offices of Trinidad and Tobago and vice versa for urban populations (Household and Budget Survey 2008/2009).

#### *Teacher Characteristics*

- Teacher Education: The percentage of standard five teachers with at least a bachelor's degree was calculated for each school.
- Teacher Gender: The percentage of female standard five teachers in each school was calculated.
- Teacher Experience: A mean of teacher experience was calculated to give the average experience of the standard five teachers per school.
- Class Size: Average class size based on the number of students in each standard five class. This also represents the teacher: student ratio for the standard-five year group.

#### *Administration*

- Attendance at Parent-Teacher's Association (PTA) meetings: Principals were asked to indicate the number of PTA meetings held specifically for the parents/guardians of standard-

five students between 2014-2015 and to give the attendance per meeting using the categories: <50%, 50-59%, 60-69%, 70-79%, 80-89%, 90-99% and 100%. From this, a new variable was created to represent average turnout at PTA meetings per school.

- SEA preparation. Principals were asked to indicate when standard five students began practicing with SEA past papers in class using the categories: Prior to 2014, Jan-March 2014, April-June 2014, July-September 2014, October-December 2014, January-March 2015, After April 2015 (N.B. The exam itself was held on May 7<sup>th</sup> 2015). This specific variable specifically measures the timeline for the use of past-papers in class and not the timeline for SEA preparation on a whole which can begin years in advance.

#### *Perceived Problems*

- Principals reported the extent to which they believed the following were obstacles to student learning at their school. Answers were indicated using a five level Likert scale with categories ranging from strongly disagree to strongly agree.

-Lack of qualified teachers

-Students arriving late for school

-Teachers arriving late for school

-Student Absenteeism

-Teacher Absenteeism

-Classroom disturbances: (e.g. cheating, profanity, physical/verbal abuse of other students)

-Insufficient Government Funding