# FACTORS IMPACTING ON STUDENT LEARNING:
## A Preliminary Look at the National Test of
## Trinidad and Tobago

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National assessments of student achievement in the basic skills or curricular domains of reading, writing, mathematics, and science are conducted in many countries with the aim of improving the quality of education. This paper presents an overview of the findings from a study conducted by a consortium of research staff from the Ministry of Education in Trinidad and Tobago, and university researchers from The University of the West Indies in Trinidad and Tobago and the University of Victoria in Canada on data from such a national assessment programme in Trinidad and Tobago. Preliminary statistical analyses were conducted on data generated by the 2006 administration of the National Test, which included not only the administration of achievement tests in Language Arts and Mathematics, but also the administration of questionnaires to students, parents, teachers, and principals. The findings from this preliminary study suggest that student and parent traits and perceptions are substantially related to student achievement in the foundational skills of language arts and mathematics as measured by the National Test.

## Introduction

Many nations conduct annual assessment of student achievement in the basic skills or curricular domains of reading, writing, mathematics, and science. The programmes take various forms—some being focused on accountability of schools and teachers for student performance (such as the *No Child Left Behind* initiative in the United States); others having a focus on curricular reform based on the evidence generated by the assessment programme (this form requires some form of national or centralized curriculum). Regardless of specific focus and format, the assessment programmes have the aim of improving the quality of education as indexed by the achievement of students in the basic skills and competencies of schooling.

However, the ways in which testing and test results are related to system-level characteristics such as educational quality are not well understood. Factors in addition to curriculum and instruction—such as

student characteristics on entry, teacher and school traits, and home and community characteristics—have been shown to be significantly related to student achievement scores, and these relationships vary from one grade to another, one school to another, and one subject area to another (Anderson et al., 2006; Fitz-Gibbon, 1998; Ma, 2001; Mandeville & Anderson 1987; Rumberger, 1995). There has been much research conducted on international and national assessment datasets, yielding a wealth of information about patterns of student and school characteristics: the *Programme of International Student Assessment* (Fuchs & Woessmann, 2004; Willms, 2004); the *School Achievement Indicators Program* of Canada (Anderson et al., 2006); the *Primer Estudio Internacional Comparitivo* of Latin American nations (Willms & Somers, 2001); the US *National Education Longitudinal Study* (Dumais, 202); the US *National Longitudinal Survey of Adolescent Health* (Watt, 2003); and state level datasets in Australia (Hill & Crévola, 1999), Canada (Anderson, 2002), and the US (Reeves & Bylund, 2005). This paper reports on related work done in one Caribbean country, Trinidad and Tobago.

Trinidad and Tobago has had a long history of the national assessment of student achievement, which spans the period from colonial times when examinations were controlled by British examination bodies to the present time when national assessments are developed and administered mainly by the regional Caribbean Examinations Council (CXC) and the Ministry of Education (MOE). The MOE administers three major national examinations set by CXC for students at the primary and secondary levels as follows:

- The Secondary Entrance Assessment (SEA), which is used to facilitate the placement of students in secondary schools throughout Trinidad and Tobago, and which is comprised of three papers in *Creative Writing, Mathematics,* and *Language Arts*

- The Caribbean Secondary Education Certificate (CSEC) examinations, which certify the successful completion of 5 years of secondary education in a number of subjects

- The Caribbean Advanced Proficiency Examinations (CAPE), which are used to assess a student's academic achievement at the end of each of the 6th and 7th years of secondary level education, and which cater for students who wish to continue their studies at tertiary level institutions

In addition, the MOE, through its Division of Educational Research and Evaluation (DERE), develops and administers two major assessment

programmes—the National Certificate of Secondary Education (NCSE), which is designed to assess the academic performance of students who have completed three years of secondary schooling, and the National Test. The latter, which is intended to generate information for decision making at the school, district, and national levels and to track students' progress through school, is the focus of this article.

The National Test is a relatively recent annual standardized assessment programme for primary students in Standards 1 and 3 (who are approximately 7 and 9 years old, respectively), covering the subjects of Language Arts and Mathematics. Beginning in 2008, the test expanded its focus to include students in Standards 2 and 4 (ages 8 and 10 years, respectively) and its curricular coverage to Science and Social Studies.

Specifically the objectives of The National Test are to:

- gather information for decision making at the school, district, and national levels;
- identify areas of the system that require further investigation;
- identify national norms;
- compare students' performance by school and educational district;
- track student progress through school. (Trinidad and Tobago. Ministry of Education [MOE], 2005, p. 1)

Since 2004, formal reports of the results of the analysis of the National Test data have been prepared and distributed to schools. School and district means for Language Arts and Mathematics for each level are reported. Student performance by gender is also included. Further, the MOE has stated that it is expected that teachers and administrators at the school and district levels will work together to interpret the results of the National Test, and to devise strategies that will build upon strengths and reduce deficiencies at the school and classroom levels. Accordingly, the Chief Education Officer states in the foreword to the 2005 National Test report:

> I recommend that principals widely discuss the national test report and the school report with staff and parents. All divisions of the Ministry of Education including, School Supervision, Curriculum Development, Educational Research and Evaluation and Student Support Services are committed to assisting schools in raising the level of student performance and are therefore available to all principals. (MOE, p. i)

This paper presents an overview of the findings from the preliminary analyses conducted on data generated by the National Test administration of 2006, which included not only achievement tests in Language Arts and Mathematics, but also the administration of questionnaires to students, parents, teachers, and principals. The questionnaires were designed to generate information about the school-related behaviours, attitudes, and perceptions that could have significant relationships to student achievement, thus providing the opportunity to conduct research to explore the student, home, and school correlates of learning outcomes. This research was conducted by a consortium of research staff from the MOE and university researchers from The University of the West Indies (UWI) in Trinidad and Tobago and the University of Victoria in Canada.

