

MEMORANDUM

September 10, 2012

TO: Board Members

FROM: Terry B. Grier, Ed.D.
Superintendent of Schools

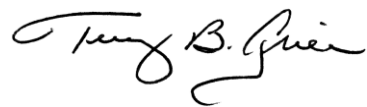
SUBJECT: **Effects of HISD Prekindergarten on Kindergarten Performance Evaluation Report**

CONTACT: Carla Stevens, (713) 556-6700

Attached is the 2011–2012 evaluation report on the effects of HISD prekindergarten on kindergarten performance. The prekindergarten curriculum focuses on beginning literacy, numeracy, and socio-emotional development of the children and establishes the basis of children's future academic success. The purpose of the current report was to examine the effects of HISD prekindergarten education programs on students' kindergarten achievement as assessed by both norm-referenced and criterion-referenced exams administered by the district. Because economic status has a strong effect on achievement, the effect of economic status was accounted for when examining the effect of HISD prekindergarten on student performance.

Approximately, 70 percent of the 2011–2012 HISD kindergarten students attended HISD prekindergarten in 2010–2011. Statistically significant differences in performance on the 2011–2012 Stanford 10 and Aprenda 3 were found between students who attended HISD prekindergarten in 2010–2011 compared to their economically-disadvantaged peers who did not attend HISD prekindergarten. Findings suggest that the effects of HISD prekindergarten on 2012 kindergarten Stanford performance were stronger for students who are economically-disadvantaged. Moreover, attending HISD prekindergarten seems to mitigate the effects of economic disadvantage status on kindergarten Stanford performance.

Additionally, on the end-of-year 2012 TPRI inventories assessing Phonological Awareness and Graphophonemic Knowledge, the economically-disadvantaged HISD prekindergarten student group had a greater percentage of students scoring at the "developed" level compared to the economically-disadvantaged student group who did not attend prekindergarten.



TBG

Attachment

cc: Superintendent's Cabinet
Chief School Officers
Nancy Gregory
Mary Jane Gomez
Alison Heath



RESEARCH

Educational Program Report

PREKINDERGARTEN EDUCATION PROGRAM: EFFECTS OF HISD PREKINDERGARTEN ON KINDERGARTEN PERFORMANCE, 2011-2012

DEPARTMENT OF RESEARCH AND ACCOUNTABILITY
HOUSTON INDEPENDENT SCHOOL DISTRICT



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PREKINDERGARTEN EDUCATION PROGRAM: EFFECTS OF HISD PREKINDERGARTEN ON KINDERGARTEN PERFORMANCE, 2011–2012

Executive Summary

Program Description

In compliance with the Texas Education Code § 29.153, the Houston Independent School District (HISD) has provided free prekindergarten classes for eligible Houston area four-year old students since the 1985–1986 scholastic year. The program curriculum focuses on beginning literacy, numeracy, and socio-emotional development, supporting the individual linguistic and cultural needs of the children served. The prekindergarten program curriculum forms the basis of children's future academic success. The purpose of this evaluation is to examine the extent that students' benefit from attending HISD prekindergarten. To determine the academic benefits of prekindergarten, the academic performance of students who attended HISD prekindergarten were compared to students who were not enrolled in prekindergarten the previous year. Specific measures of student performance include:

- Stanford 10 and Aprenda 3 reading and math scores;
- Reading comprehension levels on the TPRI Early Reading Assessment and Tejas LEE

The current report also examined prekindergarten program enrollment trends and the proportion of kindergarten students enrolled in HISD prekindergarten from 2006–2007 to 2011–2012.

Highlights

- Statistically significant differences in performance on the 2011–2012 Stanford 10 were found between economically-disadvantaged students who attended HISD prekindergarten in 2010–2011 and their economically-disadvantaged peers who did not attend HISD prekindergarten.
- The economically-disadvantaged students who attended HISD prekindergarten in 2010–2011 outperformed their economically-disadvantaged peers who did not attend HISD prekindergarten by seven NCEs on the reading subtest and by seven NCEs on the math subtest in 2012. However, the effects of HISD prekindergarten on student performance on the Stanford were small.
- The effects of HISD prekindergarten on 2012 kindergarten Stanford performance were stronger for students who are economically-disadvantaged.
- Attending HISD prekindergarten mitigates the effects of economic disadvantage status on kindergarten Stanford performance.
- Students who attended HISD prekindergarten in 2010–2011 and who took the Aprenda, outperformed the student groups who did not attend HISD prekindergarten, regardless of economic status.
- On the 2011–2012 Aprenda, students who attended HISD prekindergarten in 2010–2011 outperformed their peers who did not attend HISD prekindergarten by fourteen NCEs on the reading subtest and by fourteen NCEs on the math subtest.

- Students who attended HISD prekindergarten in 2010–2011 were 29 percent more likely to score at the developed level on the end-of year TPRI screening assessment in 2012 compared to their counterparts who did not attend HISD prekindergarten, after accounting for the effects of age, gender, economic status, LEP, and special education classification on performance.
- On the end-of-year 2012 TPRI inventories assessing Phonological Awareness and Graphophonemic Knowledge, the economically-disadvantaged HISD prekindergarten student group had a greater percentage of students scoring at the “developed” level compared to the economically-disadvantaged student group who did not attend HISD prekindergarten.
- On the end-of-year 2012 Tejas Lee inventories assessing Phonological Awareness and Graphophonemic Knowledge, the HISD prekindergarten student group had a greater percentage of students scoring at the “developed” level compared to the economically-disadvantaged student group who did not attend HISD prekindergarten in 2010–2011.

Recommendations

1. There were approximately 1,923 kindergarten students who met eligibility criteria for prekindergarten (based on economic status in kindergarten), but who did not attend HISD prekindergarten programs. Early Childhood Department should consider expanding their recruitment strategy to capture these potentially eligible prekindergarten students.
2. Given findings suggesting that HISD prekindergarten is benefitting low-income students in kindergarten, elementary grade curriculums in the district should build on the prekindergarten curriculum to continue to enhance the academic gains made by low-income students as they progress through elementary grade-levels.
3. Future evaluations reports should account for prekindergarten student performance levels once uniform prekindergarten assessments are implemented throughout the district next year.
4. To understand the influence that HISD prekindergarten has on student performance, it is imperative that evaluation reports take into account student-level differences that may also have an effect on performance.

Administrative Response

The HISD Early Childhood Department along with HISD Early Childhood Centers and elementary schools will continue to coordinate and expand recruitment efforts to ensure an increase in the enrollment of eligible students who do not attend HISD prekindergarten programs. The HISD Early Childhood Department will continue to support the recruitment effort, and provide an aligned curriculum, instruction, and assessment prekindergarten program to serve the academic needs of prekindergarten students.

Introduction

Early childhood education researchers have found that high quality prekindergarten programs enhance students' cognitive development and increase academic achievement in the long-term, particularly for students from disadvantaged backgrounds (Brooks-Gunn, 2003; Currie, 2001; Gormley, Gayer, Phillips, Dawson, 2005; Magnuson, Rhum, and Waldfogel, 2007). Review of findings also suggests that the beneficial effects of an early childhood intervention are typically much larger for more disadvantaged youth (see Currie, 2001; Magnuson et al., 2007). Despite the improved outcomes for economically-disadvantaged children who attend early childhood programs (i.e., Head Start), their average levels of achievement tend to be lower compared to their non-economically-disadvantaged peers (Currie & Neidell, 2007).

The extent that early childhood interventions improve the school readiness of low-income children remains an area of on-going debate (Nisbitt, 2009) due to the varying findings when it comes to the nature and size of the effects these programs have on student outcomes (see Currie, 2001). One of the reasons proposed for the variations in findings is the selection of biased comparison groups (Zhai, Brooks-Gunn, & Waldfogel, 2011). Previous studies have simply compared students who received a formal preschool education to all other students who did not receive a formal preschool education without controlling for demographic characteristics, such as economic status, that influence student performance (Gormley et al., 2005). The effects that low socioeconomic status has on students' academic outcomes are well documented (e.g., Aikens & Barbarin, 2008; Brooks-Gunn, 2003; Chatterji, 2006). Therefore, the current evaluation has taken into consideration a students' socioeconomic status when assessing the effects of HISD's prekindergarten programs on student achievement.

Methods

Data Collection and Analysis

- Data compiled for this report included student enrollment and individual identification numbers collected from the Texas Education Agency's (TEA) Public Education Information Management System (PEIMS). Student performance data were collected from the following test assessments: the Stanford Achievement Test (Stanford 10), the Aprenda: La Prueba de Logros en Espanol (Aprenda 3), the Texas Primary Reading Inventory (TPRI), and El Inventario de Lectura en Español de Tejas (Tejas LEE). SPSS 18, a statistical software program, was used to conduct statistical analyses throughout the report.
 - Stanford Achievement Test (Stanford 10). The Stanford 10 assesses students' academic achievement in various academic subjects across nine grade levels (kindergarten through grade 8). Kindergarten students take the Stanford at the end of the fall semester of the academic year. Normal curve equivalent scores (NCE; a normalized standard score) are reported in the current evaluation to assess student kindergarten performance.
 - La prueba de logros en español, Tercera edición (Aprenda 3). The Aprenda 3 is a norm-referenced, standardized achievement test in Spanish, and is used to assess the level of content mastery for students who receive instruction in Spanish. The Aprenda assesses students' academic achievement in the same content areas as the

Stanford (i.e., reading and math); however, the Aprenda is not a translation of the Stanford.

- Texas Primary Reading Inventory (TPRI, 2010). The Texas Primary Reading Inventory (TPRI) is a teacher-administered assessment of reading skills for children. The primary purposes of the TPRI are to facilitate a teacher's capacity to identify children at-risk for reading difficulties and to determine the appropriate instructional objectives and interventions for these students. The TPRI is administered three times a year. Kindergarten students first take the TPRI screening test, which assesses their letter knowledge and phonemic awareness to determine whether they are developed (D) or are still developing (SD). Students classified as developed on the screening section are not likely at risk of developing reading difficulties. For students who score still developing on the screening section, additional portions of the inventory are administered. The current evaluation gathered students' results on the Screening assessment, Phonological Awareness Inventory 1 (Rhyming) and Graphophonemic Knowledge Inventory 6 (Letter Name Identification).
- El Inventario de Lectura en Español de Tejas (Tejas LEE). The Tejas LEE measures reading skills important to the development of Spanish reading and comprehension in kindergarten through 3rd grade. The Tejas LEE is administered three times a year and is used to determine appropriate instructional interventions. The current evaluation examined students' beginning of the year performance levels on Inventory 1 (Identificación de las letras/Letter Naming) assessing graphophonemic knowledge and Inventory 3 (Conocimiento de rimas/Rhyming) assessing phonological awareness.
- The current analysis focused on the performance of the 2011–2012 HISD kindergarten students enrolled in any one of the HISD prekindergarten programs in 2010–2011. Table 1 (p. 15) provides a breakdown of the demographic characteristics of the 2011–2012 HISD kindergarteners by whether they were enrolled in HISD prekindergarten in 2010–2011. Students included in the HISD prekindergarten group were enrolled across 176 schools in one of four program designs (A) Early Childhood Centers, (B) School-based Prekindergarten, (C) HISD/Head Start Collaborative, and (D) Montessori programs (See Appendix A for a list of schools). The non-prekindergarten cohort¹ is the comparison group. Because it is well documented that economic status has a strong effect on student achievement (Aikens & Barbarin, 2008), these groups were further disaggregated by economic status.²
- A 2 X 2 between subjects Analysis of Variance (ANOVA) design using HISD prekindergarten (attended HISD prekindergarten and did not attend HISD prekindergarten) and economic status (economically-disadvantaged and not economically-disadvantaged) was used to evaluate the Stanford and Aprenda reading and math performance of HISD kindergarten students.
- Several Analysis of Variance assumptions were tested (i.e., normality, independence, homogeneity of variance). A few of the analyses did not meet the homogeneity of variance assumption. When the homogeneity of variance assumption was not met, a Welch F-test was conducted for significance testing. To test for simple effects, two separate ANOVAs were

¹ Students in the non-prekindergarten cohort enrolled in one of the four local Head Start agencies the previous year were not included in the analysis.

² Students who are eligible for free or reduced-price meals under the National School Lunch and Child Nutrition Program were classified as economically-disadvantaged.

conducted. Prior to conducting the first ANOVA, the split file method in SPSS was used (file was split by economic status) to test the simple effects of HISD prekindergarten on Stanford performance. For the second ANOVA, the data file was split by HISD prekindergarten to test the simple effects of economic status on Stanford performance.

- To predict the likelihood of kindergarten students being classified as “developed” on the TPRI End-of-Year Screening Assessment, an indicator of whether a child is “at risk” of developing reading difficulties, three logistic regression analysis models were employed. The first model included five student demographic characteristics (economic status, gender, special education status, age, and Limited English proficiency (LEP) classification) as predictors; the second model included HISD prekindergarten enrollment status³. Finally, the third model included both the demographic controls as well as the HISD prekindergarten enrollment status. The reason that three different models were included was to examine whether the effects of attending prekindergarten were significant after controlling for demographic variables associated with academic performance.