The research consortium works to support the objectives of the National Test programme by exploring the relationships between student achievement and the traits of schools, the classroom, the home, teachers, and the student. The primary purpose of identifying significant correlates of student learning, and collecting and analysing the data is to describe, predict, and ultimately influence educational processes and outcomes. The development of models of variables that serve as correlates of student learning should facilitate better and deeper understanding of student and school performance, and lead to better informed policy initiatives and educational programmes (Raudenbush & Willms, 1991; Willms & Kerckhoff, 1995). This is directly related to the MOE's strategic research directions in the area of learning outcomes, particularly in understanding and evaluating the achievement of students in the core areas of Language Arts, Mathematics, and Science in relation to the contextual characteristics of schooling. The research focus of the consortium is based on the belief that a necessary step toward addressing these issues within a policy framework involves assembling, organizing, and analysing educational indicator data in ways that identify and incorporate linkages among variables from students, schools, and the home. An initial challenge is to access, analyse, and interpret the information in meaningful ways that will inform our understandings of schools and educational outcomes—and our initial work to meet this challenge is the focus of this paper.

## The Context

In the Republic of Trinidad and Tobago, there are two main categories of primary schools—public and private—located within eight educational districts. The two categories give rise to three types of primary schools.

The public schools comprise the government primary schools and the denominational primary schools. In this report, the government primary schools are referred to as Type 1 schools, the denominational primary schools as Type 2 schools, and the private primary schools as Type 3 schools. The schools use the National Curriculum document and prepare their students for the National Test in Standards 1 to 4, and for the SEA at the end of Standard 5.

The SEA, which started in 2001, is a high-stakes test, which is used to place students into the secondary system. The SEA replaced the Common Entrance Examination (CEE), which began in 1961. These tests are described as high-stakes because the demand for school places in the older, more established secondary schools, which are perceived by the public as "prestige" schools, is greater than the supply. Consequently, there is intense competition among students for the few available places. As with the predecessor CEE, the results of the SEA are published in the newspapers, and primary schools are often judged on the basis of their students' performance on the examination. Therefore, schools whose candidates gain places in the "prestigious" secondary schools are themselves perceived as "prestige" primary schools. In addition, the top 100 students receive special awards from the Government of the Republic of Trinidad and Tobago. That there are no rewards and sanctions based on the results of the National Test, which is held annually in the month of June, is likely related to the different purposes served by each test. While the SEA is a summative examination, the National Test can be described as formative in nature, with diagnosis and development as the intended outcomes. In the foreword to the 2005 report on the National Test, the Chief Education Officer states that: "the information on the National Test provides us with a base on which to build. We have an opportunity to focus on improving the identified areas of weakness, to improve quality in all aspects of teacher/student relationships…" (MOE, 2005, p. i).

Formal reporting of the results of the National Test began in 2004. In 2004, the data obtained were analysed to obtain descriptive statistics (means and standard deviations), which were used to compare performances among educational districts and also to compare performance on the basis of gender. The 2004 analysis pointed to differences in performance among the educational districts, with five of the eight educational districts performing below the national mean of 50.0. In addition, it was found that "in every single district, gender differences are larger in Language Arts than in Mathematics for both Standards 1 and 3" (MOE, 2004, p. iii). In 2005, the analysis was expanded to include differences among school types. In addition to the

previous general trends, the findings revealed that the private primary schools (Type 3) consistently outperformed the public primary schools, with the denominational primary performing significantly better than the government schools.

Having obtained a general sense of what was happening at the primary levels investigated, it was evident that further analysis of student achievement in relation to school type and other significant factors is now required. The purpose of this study was, therefore, to build on and deepen the analysis done in previous years by exploring the relationships between student achievement and the traits of schools, the classroom, the home, teachers, and the student.

## The Data and Results

This study focused on the Language Arts and Mathematics tests administered to Standard 3 students in 2006. The Language Arts test assessed students' performance on seven dimensions—spelling, vocabulary, comprehension, study skills, creative writing, punctuation, parts of speech, and sentence structure. The Mathematics test tapped the areas of number, measurement and money, geometry, and statistics. Both tests were of the free response format.

A sample of 1,391 students, and their parents, teachers, and school principals was selected by the MOE to complete questionnaires to elicit their experiences, perceptions, and attitudes related to schooling. This dataset provided an opportunity for secondary data analysis (Anderson, Lin, Treagust, Ross, & Yore, 2007) and an analysis of student and parent data constitutes the focus of this paper.

The questionnaires were designed to obtain a range of background information, as well as information on a variety of factors that could impact on school performance. The student questionnaires were adapted from instrumentation developed by the Consortium on Chicago School Research (2000). In the Consortium's *User's Manual*, student surveys are described as follows:

> While the content between the elementary and high school surveys did differ somewhat, all students were asked about their academic experiences, including classroom activities, homework, and the behavior of other students. In addition to their academic experiences, students were also asked about issues of safety and discipline, their motivation and expectations for learning, the peer culture of the school, the community and their involvement in it, the degree to which their parents were

involved in their education, supports for new students or students after absences, the summer school they attended in 1998, and their educational plans and aspirations. Background questions, such as whether English is the language spoken in the home, whether they were born in the United States, and questions about their parents' education. (p. 8)

The parent questionnaires were developed by the MOE (drawing on existing questionnaires) specifically for administration with the National Test. All questionnaire items (see Appendix A) were in a Likert selection format.

In Language Arts there were significant differences in the mean performance of female and male students (Table 1), whereas there were no significant differences between female and male students on Mathematics (it should be noted that the scores reported are raw scores that have not been transformed to the National Test scale with a mean of 50). School type showed significant differences on both Language and Mathematics, with Type 3 schools outperforming both Type 1 (effect sizes ≈ 1.0) and Type 2 schools (effect sizes ≈ 0.7) on both Language and Mathematics; and Type 2 schools outperforming Type 1 schools (effect sizes ≈ 0.3 on both Language and Mathematics). There were moderately strong correlations between Language and Mathematics achievement (0.77 overall), and these were relatively consistent across genders and across school types.