Data Limitations

- The current evaluation has a few limitations that should be addressed. The first limitation is that it is not known whether students who did not attend HISD prekindergarten received some other form of early childhood intervention. However, for the current year, students who were enrolled in one of the local Head Starts were identified and excluded from the comparison group given that these students had received some form of early childhood intervention. The second limitation is that comparison groups were not matched by prior performance levels because students within each of these groups are not administered the same assessments in kindergarten. Controlling for performance levels at the beginning of kindergarten may help explain some of the variance in performance between groups. The final limitation is that an experimental design was not used to evaluate the effects of prekindergarten on student performance.

Results

What was the HISD prekindergarten program enrollment trend in the last six years?

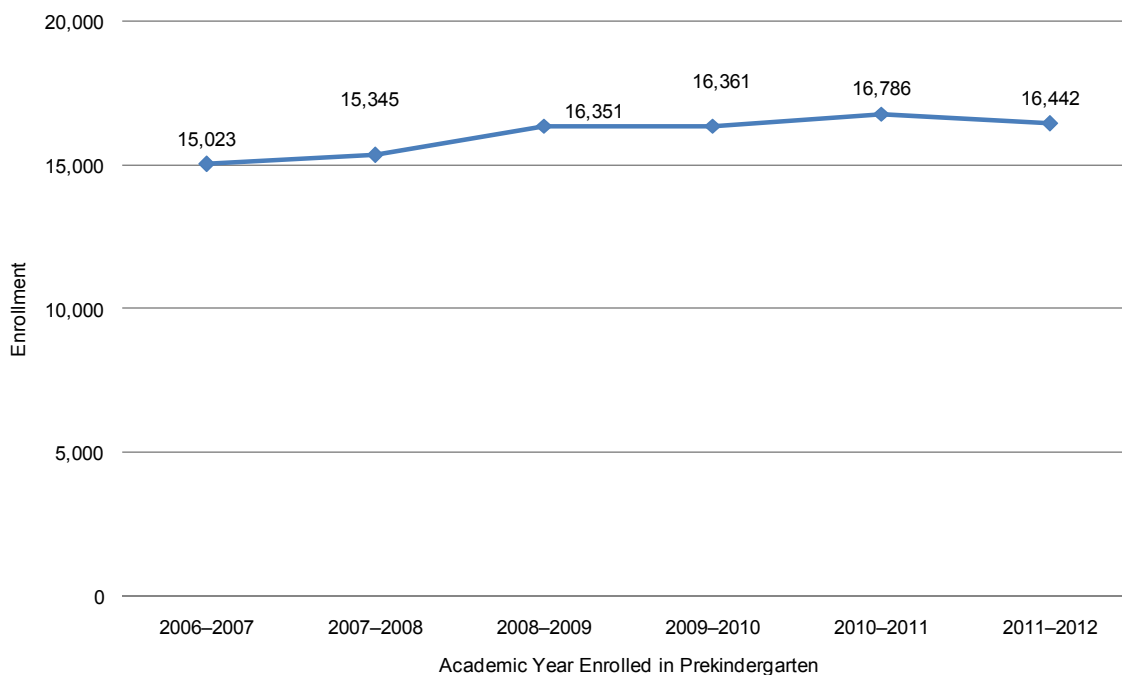
- **Figure 1** (p. 6) presents the prekindergarten enrollment trend of HISD students from 2006–2007 through the 2011–2012 academic years.
- The average annual increase of students enrolled in HISD prekindergarten was 2.3 percent, with the largest jump in enrollment between 2007–2008 and 2008–2009.
- The total growth over the five periods depicted in Figure 1 was 9.5 percent, which stands in contrast to the district-wide slight decline in enrollment over the last five periods (-0.4 percent; see HISD District and School Profiles).

What was the six-year trend in the proportion of kindergarten students who were enrolled in HISD prekindergarten the previous year?

- **Figure 2** (p. 7) depicts the percent of kindergarteners from 2006–2007 through 2011–2012 who had been enrolled in an HISD prekindergarten program the previous year.

³ Students who attended HISD prekindergarten were coded a 1 and those who did not were coded 0.

Figure 1. The 2006–2012 enrollment trends of students who attended prekindergarten in HISD.



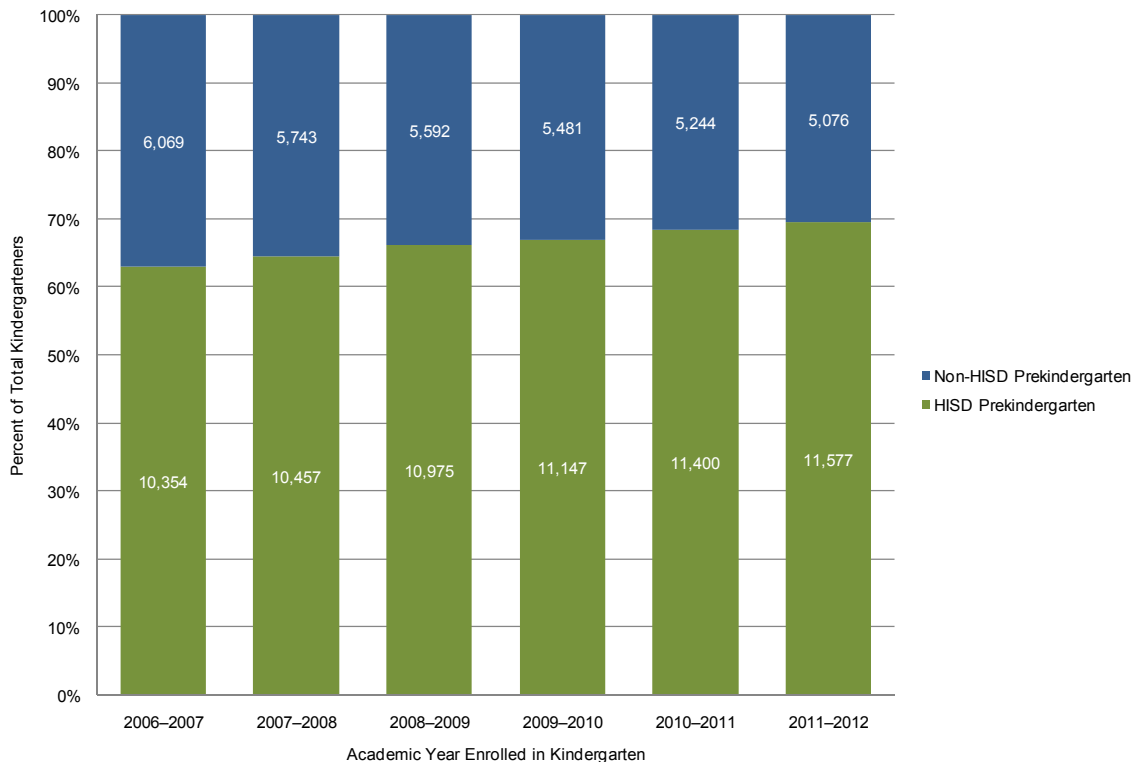
- The proportion of kindergarteners who attended HISD prekindergarten the previous year has increased on average by 1.3 percent annually over the last six years.
- In 2006–2007, approximately 63.0 percent of kindergarteners were enrolled in HISD prekindergarten the previous year, and by 2011–2012, the proportion of kindergarteners who attended HISD prekindergarten was at 70.0 percent.
- Of the 2011–2012 kindergarteners, 88 percent who were eligible to attend prekindergarten (based on their economic status classification in kindergarten) attended prekindergarten.

What was the effect of HISD prekindergarten and economic status on students' 2011–2012 Stanford performance in kindergarten?

Stanford Reading

- Stanford Reading Mean Normal Curve Equivalent (NCE) scores by HISD prekindergarten groups and by economic status are presented in **Figure 3** (p. 8) (See Table 2, p. 16, for additional descriptive statistics).
- Statistically significant differences in mean reading NCE scores were found based on HISD prekindergarten enrollment and economic status.
 - The main effect of HISD prekindergarten, $F(1, 9632) = 59.39$, $p < .001$, $\eta^2 = .01$ was significant.
 - The main effect of economic status, $F(1, 9632) = 676.73$, $p < .001$, $\eta^2 = .07$, was significant.
- Economically-disadvantaged students who attended HISD prekindergarten scored significantly higher on the reading subtest compared to economically-disadvantaged students who did not attend HISD prekindergarten (7 NCEs).
 - The simple effect of HISD prekindergarten for economically-disadvantaged students, $F(1, 7030) = 190.89$, $p < .001$, $\eta^2 = .02$, was significant.

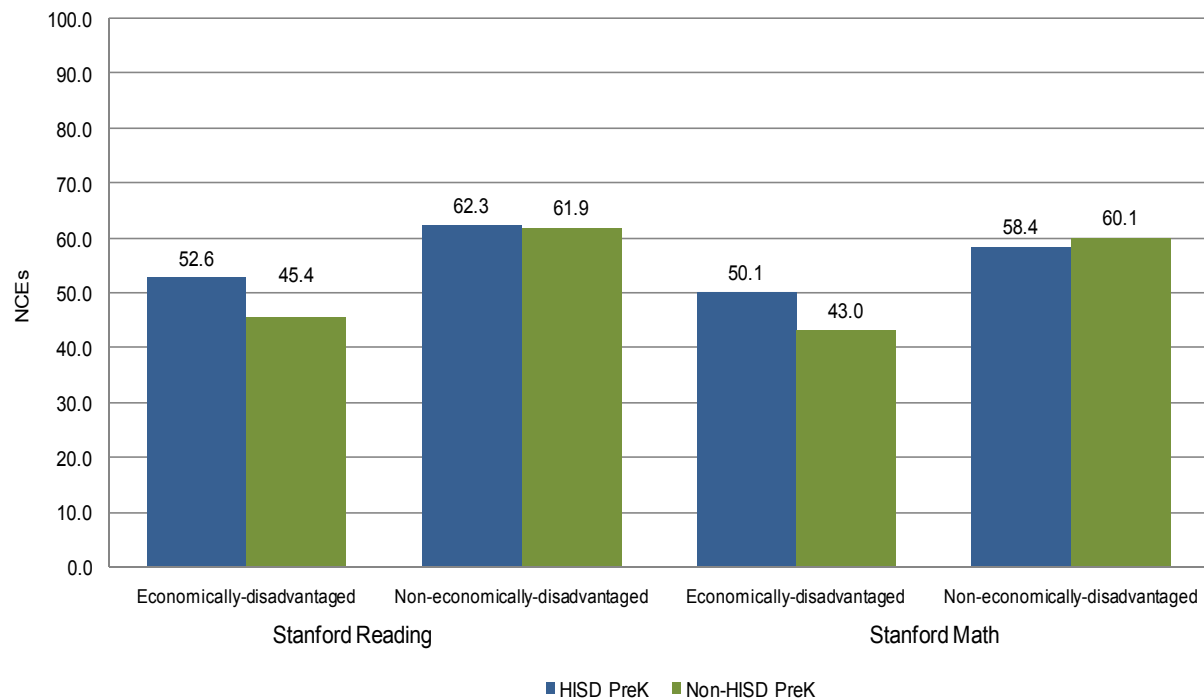
Figure 2. Six-year trend in the percent and number of kindergarteners who attended HISD prekindergarten the previous year.⁴



- No statistically significant differences in reading scores emerged among non-economically-disadvantaged students who attended HISD prekindergarten and who did not attend HISD prekindergarten.
 - The simple effect of HISD prekindergarten for non-economically-disadvantaged students, $F(1, 2604) = 127.39$, $p > .05$, $\eta^2 = .01$, was not significant.
- Among students who attended HISD prekindergarten, non-economically-disadvantaged students scored significantly higher than economically-disadvantaged students (10 NCEs).
 - The simple effect of economic status for students who attended HISD prekindergarten, *Welch's* $F(1, 1023.66) = 146.01$, $p < .001$, est. $\omega^2 = .02$, was significant.
- Among students who did not attend HISD prekindergarten, non-economically-disadvantaged students scored significantly higher than economically-disadvantaged students (17 NCEs) did.
 - The simple effect of economic status for students who did not attend HISD prekindergarten, *Welch's* $F(1, 3506.06) = 583.33$, $p < .001$, est. $\omega^2 = .14$, was significant.
- The extent that HISD prekindergarten had an influence on Stanford performance varied by students' economic status.

⁴ Data retrieved from TEA PEIMS, 2006–2007, 2007–2008, 2008–2009, 2009–2010, 2010–2011, and 2011–2012. HISD prekindergarten count includes kindergarten students classified as Early Education (early childhood programs other than state-approved prekindergarten and kindergarten). HISD non-prekindergarten students may include students who had repeated kindergarten.

Figure 3. Mean Stanford scores for HISD kindergarten students who were enrolled in HISD prekindergarten the previous year and comparison group by economic status, 2011–2012.



- At the same time, the extent that economic status had an influence on Stanford performance varied by whether the student attended HISD prekindergarten.
 - The interaction between HISD prekindergarten and economic status was significant, $F(1, 9632) = 45.66, p < .001, \eta^2 = .01$ (see Appendix B).
- The influence of economic status on Stanford performance was stronger for the student group that did not attend HISD prekindergarten compared to the student group that did attend HISD prekindergarten.