Although the original student questionnaires were ordered into subtest categories on the basis of response data from US students, it was considered prudent to re-analyse the response data from the Trinidad and Tobago students to empirically estimate the structure within this context. This also facilitated further analyses, and so item responses by both students and parents to each questionnaire were subjected to principal component analysis to reduce the number of variables to a more manageable set. The resulting solutions were rotated orthogonally to generate non-correlated factor scores, which were then used in the subsequent regression analyses. From the Student responses, nine factors were derived from a total of 59 items accounting for 42% of variance in the student items (Table 2); and from the Parent responses nine factors were derived from a total of 49 items accounting for 51% of the variance in the parent items (Table 3). Complete item listings and factor loadings for both Student and Parent questionnaire results are tabulated in Appendix A.

**Table 1. Mean Results for National Test 2006 – Language and Mathematics**

|  | n | Language Mean (SD) | Mathematics Mean (SD) | Correlation Language-Math |
|---|---|---|---|---|
| **Total sample** | 1,391 | 26.11 (10.9) | 26.39 (12.9) | 0.77 |
| **Gender** |  |  |  |  |
| Female | 696 | 28.54 (10.2)[a] | 26.84 (12.5)[b] | 0.77 |
| Male | 695 | 23.68 (11.0) | 25.93 (13.4) | 0.80 |
| **School type** |  |  |  |  |
| One | 306 | 23.40 (10.9)[c.] | 22.48 (12.2)[d.] | 0.77 |
| Two | 999 | 26.30 (10.6) | 26.87 (12.8) | 0.76 |
| Three | 86 | 33.61 (10.5) | 34.67 (12.4) | 0.73 |

[a] Female-Male difference on Language is significant (p=0.000).

[b.] Female-Male difference on Mathematics is non-significant.

[c.] Type differences are significant on Language – all pairs.

[d.] Type differences are significant on Mathematics – all pairs.

The Student and Parent factors were then regressed on both Language achievement and Mathematics achievement to explore the relationships of student and home characteristics to achievement. Initially, Student factors were regressed on the achievement measures separately, followed by regressions using the Parent factors—these results are reported in Appendix B (Tables A to D). However, to achieve more parsimonious reporting in this paper the final regressions were run on the combined Student and Parent factors (Tables 4 and 5) with no loss of overall pattern of relationships. It should be noted that a preliminary regression was run with the Socio-Economic Index derived from the Parent responses to evaluate its influence on achievement results. Since the $R^2$ was relatively low—0.038 for Language and 0.028 for Mathematics— it was decided not to condition the analyses by SEI and simply include SEI as one the predictors in the regression. It should also be noted that the mean SEI varied substantially across school type, with the parents in Type 1 schools yielding a mean of 0.05, those of Type 2 schools a mean SEI of -0.11, and those in Type 3 schools a mean of 1.14. Further, the correlation between SEI and achievement measures, although low, is much higher for Type 3 schools (r=0.28) than for either Type 1 schools (r=0.13) or Type 2 schools (r=0.15).

**Table 2. Student Factors**

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**Teacher Engagement**
    Items include:    My teacher praises my effort when I work hard.
    My teacher expects me to do my best all of the time.
    My teacher really listens to what I have to say.

**Reading Self-concept**
    Items include:    I am a __(poor/fair/good/very good) ___ reader.
    My friends think that I am a __(poor/fair/good/very good) ___reader.
    I read  _(a lot better than /a little bit better than/about the same/not as well as)__ my friends.

**View of Reading**
    Items include    Reading a book is something I _(never/not very often/a few times/always) like to do.
    People who read a lot are _(very interesting/interesting/ not very interesting/boring)_.
    Knowing how to read well is _(not important/a little important/important/very important)__.

**Parent Involvement**
    Items include:    How often does a parent or adult living with you wait for you at home after school?
    How often does a parent or adult living with you make sure you are prepared for school?
    How often does a parent or adult living with you praise you for doing well at school?

**Teacher Care**
    Items are:    My teacher cares if I don't do my work in class.
    My teacher cares if I get low scores in class.

**Attitude to School**
    Items include:    I often count the minutes until the class ends.
    I'm bored in school.
    I wish I did not have to go to school.

**Writing at Home**
    Items include:    How often did you write in a private diary or journal outside of school?
    How often did you write stories or letters for fun outside of school?
    How often did you write e-mails to your friends or family?

**Writing Activity**
    Items include:    For this school year, how often did you write a story?
    For this year, how often did you write a letter?
    How often do you organize your story or letter before you write?

**Reading Engagement**
    Items include:    I worry about what other children think about my reading.
    I would like for my teacher to read books out aloud to the class.
    I am glad to go back to school after vacation.

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**Table 3. Parent Factors**

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**Reading Encouragement**

| | |
|---|---|
| Items include: | How often did you or someone else in your home listen to your child read aloud? |
| | How often did you or someone else in your home encourage your child to read? |
| | How often did you or someone else in your home encourage your child to write? |

**Reading Readiness**

| | |
|---|---|
| Items include: | When your child began Primary School how well could he /she read some words? |
| | When your child began Primary School how well could he /she read sentences? |
| | When your child began Primary School how well could he /she write some words? |

**Socio-Economic Index**

| | |
|---|---|
| Items include: | About how many books are there in your home? |
| | What is the highest level of education completed by the child's father? |
| | What kind of work does the child's father do? |
| | Compared with other families, how well off do you think your family is financially? |

**Reading at Home**

| | |
|---|---|
| Items include: | When you are at home, how often do you read for work? |
| | When you are at home, how often do you read for enjoyment? |
| | When you are at home, how often do you read to get news? |

**School Engagement**

| | |
|---|---|
| Items are: | My child's school includes me in my child's education. |
| | My child's school cares about my child's progress in school. |
| | My child's school does a good job in helping my child become better in reading. |

**Early Reading**

| | |
|---|---|
| Items include: | Before your child began Primary School, how often did you read a book to him or her? |
| | Before your child began Primary School, how often did you play with alphabet toys, etc. with him or her? |
| | Before your child began Primary School, how often did you talk about things that you had read with him or her? |

**Parent Reading Attitude**

| | |
|---|---|
| Items are: | I read only if I have to. |
| | I read only if I need information. |
| | In a typical week, how much time do you usually spend reading for yourself at home? |

**Table 3.** (continued)

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**Pre-School**
      Items are:         Did your child attend pre-school?
                                How long was your child in pre-school?
                                How old was your child when he/she began Primary
                                School?