Stanford Math

- Stanford Math mean Normal Curve Equivalent (NCE) scores by HISD prekindergarten groups and by economic status are presented in **Figure 3** (See Table 2 for additional descriptive statistics).
- Statistically significant differences in mean math NCE scores were found based on HISD prekindergarten enrollment and economic status.
 - The main effect of HISD prekindergarten, $F(1, 9679) = 25.67, p < .001, \eta^2 = .00$, was significant.
 - The main effect of economic status, $F(1, 9679) = 588.78, p < .001, \eta^2 = .06$, was significant.
- Economically-disadvantaged students who attended HISD prekindergarten the previous year scored significantly higher on the math subtest compared to economically-disadvantaged students who did not attend HISD prekindergarten in 2010–2011 (7 NCEs).

- The simple effect of HSD prekindergarten for economically-disadvantaged students, *Welch's F* (1, 2983.48) = 142.61, $p < .001$, est. $\omega^2 = .02$, was significant.
- Non-economically-disadvantaged students who did not attend HSD prekindergarten scored slightly higher on the math subtest compared to the student group who did attend HSD prekindergarten (two NCEs).
 - The simple effect of HSD prekindergarten for non-economically-disadvantaged students, $F(1, 2617) = 4.23$, $p < .05$, $\eta^2 = .00$, was significant.
- Among students who attended HSD prekindergarten, non-economically-disadvantaged students scored significantly higher in math compared to economically-disadvantaged students (8 NCEs).
 - The simple effect of economic status for students who attended HSD prekindergarten, *Welch's F* (1, 1102.97) = 120.65, $p < .001$, est. $\omega^2 = .02$, was significant.
- Among students who did not attend HSD prekindergarten, non-economically-disadvantaged students scored significantly higher in math than economically-disadvantaged students (17 NCEs).
 - The simple effect of economic status for students who did not attend HSD prekindergarten, *Welch's F* (1, 3573.33) = 596.87, $p < .001$, est. $\omega^2 = .14$, was significant.
- The extent HSD prekindergarten had an influence on Stanford math performance varied by students' economic status.
- The extent economic status had an influence on Stanford math performance varied by whether the student attended HSD prekindergarten.
 - The interaction between HSD prekindergarten and economic status was also significant, $F(1, 9679) = 70.48$, $p < .001$, $\eta^2 = .01$ (see Appendix B).
- The influence of economic status on Stanford performance was stronger for the student group that did not attend HSD prekindergarten compared to the student group that did attend HSD prekindergarten.

What is the effect of 2010–2011 HSD prekindergarten attendance and economic status on students' 2011–2012 Aprenda performance in kindergarten?

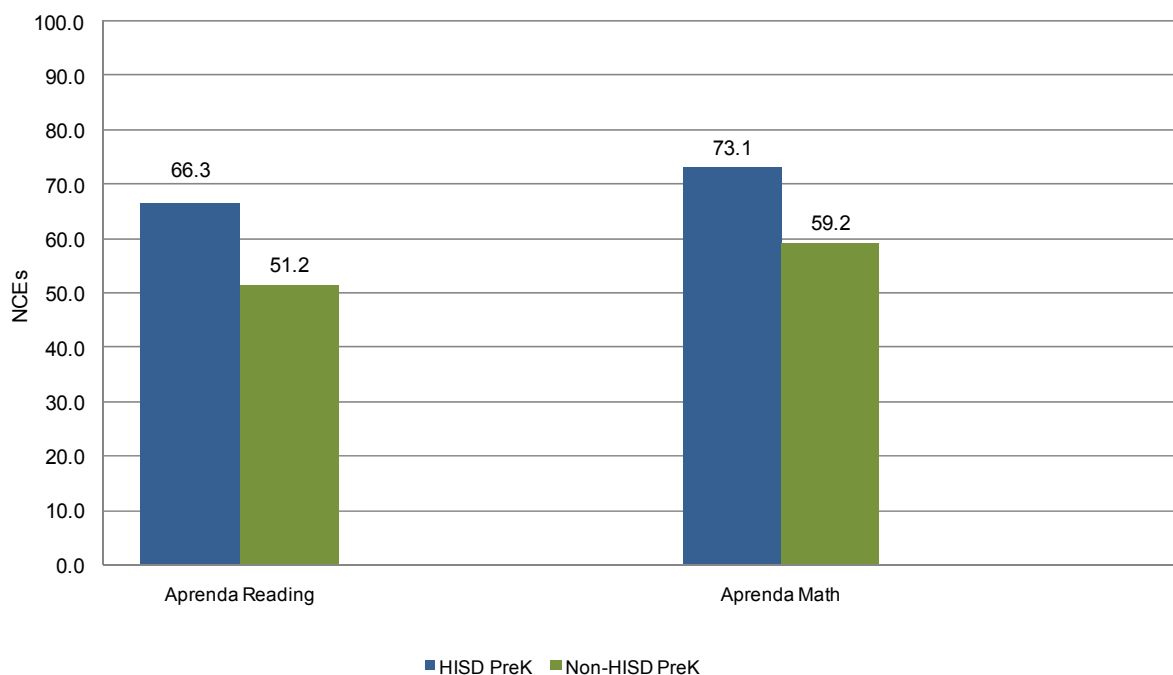
Aprenda Reading

- Aprenda Reading mean Normal Curve Equivalent (NCE) scores by HSD prekindergarten groups are displayed in **Figure 4** (p. 10) (See Table 3, p. 16, for additional descriptive statistics).
- Statistically significant differences in mean reading NCE scores were found based on HSD prekindergarten enrollment only.
 - The main effect of HSD prekindergarten, $F(1, 5968) = 87.19$, $p < .001$, $\eta^2 = .01$, was significant; whereas, the main effect of economic status, $F(1, 5968) = 0.13$, $p > .05$, $\eta^2 = .00$, was not significant. The interaction between HSD prekindergarten and economic status was also not significant, $F(1, 5968) = 2.36$, $p > .05$, $\eta^2 = .00$. Therefore, no further testing of simple effects was necessary.
- Students who attended HSD prekindergarten scored significantly higher on the reading subtest compared to students who did not attend HSD prekindergarten (15 NCEs), regardless of economic status.

Aprenda Math

- Apenda Math Mean Normal Curve Equivalent (NCE) scores by HISD prekindergarten groups are displayed in Figure 4 (See Table 3 for additional descriptive statistics).
- Statistically significant differences in mean NCE scores were found based on HISD prekindergarten enrollment only.
 - The main effect of HISD prekindergarten, $F(1, 5976) = 73.53$, $p < .001$, $\eta^2 = .01$, was significant; whereas, the main effect of economic status, $F(1, 5976) = 0.87$, $p > .05$, $\eta^2 = .00$, was not significant. The interaction between HISD prekindergarten and economic status was not significant, $F(1, 5976) = 1.14$, $p > .05$, $\eta^2 = .00$. Therefore, no further testing of simple effects was necessary and group means were disaggregated only by HISD prekindergarten enrollment status.
- Students who attended HISD prekindergarten scored significantly higher on the math subtest compared to students who did not attend HISD prekindergarten (14 NCEs), regardless of economic status.