**Parent Reading Activity**
      Items are:         I like talking about books with other people.
                                I like to spend my spare time reading.
                                Reading is an important activity in my home.

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The results of the regression of Student and Parent factors on Language achievement accounted for 41% of the variance in the student Language scores for Standard 3 on the National Test (Table 4). The extent to which students view themselves as competent readers (Reading Self Concept: $\beta = 0.29$) and have a positive focus towards school and reading (Reading Engagement: $\beta = 0.28$) are positively related to achievement in Language. Student perceptions of teacher encouragement, attention, and expectations are also positively related to higher levels of Language achievement (Teacher Engagement: $\beta = 0.19$). Further, student perceptions of teachers caring about their school performance was related to Language achievement (Teacher Cares: $\beta = 0.08$). The extent to which students perceive their parents as involved with their school-related activities such as homework, school focus, and preparation is positively related to Language achievement (Parent Involvement: $\beta = 0.10$). Student attitude towards attending school in general was related to Language achievement—students indicating negative attitude tended to lower levels of achievement (Attitude to School: $\beta = 0.16$). The amount of writing activities that students reported to have engaged in was related to Language achievement (Writing Activity: $\beta = 0.10$). The extent to which students reported that they liked reading and read outside of school was not related to Language achievement (View of Reading: $\beta = $ n.s.), nor was the extent of student-reported writing activities outside of school (Writing at Home: $\beta = $ n.s.).

In relation to Language achievement, six of the Parent factors had a significant relationship. The extent to which students could read and write before entry to school, as reported by parents, was related to Language achievement (Reading Readiness: $\beta = 0.21$). A related factor—the extent of reading-based activities at home before entry to primary school—was positively related to Language achievement (Early Reading: $\beta = 0.06$). Attendance in a pre-school environment was also

related to achievement in Language (Pre-School: β = 0.06). The reported attitude of parents towards reading was related to the child's Language achievement (Parent Reading Attitude: β = 0.07). The parent-reported levels of education, employment, and financial status were related to Language achievement (Socio-Economic Index: β = 0.13). Somewhat counterintuitively, the extent to which parents reported that they or another adult in the home listened to or talked with the child about their reading or read with the child (Reading Encouragement) did not have a significant relationship to Language achievement. The extent of reading reported by parents (Reading at Home) and the kinds of reading they did (Parent Reading Activity) were not significantly related to Language achievement of these students.

**Table 4. Regression of Student and Parent Factors on LANGUAGE**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.19 | 0.23 | - | .000 |
| **Student factors** | | | | |
| Teacher engagement | 2.06 | 0.23 | 0.19 | .000 |
| Reading self-concept | 3.10 | 0.24 | 0.29 | .000 |
| Parent involvement | 1.13 | 0.23 | 0.10 | .000 |
| Teacher cares | 0.87 | 0.23 | 0.08 | .000 |
| Attitude to school | 1.77 | 0.23 | 0.16 | .000 |
| Writing activity | 1.07 | 0.23 | 0.10 | .000 |
| Reading engagement | 3.00 | 0.24 | 0.28 | .000 |
| **Parent factors** | | | | |
| Reading readiness | 2.26 | 0.23 | 0.21 | .000 |
| Socio-economic index | 1.41 | 0.23 | 0.13 | .000 |
| School engagement | 1.03 | 0.23 | 0.10 | .000 |
| Early reading | 0.60 | 0.23 | 0.06 | .009 |
| Parent reading attitude | 0.78 | 0.23 | 0.07 | .001 |
| Pre-school | 0.69 | 0.23 | 0.06 | .003 |

$R^2 = 0.41$

The regression of the Student and Parent factors on Mathematics achievement generated similar results (Table 5) as those from the Language analysis. Overall, 31% of the variance in Mathematics achievement was accounted for by the Student and Parent factors. The significant predictors are also similar. The Student factors related to Mathematics achievement were Teacher Engagement (β=0.19); Reading

self-concept (β=0.20); Parent involvement (β=0.10); Attitude to school (β=0.13); Writing activity (β=0.07); Writing at home (β=0.10); and Reading engagement (β=0.28). The Parent factors significantly related to Mathematics achievement were Reading encouragement (β=0.06); Socio-economic index (β=0.11); School engagement (β=0.08); Parent reading attitude (β=0.07); and Pre-school (β=0.05). Three differences to the Language results are the non-significance of the Parent factors of Reading readiness and Early reading, and the non-significance of the Student factor related to student perceptions of his/her Teacher caring.

In order to further explore these results, student and parent scores were aggregated at the school level along with achievement results to generate mean scores for each school included in the analyses. It must be noted that the data set was reduced from 89 schools to a total of 56 schools—only those schools with at least 10 students in the data set were included in the analysis. The regression of student and parent factors at the school level shows strong linkage to achievement, with an $R^2$ of 0.71 for mean school achievement in Language (Table 6) and 0.62 in Mathematics (Table 7). It should be noted that at the school level, the socio-economic index was not a significant predictor of school level performance in either Language or Mathematics achievement. However, both students' reading engagement and writing activities in school were significantly predictive of school level achievement—as were parent-reported averages of school engagement and reading readiness, and reported levels of pre-school attendance.

The analyses of school-level results demonstrate strong relationships between school-mean achievement in Language Arts and Mathematics, and student and parent traits and perceptions. However, these are trends in the data and do not predetermine achievement status of a specific school. For example, if we look at the mean results reported in Table 1, we see that Type 3 schools generally outperform Type 1 schools by almost one standard deviation (a 9.8 difference in mean scores) and Type 2 schools by 7.1 points. However, with a consideration of the top five schools in Language achievement it is found that one of the top schools is in fact a Type 1 school, which the general results would not suggest to be the case. So we find that although there is a large effect size in regard to school type in relation to Language achievement, at least one school does not conform to this trend.