Figure 4. Mean Apenda scores for HISD kindergarten students who were enrolled in HISD prekindergarten the previous year and comparison group, 2011–2012.



What are the odds that a student who attended HISD prekindergarten was classified as “developed” (not at risk for reading difficulties) based on the 2011–2012 End-of-Year TPRI Screening Assessment?

- Five demographic characteristics (economic status, gender, special education status, age, LEP classification) emerged as significant predictors of students' scoring at the "developed" level on the 2011–2012 TPRI End-of-Year screening assessment (see Table 4, p. 17).
- HISD prekindergarten enrollment status alone, without accounting for other demographic characteristics, did not have a significant predictive effect on whether a student scored at the "developed" level on the TPRI screening assessment.
- When accounting for all five demographic characteristics mentioned, students who attended HISD prekindergarten were 29 percent more likely to score at the "developed" level compared to their counterparts who did not attend HISD prekindergarten.

How did kindergarten students who attended HISD prekindergarten in 2010–2011 perform on the 2011–2012 End-of-Year TPRI inventories compared to their peers who did not attend HISD prekindergarten in 2010–2011?

Inventory 1: Rhyming & Inventory 6: Letter Name Identification

- The economically-disadvantaged HISD prekindergarten group had a greater percentage of students scoring at the "developed" level compared to the economically-disadvantaged student group who did not attend HISD prekindergarten on both the "Rhyming" and "Letter Name Identification" inventories (see **Figure 5**, p. 12, and Table 5, p. 18).
- The non-economically-disadvantaged HISD prekindergarten group had a greater percentage of students scoring at the "developed" level compared to their non-economically-disadvantaged counterparts who did not attend HISD prekindergarten on the "Rhyming" inventory.
- Conversely, the non-economically-disadvantaged HISD prekindergarten group had a slightly lower percentage of students scoring at the "developed" level compared to their non-economically-disadvantaged counterparts who did not attend HISD prekindergarten on the "Letter Name Identification" inventory.

How did kindergarten students who attended HISD prekindergarten in 2010–2011 perform on the 2011–2012 End-of-Year Tejas LEE inventories compared to their peers who did not attend HISD prekindergarten?

Tejas LEE Inventory 1: Letter Naming & Tejas LEE Inventory 3: Rhyming

- Both economically-disadvantaged and non-economically-disadvantaged HISD prekindergarten groups had a greater percentage of students scoring at the "developed" level compared to their counterparts who did not attend HISD prekindergarten on the "Letter Naming" and "Rhyming inventories", regardless of economic status (see **Figure 6**, p. 12, and Table 6, p. 18).
- The difference in percentage was much greater for the economically-disadvantaged groups.

Figure 5. Percent of kindergarten students identified as “Developed” on the 2011–2012 End-of-Year TPRI Inventories by HISD prekindergarten enrollment and economic status.

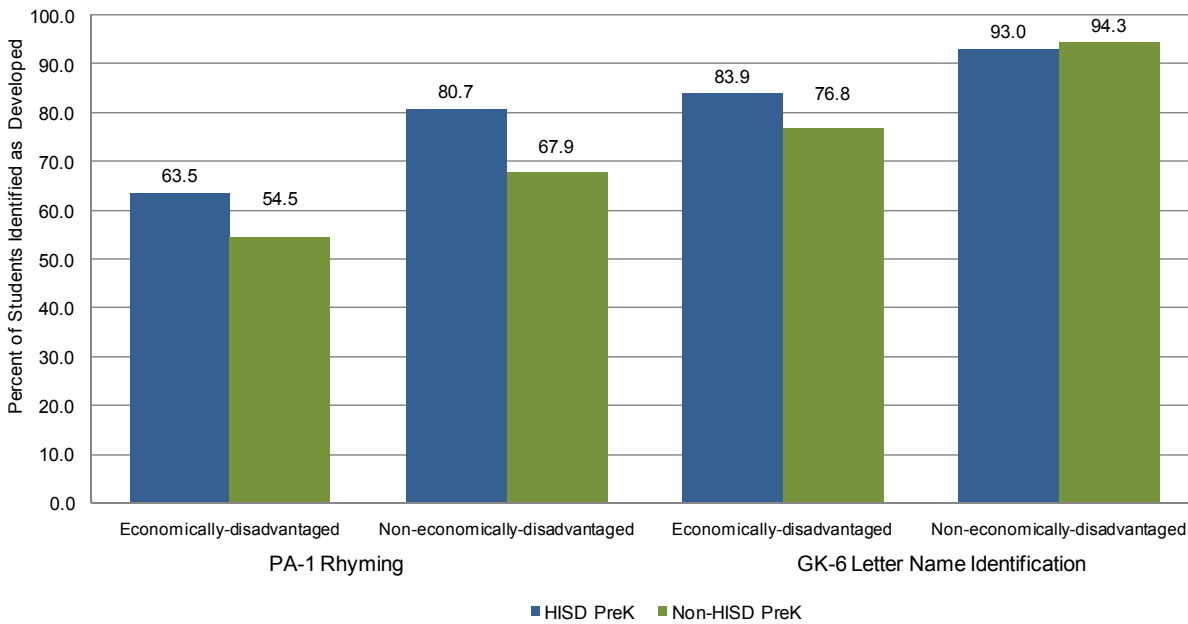
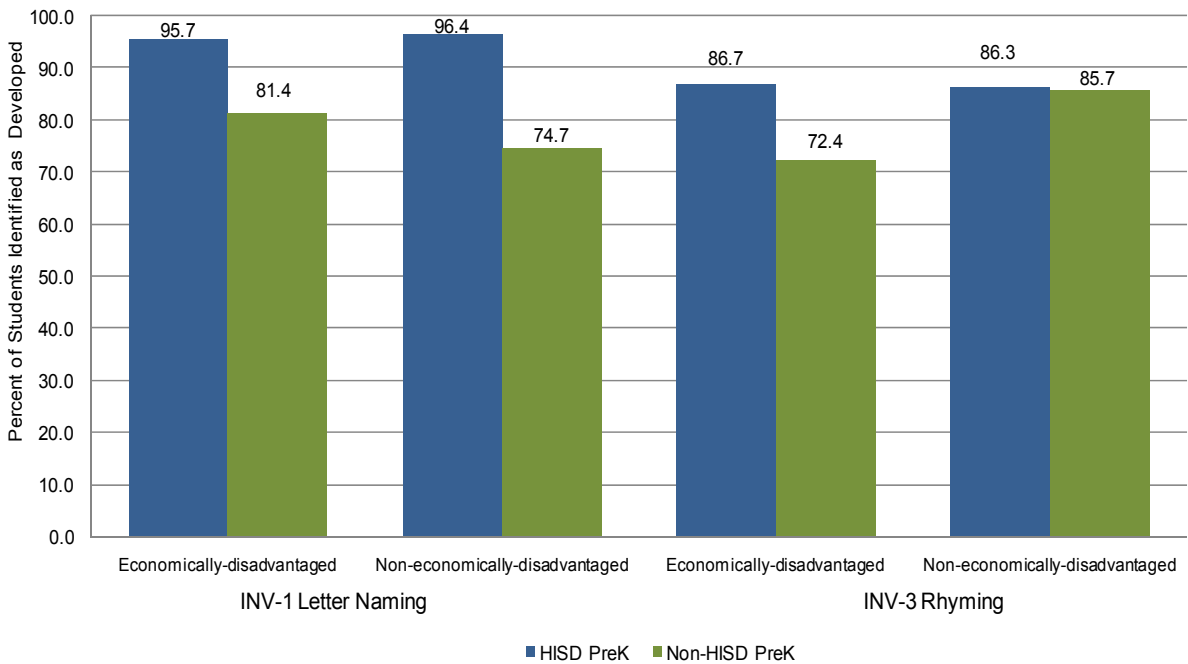


Figure 6. Percent of kindergarten students identified as “Developed” on the 2011–2012 End-of-Year Tejas LEE Inventories by HISD prekindergarten enrollment and economic status.



Discussion

The overall purpose of prekindergarten education is to increase the school readiness of disadvantaged students who may otherwise fall behind because of their environments and conditions. The current evaluation examined the effect of 2010–2011 HISD prekindergarten on students' achievement in kindergarten during the 2011–2012 academic year. Findings from the evaluation indicate that the effects of HISD prekindergarten on students' kindergarten Stanford reading and math performance are stronger for students who are economically-disadvantaged. In addition, students' economic status has a greater effect on the Stanford performance of students who did not attend HISD prekindergarten than for students who did attend HISD prekindergarten. This suggests that attending HISD prekindergarten mitigates the effects of being economically-disadvantaged on kindergarten academic performance.

The tendency of students who attended HISD prekindergarten to perform at lower levels than their non-economically-disadvantaged peers who did not attend prekindergarten was not seen in students' average performance level on the Aprenda and the Tejas LEE Spanish language tests. The data suggest that economic status did not play a significant role on HISD students' performance on Spanish language exams. In other words, students who attended HISD prekindergarten and who took the Aprenda, tended to outperform the student groups who did not attend HISD prekindergarten, regardless of economic status.

After controlling for a students' age, gender, economic status, LEP, and Special Education classification, attending HISD prekindergarten had a statistically significant influence on whether students were classified as “developed” based on the TPRI Screening Assessment. In other words, after accounting for these five demographic characteristics, students who attended HISD prekindergarten were less likely to be identified as “at-risk” for developing reading difficulties compared to their counterparts who did not attend HISD prekindergarten.

Given that the current evaluation highlighted differences in student performance associated with HISD prekindergarten enrollment and economic status, future evaluations should examine additional variables to understand how economic status affects the performance of these kindergarten students. Researchers have proposed that family processes, such as parental involvement, are a link through which economic status affects students' academic outcomes (Brooks-Gunn, 2003), and has been found to protect at-risk students from negative academic outcomes (Chatterji, 2006). Future evaluations will attempt to determine the extent that parental involvement influences the kindergarten performance of students who attended an HISD Early Childhood Center.

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Table 1: 2011–2012 Demographic Characteristics of HISD Kindergarteners by 2010–2011 Prekindergarten and Non-Prekindergarten Student Groups

	HISD Prekindergarten (N = 11,464)		HISD Non-Prekindergarten (N = 4,945)	
	N	%	N	%
Gender				
Female	5,678	49.5	2,404	48.6
Male	5,786	50.5	2,541	51.4
Race/Ethnicity				
African American	2,428	21.2	1,217	24.6
Hispanic	8,417	72.7	2,291	46.3
White	259	2.3	974	19.7
Asian	228	2.0	335	6.8
American Indian	21	0.2	10	0.2
Pacific Islander	11	0.1	5	0.1
More than 2 Races	47	0.4	113	2.3
Limited English Proficient (LEP)	6,268	55.0	1,317	25.8
Economically-disadvantaged	10,499	92.1	3,189	62.5
Tuition Based PreK 2009–2010	142	1.2	N/A	N/A
Special Education	444	3.9	153	3.0

Note. All data retrieved from PEIMS 2011–2012. There were 16,653 total students enrolled in 2011–2012 kindergarten programs; however, 131 students were also enrolled in kindergarten in 2010–2011 and 113 students were classified as “EE” in 2010–2011. These students were excluded from analysis.

Table 2: Means and Standard Deviations of 2012 Stanford 10 Reading and Math Normal Curve Equivalent (NCE) Scores by Economic Status and HISD 2010–2011 Prekindergarten Enrollment Status Groups

	Prekindergarten Enrollment Status Groups			
	HISD PreK		Non-HISD PreK	
<u>Stanford Reading</u>	n	M	n	M
Economically-disadvantaged	5,239	52.64 ^{a***} (19.40)	1,792	45.35 ^a (18.86)
Non-economically-disadvantaged	811	62.33 (21.54)	1,794	61.85 (21.94)
<u>Stanford Math</u>				
Economically-disadvantaged	5,267	50.06 ^{b***} (20.77)	1,798	43.03 ^b (21.82)
Non-economically-disadvantaged	813	58.35 ^{c*} (19.91)	1,805	60.09 ^c (20.06)

Note. Standard deviations appear in parentheses below means. Differences in means with similar superscripts within rows were statistically significant. * $p < .05$. *** $p < .01$.

Table 3: Means and Standard Deviations of 2012 Aprenda 3 Reading and Math Normal Curve Equivalent (NCE) Scores by HISD 2010–2011 Prekindergarten Enrollment Status Groups

	Prekindergarten Enrollment Status Groups			
	HISD PreK		Non-HISD PreK	
<u>Aprenda</u>	n	M	n	M
Reading	5,111	66.31 ^{a***} (22.23)	861	51.19 ^a (22.80)
Math	5,111	73.06 ^{***} (20.78)	865	59.19 ^b (21.42)

Note. *** $p < .01$. Standard deviations appear in parentheses below means. Differences in means with similar superscripts within rows were statistically significant.