**Table 5. Regression of Student and Parent Factors on MATHEMATICS**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.49 | 0.29 | - | .000 |
| **Student factors** | | | | |
| Teacher engagement | 2.50 | 0.30 | 0.19 | .000 |
| Reading self-concept | 2.61 | 0.30 | 0.20 | .000 |
| Parent involvement | 1.35 | 0.30 | 0.10 | .000 |
| Attitude to school | 1.60 | 0.29 | 0.13 | .000 |
| Writing activity | 1.29 | 0.29 | 0.10 | .000 |
| Writing at home | 0.87 | 0.30 | 0.07 | .003 |
| Reading engagement | 3.68 | 0.30 | 0.28 | .000 |
| **Parent factors** | | | | |
| Reading encouragement | 0.68 | 0.26 | 0.06 | .010 |
| Socio-economic index | 1.52 | 0.30 | 0.11 | .000 |
| School engagement | 0.97 | 0.30 | 0.08 | .001 |
| Parent reading attitude | 0.95 | 0.30 | 0.07 | .001 |
| Pre-school | 0.67 | 0.30 | 0.05 | .024 |

$R^2 = 0.31$

**Table 6. Regression of School Average Scores of Student and Parent Factors on LANGUAGE Achievement**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.31 | 0.53 | - | .000 |
| **Student factors** | | | | |
| Writing activity | 4.85 | 1.02 | 0.38 | .000 |
| Reading engagement | 5.75 | 1.26 | 0.40 | .000 |
| **Parent factors** | | | | |
| Reading readiness | 8.91 | 1.96 | 0.40 | .000 |
| School engagement | 2.89 | 1.45 | 0.16 | .050 |
| Pre-school | 5.75 | 1.79 | 0.26 | .002 |

$R^2 = 0.71$

**Table 7. Regression of School Average Scores of Student and Parent Factors on MATHEMATICS Achievement**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.43 | 0.74 | - | .000 |
| **Student factors** | | | | |
| Writing activity | 4.14 | 1.43 | 0.27 | .006 |
| Reading engagement | 7.14 | 1.82 | 0.41 | .000 |
| **Parent factors** | | | | |
| Reading readiness | 6.67 | 2.72 | 0.25 | .018 |
| School engagement | 4.32 | 2.03 | 0.19 | .038 |
| Early reading | 6.54 | 2.64 | 0.23 | .017 |
| Pre-school | 5.99 | 2.49 | 0.22 | .020 |

$R^2 = 0.62$

## Discussion

It is evident that student and parent traits and perceptions are substantially related to student achievement in the foundational skills of Language Arts and Mathematics as measured by the National Test. These skills are likely to be fundamental to academic performance in the long term. So by knowing something about a student's reading readiness, self-concept, reading engagement, and perceptions of teacher engagement we may be better able to predict success in school. And this can lead to informed policy initiatives and instructional enhancements being developed and implemented to improve student achievement and overall school performance. By knowing about relationships of parent encouragement and attention to the academic performance of their children, schools could encourage parents to attend to their child's reading and other school-related activities, and even encourage positive parental attitudes towards reading in general. Through the development of better communications between schools and parents these attitudes and activities could be enhanced—leading to improved achievement by the students.

Given that these findings were obtained for students at a very early stage in their school career (Standard 3), it is possible that a significant impact can be made on student achievement in the long term if attention is paid to the factors identified above as contributing to student achievement. This enhanced focus on schooling could also lead to better

perceptions of the value of education in later life and decrease the current levels of dropout, particularly by male students in Trinidad and Tobago who have relatively high levels of droupout as reported in a recent study (George, 2006).

It is to be noted that many of these student and parent factors cross over from Language to Mathematics achievement, suggesting that they have a general relationship to academic performance. Consequently, by developing school-based initiatives to address these factors—for example, student attitudes towards schools, student perceptions of teacher caring, or parental encouragement of student reading—there could be enhanced achievement by students and higher levels of school performance in Language Arts and Mathematics.

It is also shown that a factor such as the socio-economic index is significantly related to achievement, although family economic, educational, and vocational levels are not accessible to educational policy intervention. However, in future rounds of analyses we will be conducting multi-level analysis using teacher and school (principal) level perceptions, attitudes, and traits to investigate traits that could modulate the effects of SEI on student achievement, and to identify those teachers or schools that enhance equity of achievement across students from variant socio-economic backgrounds. By identifying these teachers and schools, we should be able to learn the kinds of instructional and organizational approaches that could be generalized across schools in Trinidad and Tobago.

In suggesting the need for the development of evidence-based policy and the implementation of educational programmes and approaches, we are keenly aware of the need to monitor and evaluate the effects of any such developments. The current research and the results for the National Test could be used as a baseline measure of educational performance in Trinidad and Tobago. The nature and levels of future achievement, student and parental factors, and school traits could then be measured, analysed, and compared to monitor educational performance in Trinidad and Tobago schools, and to further our understandings of student achievement and school performance.

Some initial steps that could be taken based on our results include the development of initiatives that would target the manner in which students view their schooling environment, since these perceptions are consistently related to achievement. It would be worthwhile to investigate the extent to which these relationships are directional, in the sense that enhanced perceptions result in enhanced achievement as opposed to the conjecture that students with higher levels of achievement tend to develop more positive perceptions of themselves and their school

environment. Another initiative could focus on teacher caring and encouragement, which is positively related to student achievement—creating professional development programmes for teachers to enhance their caring and encouraging behaviours in the classroom, aimed particularly at schools that have been identified as having lower levels of both student achievement and student perceptions of teacher caring and encouragement. Our analyses suggest this could lead to higher levels of student and school achievement. A third initiative based on the results of this research would be aimed at parents—to encourage parental engagement in their children's schooling and achievement.