Table 4: Hierarchical Logistic Regression on Scoring “Developed” on the 2012 TPRI End-of-Year Screening Assessment

“Developed” on TPRI Screening			
	Model 1	Model 2	Model 3
Variable	Exp(b)	Exp(b)	Exp(b)
Economically-disadvantaged = 1	0.38***		0.30***
Gender (Female = 1)	1.62***		1.62***
Special Education = 1	0.37***		0.33***
Age	1.53***		1.52***
Limited English Proficient (LEP) = 1	0.72***		0.66***
HISD Prekindergarten = 1		1.11	1.73***
-2LL	6666.04	6953.55	6607.42
Model Chi-square	289.97***	2.46	348.59***
Nagelkerke Pseudo R^2	0.06	0.01	0.07

Note. $N = 8,581$. ; * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5: Percent of Students Identified as Developed on the 2012 End-of-Year TPRI Inventories by Economic Status and HISD Prekindergarten Enrollment Status Groups

	Prekindergarten Enrollment Status Groups			
	HISD PreK		Non-HISD PreK	
	n	%D	n	%D
<u>PA-1 Rhyming</u>				
Economically-disadvantaged	682	63.5	358	54.5
Non-economically-disadvantaged	57	80.7	106	67.9
<u>GK-1 Letter Name Identification</u>				
Economically-disadvantaged	682	83.9	358	76.8
Non-economically-disadvantaged	57	93.0	106	94.3

Note. D = "Developed."

Table 6: Percent of Students Identified as Developed on the 2012 End-of-Year TPRI Inventories by Economic Status and HISD Prekindergarten Enrollment Status Groups

	Prekindergarten Enrollment Status Groups			
	HISD PreK		Non-HISD PreK	
	n	%D	n	%D
<u>INV-1 Letter Naming</u>				
Economically-disadvantaged	4,882	95.7	757	81.4
Non-economically-disadvantaged	139	96.4	91	74.7
<u>INV-3 Rhyming</u>				
Economically-disadvantaged	4,882	86.7	757	72.4
Non-economically-disadvantaged	139	86.3	91	85.7

Note. D = "Developed."

APPENDIX A

SCHOOLS ATTENDED BY 2011–2012 KINDERGARTEN STUDENTS IN 2010–2011

Campus Number	Campus Name
102	ALCOTT
104	ALMEDA
105	ANDERSON
106	ATHERTON
107	BARRICK
108	BASTIAN
109	BERRY
110	BLACKSHEAR
111	BONHAM
112	BONNER
113	RODERICK R PAIGE
114	BRAEBURN
115	DURHAM
116	BRIARGROVE
117	BRISCOE
119	BROOKLINE
120	BROWNING
121	BRUCE
122	BURBANK
123	CODWELL
124	BURNET
125	BURRUS
127	WOODSON SCHOOL
128	LYONS
130	CONDIT
131	HALPIN EARLY CHILDHOOD CTR
132	COOP
133	CORNELIUS
134	CRAWFORD
135	CROCKETT
136	CUNNINGHAM
137	DE CHAUMES
138	DE ZAVALA
139	DODSON
140	DOGAN
143	BRIARMEADOW CHARTER
147	ELIOT
148	ELROD

APPENDIX A (CONT.)

149	EMERSON
151	BELL
152	FIELD
153	FONDREN
154	FOSTER
155	FRANKLIN
156	FROST
157	GARDEN OAKS
158	GARDEN VILLAS
159	GOLFCREST
160	GORDON
162	GREGG
164	GRIMES
166	HARRIS J R
167	HARRIS R P
168	HARTSFIELD
169	HARVARD
170	HELMS
171	HENDERSON J
172	HENDERSON N
173	HEROD
174	HIGHLAND HTS
175	HOBBY
179	HOUSTON GARDENS
180	ISAACS
181	JANOWSKI
182	JEFFERSON
185	KASHMERE GARDENS
186	ROBINSON
187	KELSO
188	KENNEDY
189	KOLTER
192	LANTRIP
195	LOCKHART
196	LONGFELLOW
197	LOOSCAN
198	LOVE
199	LOVETT
200	H S FOR BUSINESS AND ECONOMIC SUCCESS
201	MACGREGOR
202	MCDADE

APPENDIX A (CONT.)

203	MADING
204	MEMORIAL
207	MONTGOMERY
209	NEFF
210	NORTHLINE
211	OAK FOREST
212	OATES
213	OSBORNE
214	PARK PLACE
215	PARKER
216	PATTERSON
217	PECK
218	PILGRIM ACADEMY
219	PINEY POINT
220	PLEASANTVILLE
221	POE
222	PORT HOUSTON
223	PUGH
224	RED
225	REYNOLDS
226	RHOADS
227	MCNAMARA
229	ROBERTS
231	ROOSEVELT
232	ROSS
233	RUCKER
234	THE RUSK SCHOOL
237	SCARBOROUGH
238	SCOTT
239	SHEARN
240	SHERMAN
241	SINCLAIR
242	SMITH
243	THOMPSON
244	SOUTHMAYD
245	STEVENS
246	STEVENSON
247	YOUNG
248	SUTTON
249	TRAVIS
251	TWAIN

APPENDIX A (CONT.)

252	WAINWRIGHT
253	WALNUT BEND
254	WESLEY
255	WEST UNIVERSITY
256	WHARTON K-8 DUAL LANGUAGE ACADEMY
257	WHIDBY
258	WHITTIER
259	WILSON MONTESSORI
260	WINDSOR VILLAGE
262	GRISSOM
263	LAW
264	MITCHELL
265	PETERSEN
266	E O SMITH
267	WHITE
268	BENBROOK
269	SCROGGINS
271	FOERSTER
273	ASHFORD
274	ASKEW
275	BUSH
279	TIJERINA
281	SANCHEZ
282	GREGORY-LINCOLN ED CTR (EE-5)
283	GARCIA
285	VALLEY WEST
286	HERRERA
287	CAGE
289	MARTINEZ C
290	CRESPO
291	GALLEGOS
292	CARRILLO
295	BENAVIDEZ
296	T H ROGERS
297	DAVILA
298	MARTINEZ R
299	MILNE
328	TSU CHARTER LAB SCH
350	ENERGIZED FOR EXCELLENCE EARLY CHILDHOOD ACAD
352	FARIAS EARLY CHILDHOOD CENTER
353	SCHOOL AT ST GEORGE PLACE

APPENDIX A (CONT.)

354	MISTRAL CENTER FOR EARLY CHILDHOOD
355	KING EARLY CHILDHOOD CTR
357	LAURENZO EARLY CHILDHOOD CTR
358	COOK JR
359	MORENO
360	BELLFORT EARLY CHILDHOOD CENTER
369	GROSS
371	YOUNG SCHOLARS ACADEMY FOR EXCELLENCE
372	RODRIGUEZ
373	SEGUIN
378	KANDY STRIPE ACADEMY
389	KETELSEN
392	YOUNG LEARNERS
395	HINES-CALDWELL
396	RAY DAILY

APPENDIX B

INTERACTION GRAPHS