In summary, many of the factors significantly related to student achievement in this study have a fair degree of commonality, in that they are centred on the attention given by students and parents to what could be termed the general elements of schooling: reading engagement; student self-regard for their own abilities (reading readiness in this case); parental encouragement of student engagement with their studies; student perceptions of teacher caring and encouragement; and parental perceptions of feeling welcomed to and engaged with the school. When aggregated at the school level to yield school traits, school level performance is also strongly related to student and parental factors. These factors could be viewed as a generalized positive academic focus—awareness and attention to schooling by students, parents, and teachers. Perhaps steps could be taken that could help to build a positive influence on student achievement—help students attend more closely to school-based learning activities and environmental elements, promoting teacher behaviours that are likely to be viewed by students as caring and encouraging, and have the school consciously take steps to further parental perceptions of participation.

## Future Directions

The adoption of an evidence-based based approach to policy development and curricular implementation is a positive step toward better education in Trinidad and Tobago: higher achievement, more equitable schooling, and more enhanced access and engagement by students, teachers, and parents. These are the intended outcomes. However, achieving these outcomes would require attention to at least three issues: the development of assessment literacy in the education community; the nature of the research conducted by the consortium as we move forward; and the expanded role of the School of Education (SOE), UWI, St. Augustine. Each of these issues will be discussed below.

The educational system of Trinidad and Tobago has made substantial investments in the production and collection of achievement information—the expansion of the National Test from 2 primary school levels to 5 is one index of this interest—and there should be concomitant attention paid to the wise use of the results of these investments. The use of these data to improve the quality of schools demands a high level and broad presence of assessment knowledge or literacy. Assessment literacy can be defined as the assessment-related knowledge, skills, and competencies of educators. Stiggins (2001) states: "assessment literacy comprises two skills: first is the ability to gather dependable and quality information about student achievement; second is the ability to use that information effectively to maximize student achievement" (p. 21). So that not only is the development and administration of high-quality achievement tests a part of assessment literacy, but also competencies such as the communication of results (report cards, school and system level reports, student grades and scores); understanding how to use assessment information to maximize student motivation and learning by involving students as full partners in assessment, record keeping, and communication; and how to effectively communicate with parents so they better understand the meanings and limitations of assessment information.

However, more recently, other formal attempts to conceptualize the term *assessment literacy* have widened the group of stakeholders for whom assessment literacy is applicable. For example, in addition to teachers, Orrell (2005) refers to the need for assessment literacy at various levels, including community stakeholders, parents, students, and student associations. Further, Newfields (2006) states that assessment literacy is not a single phenomenon "with some unitary sort of meaning…it means different things to different populations" (p. 1).

The desire for increased participation by, and dialogue among, the numerous stakeholders directly and indirectly involved in the process of education requires shared understandings around assessment issues. Within the context of Trinidad and Tobago, the programme for assessment literacy should be developed to help stakeholders to come to shared understandings about current practices, as well as the history of assessment in the country; the complex nature of assessment, for example, the various purposes of assessment, various assessment concepts, such as reliability and validity of tests; and the specific findings of annual National Tests and the interpretation of these findings. However, any programme that is developed to address the assessment literacy of the various stakeholders—teachers, parents, business, and the media, for example, must be cognizant of the many possible entry points

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in relation to knowledge about assessment issues and concepts and, hence, of the various possible outcomes. Accordingly, the programme devised should include clear paths to numerous outcomes with seamless movement from one point to another.

Secondly, the research reported here is based on a statistical analysis of assessment data and student, parent, and educator questionnaire responses, which generates general patterns of relationships among student achievement, behaviours, attitudes, and perceptions. As we have pointed out, there are certainly specific situations in which the patterns do not hold. The meanings, reasons, and motivations underlying the relationships are not revealed by the analyses conducted here. To explore these areas, which are likely to yield valuable insight into student and school performance, will require research utilizing alternate methodologies. Further research should expand our repertoire of methodologies leading to a more comprehensive programme of research that would include qualitative studies and adopt mixed methods designs (see Brown, 2005; Gorard, 2002; Smyth, 2006; Trochim, 2006). Over time, with a broad spectrum of research approaches it is likely that the consortium would develop a more nuanced and holistic understanding of education, schooling, and schools, which should in turn lead to more insightful, meaningful, and realistic policy recommendations.

Finally, the SOE, as a member of the research consortium, should not restrict its role to participation in the research activities, but should also collaborate with stakeholders to disseminate the findings of the research, which would be tailored to the audience to which it is presented. This would require publications that are not only appropriate for academic journals, but public reports, presentations, and discussions that can be understood by the various groups of stakeholders without compromising validity and meaning of the main ideas being communicated.

What we (the research consortium) have done is a good start, but we suggest that the initiative of using empirical evidence to help better understand, and, over time, improve education within schools in Trinidad and Tobago is far from over.

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# Appendix A

## Factors from Student & Parent Questionnaires

### Student Item Factors

| **FACTOR 1** | | **Teacher Engagement** |
|---|---|---|
| ITEM5A | 0.419 | My teacher encourages me to do extra work when I don't understand something? |
| ITEM5B | 0.543 | My teacher praises my effort when I work hard. |
| ITEM5E | 0.702 | My teacher expects me to do my best all of the time |
| ITEM5F | 0.610 | My teacher expects me to complete my homework every night. |
| ITEM5G | 0.680 | My teacher thinks that it is important that I do well in class |
| ITEM6D | 0.452 | I usually look forward to the class every day. |
| ITEM6E | 0.512 | I work hard to do my best in the class |
| ITEM7A | 0.557 | My teacher really listens to what I have to say |
| ITEM7B | 0.665 | My teacher helps me to improve if I am behind. |
| ITEM7C | 0.629 | My teacher notices if I have trouble learning something |
| ITEM7D | 0.613 | My teacher is willing to give extra help on schoolwork if I need it |
| ITEM7E | 0.734 | My teacher believes that I can do well in school |
| ITEM8A | 0.387 | I am glad to go back to school after vacation |

| **FACTOR 2** | | **Reading Self-concept** |
|---|---|---|
| ITEM1A | -0.793 | My friends think that I am a ___reader |
| ITEM1B | -0.695 | I read ___ my friends |
| ITEM1C | -0.547 | When I come to a word I don't know, I can ___ figure it out |
| ITEM1D | -0.650 | When I am reading by myself, I understand____ I read |
| ITEM1E | 0.836 | I am a ___reader |
| ITEM1G | 0.480 | When my teacher asks me a question about what I read, I __ think of an answer. |
| ITEM1I | 0.307 | When I am in a group talking about stories I ___ talk about my ideas |
| ITEM1J | 0.764 | When I read out loud I am ___ reader |

| **FACTOR 3** | | **View of Reading** |
|---|---|---|
| ITEM2A | 0.488 | Reading a book is something I ___like to do |
| ITEM2B | -0.549 | My best friend thinks that reading is __. |
| ITEM2C | 0.350 | I tell my best friends about good books I read |
| ITEM2D | -0.565 | People who read a lot are ___. |
| ITEM2E | -0.531 | I think a Library is ___ place to spend time |
| ITEM2F | 0.386 | Knowing how to read will is __. |

| | | |
|---|---|---|
| ITEM2G | 0.615 | I think reading is ___ way to spend time |
| ITEM2H | 0.461 | When I grow up I will spend ___ of my time reading |
| ITEM2I | -0.341 | I would like for my teacher to read books out aloud to the class |
| ITEM2J | -0.571 | When someone gives me a book as a present I feel __. |

**FACTOR 4**          **Parent Involvement**

| | | |
|---|---|---|
| ITEM9A | 0.422 | How often does a parent or adult, living with you, wait for you at home after school? |
| ITEM9B | 0.561 | How often do a parent or adult living with you, make sure you are prepared for school? |
| ITEM9C | 0.548 | How often does a parent or adult living with you, make sure you get to school on time? |
| ITEM9D | 0.430 | How often does a parent or adult living with you, is somewhere that you can get in touch with any time you need to? |
| ITEM10A | 0.514 | How often does a parent or adult living with you help you with your homework? |
| ITEM10B | 0.675 | How often does a parent or adult living with you check to see if you have done your homework? |
| ITEM10C | 0.565 | How often does a parent or adult living with you praise you for doing well at school? |
| ITEM10D | 0.556 | How often does a parent or adult living with you encourage you to work hard at school? |

**FACTOR 5**          **Teacher Care**

| | | |
|---|---|---|
| ITEM5C | 0.806 | My teacher cares if I don't do my work in class. |
| ITEM5D | 0.832 | My teacher cares if I get low scores in class. |

**FACTOR 6**          **Attitude to School**

| | | |
|---|---|---|
| ITEM6A | -0.559 | I often count the minutes until the class ends. |
| ITEM6C | -0.662 | I am usually bored with what goes on in the class. |
| ITEM8B | -0.697 | I 'm bored in school. |
| ITEM8D | -0.574 | I wish I did not have to go to school. |
| ITEM8E | -0.468 | I wish I could go to a different school. |

**FACTOR 7**          **Writing at home**

| | | |
|---|---|---|
| ITEM4A | 0.496 | How often did you write in a private diary or journal outside of school? |
| ITEM4B | 0.465 | How often did you write stories or letters for fun outside of school? |
| ITEM4C | 0.692 | How often did you write e-mails to your friends or family? |

| ITEM4D | 0.704 | How often do you use a computer at home to make changes to the story or letter that you are writing at home? |
| ITEM4E | 0.347 | When you write at home how often did your parent talk to you about what you were writing? |

**FACTOR 8**                **Writing Activity**

| ITEM3A | 0.634 | For this school year how often did you write a story? |
| ITEM3B | 0.658 | For this year, how often did you write letter? |
| ITEM3C | 0.367 | How often do you organize your story or letter before you write ( for example make an outline, draw a chart)? |
| ITEM3D | 0.388 | How often did you make changes to your story or letter to fix mistakes/ errors and improve it? |
| ITEM3E | 0.405 | How often did you work with other students in pairs or small groups to discuss and improve your story or letter? |

**FACTOR 9**                **Reading Engagement**

| ITEM1F | -0.561 | I worry about what other children think about my reading |
| ITEM2I | -0.389 | I would like for my teacher to read books out aloud to the class. |
| ITEM6B | 0.447 | I get so interested in my work, I did not want to stop.. |
| ITEM8A | 0.422 | I am glad to go back to school after vacation. |

## Parent Item Factors

**FACTOR 1**                **Reading Encouragement**

| ITEM7AP | 0.565 | How often did you or someone else in your home listen to your child read aloud? |
| ITEM7BP | 0.476 | How often did you or someone else in your home talk to your child about things we have done? |
| ITEM7CP | 0.646 | How often did you or someone else in your home talk with your child about what he/she is reading on his/her own? |
| ITEM7DP | 0.471 | How often did you or someone else in your home talk with your child about what I am reading (or what someone else in my home is reading? |
| ITEM7EP | 0.638 | How often did you or someone else in your home discuss your child's classroom reading work with him/her? |
| ITEM7FP | 0.226 | How often did you or someone else in your home go to the library or bookstore with your child? |
| ITEM7GP | 0.728 | How often did you or someone else in your home encourage your child to read? |

| ITEM7HP | 0.709 | How often did you or someone else in your home encourage your child to write? |

**FACTOR 2**  **Reading Readiness**

| ITEM6AP | 0.705 | When your child began Primary School how well could he /she recognise most of the letters of the alphabet? |
| ITEM6BP | 0.810 | When your child began Primary School how well could he /she read some words? |
| ITEM6CP | 0.804 | When your child began Primary School how well could he /she read sentences? |
| ITEM6DP | 0.735 | When your child began Primary School how well could he /she write letters of the alphabet? |
| ITEM6EP | 0.783 | When your child began Primary School how well could he /she write some words? |

**FACTOR 3**  **Socio-Economic Index**

| ITEM12P | 0.441 | About how many books are there in your home? |
| ITEM13mP | 0.644 | What is the highest level of education completed by the child's father, stepfather or male guardian? |
| ITEM13fP | 0.640 | What is the highest level of education completed by the child's mother, stepmother, or female guardian? |
| ITEM15mP | 0.532 | What kind of work does the child's father, stepfather or male guardian do for their main jobs? |
| ITEM15fP | 0.610 | What kind of work does the child's mother, stepmother or female guardian do for their main jobs? |
| IITEM16P | -0.492 | Compared with other families, how well off do you think your family is financially |

**FACTOR 4**  **Reading at Home**

| ITEM10AP | 0.557 | When you are at home, how often do you read for work |
| ITEM10BP | 0.553 | When you are at home, how often do you read for enjoyment |
| ITEM10CP | 0.483 | When you are at home, how often do you read for to get news |
| ITEM10DP | 0.635 | When you are at home, how often do you read for my education/school |
| ITEM10EP | 0.526 | When you are at home, how often do you read for other reasons |

**FACTOR 5**  **School Engagement**

| ITEM8AP | 0.772 | My child's school includes me in my child's education |
| ITEM8CP | 0.848 | My child's school cares about my child's progress in school |
| ITEM8DP | 0.798 | My child's school does a good job in helping my child become better in reading |

**FACTOR 6**  **Early Reading**

| | | |
|---|---|---|
| ITEM2AP | -0.639 | Before your child began Primary School, how often did you or someone else in your home read a book to him or her? |
| ITEM2BP | -0.659 | Before your child began Primary School, how often did you or someone else in your home tell stories to him or her? |
| ITEM2CP | -0.620 | Before your child began Primary School, how often did you or someone else in your home sing songs with him or her? |
| ITEM2DP | -0.636 | Before your child began Primary School, how often did you or someone else in your home play with alphabet toys etc. with him or her? |
| ITEM2EP | -0.515 | Before your child began Primary School, how often did you or someone else in your home talk about things you had done with him or her? |
| ITEM2FP | -0.604 | Before your child began Primary School, how often did you or someone else in your home talk about things what you had read with him or her? |
| ITEM2GP | -0.658 | Before your child began Primary School, how often did you or someone else in your home play word games with him or her? |
| ITEM2HP | -0.675 | Before your child began Primary School, how often did you or someone else in your home write letters or words with him or her? |
| ITEM2IP | -0.646 | Before your child began Primary School, how often did you or someone else in your home read aloud signs and labels with him or her? |

**FACTOR 7**  **Parent Reading Attitude**

| | | |
|---|---|---|
| ITEM9P | 0.439 | In a typical week, how much time do you usually spend reading for yourself at home, including books, magazines, newspapers and materials for work |
| ITEM11AP | 0.778 | I read only if I have to. |
| ITEM11DP | 0.781 | I read only if I need information. |

**FACTOR 8**  **Pre-School**

| | | |
|---|---|---|
| ITEM3P | 0.628 | Did your child attend Pre-school? |
| ITEM4P | -0.366 | How long was your child in pre-school? |
| ITEM5P | 0.749 | How old was your child when he/she began Primary School? |

**FACTOR 9**  **Parent Reading Activity**

| | | |
|---|---|---|
| ITEM11BP | 0.675 | I like talking about books with other people. |
| ITEM11C P | 0.654 | I like to spend my spare time reading. |
| ITEM11EP | 0.545 | Reading is an important activity in my home. |

# Appendix B

## Regression Results from Separate Analyses of Student & Parent Data

### Table A. Regression of Student Factors on LANGUAGE

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.12 | 0.24 | - | .000 |
| Teacher engagement | 2.30 | 0.24 | 0.21 | .000 |
| Reading self-concept | 3.91 | 0.24 | 0.36 | .000 |
| Parent involvement | 1.38 | 0.24 | 0.13 | .000 |
| Teacher cares | 1.12 | 0.24 | 0.10 | .000 |
| Attitude to school | 1.92 | 0.24 | 0.18 | .000 |
| Writing activity | 0.93 | 0.24 | 0.09 | .000 |
| Reading engagement | 3.51 | 0.24 | 0.32 | .000 |

$R^2 = 0.34$

### Table B. Regression of Student Factors on MATHEMATICS

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.40 | 0.30 | - | .000 |
| Teacher engagement | 2.69 | 0.30 | 0.21 | .000 |
| Reading self-concept | 3.28 | 0.30 | 0.25 | .000 |
| Parent involvement | 1.53 | 0.30 | 0.12 | .000 |
| Attitude to school | 1.76 | 0.30 | 0.14 | .000 |
| Writing activity | 0.68 | 0.30 | 0.05 | .024 |
| Writing at home | 1.10 | 0.30 | 0.09 | .000 |
| Reading engagement | 4.22 | 0.30 | 0.33 | .000 |

$R^2 = 0.26$

**Table C. Regression of Parent Factors on LANGUAGE**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.21 | 0.26 | - | .000 |
| Reading encouragement | 0.68 | 0.26 | 0.06 | .010 |
| Reading readiness | 3.44 | 0.26 | 0.32 | .000 |
| Socio-economic index | 2.12 | 0.26 | 0.20 | .000 |
| Reading at home | 0.53 | 0.26 | 0.05 | .043 |
| School engagement | 1.29 | 0.26 | 0.12 | .000 |
| Early reading | 1.39 | 0.26 | 0.13 | .000 |
| Parent reading attitude | 1.47 | 0.26 | 0.14 | .000 |
| Pre-school | 0.97 | 0.26 | 0.09 | .000 |

$R^2 = 0.20$

**Table D. Regression of Parent Factors on MATHEMATICS**

| Variable | B | SE$_B$ | β | p |
|---|---|---|---|---|
| Constant | 26.52 | 0.33 | - | .000 |
| Reading readiness | 3.16 | 0.33 | 0.32 | .000 |
| Socio-economic index | 2.15 | 0.33 | 0.17 | .000 |
| School engagement | 1.26 | 0.33 | 0.10 | .000 |
| Early reading | 1.15 | 0.33 | 0.09 | .000 |
| Parent reading attitude | 1.60 | 0.33 | 0.12 | .000 |
| Pre-school | 0.86 | 0.33 | 0.07 | .009 |

$R^2 = 0.13$