MEMORANDUM January 20, 2017

TO: Lance Menster
Officer, Elementary Curriculum and Development

FROM: Carla Stevens
Assistant Superintendent, Research and Accountability

SUBJECT: **EFFECTS OF HISD PREKINDERGARTEN PROGRAMS ON KINDERGARTEN STUDENTS' ACADEMIC ACHIEVEMENT, 2015–2016**

This evaluation compares the academic achievement of kindergarten students who were previously enrolled in an HISD prekindergarten program (Pre-K) to their Non-HISD Pre-K peers on the 2015–2016 Iowa Assessments and Logramos 3rd Edition Norm Reference Tests (NRT).

Key findings include:

- HISD Pre-K students who took the Logramos language arts and mathematics subtests achieved higher mean standard scores than those of their Non-HISD Pre-K peers. In contrast, HISD Pre-K students achieved lower mean standard scores than those of Non-HISD Pre-K peers on the Iowa English language arts and mathematics subtests.

- Students who attended an HISD Pre-K program for two consecutive years achieved mean standard scores on the Iowa and Logramos language arts and mathematics subtests that were higher than those of their peers who attended only one year of HISD Pre-K.

- HISD prekindergarten programs were observed to have small positive effects for students who were identified as limited English proficient (LEP) on both the Iowa and Logramos language arts and mathematics subtests.

- HISD prekindergarten programs were observed to have moderate positive effects on the academic achievement of students who were enrolled for two consecutive years in an HISD Pre-K program when compared to Non-HISD Pre-K students' achievement on the Logramos language arts and mathematics subtests.

Further distribution of this report is at your discretion. Should you have any further questions, please contact me at 713-556-6700.

Carla J. Stevens CJS

Attachment

cc: Grenita Lathan
Ashlea Graves
Rachele Vincent
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HOUSTON INDEPENDENT SCHOOL DISTRICT

RESEARCH

Educational Program Report

EFFECTS OF HISD PREKINDERGARTEN PROGRAMS ON KINDERGARTEN STUDENTS' ACADEMIC ACHIEVEMENT, 2015–2016

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EFFECTS OF HISD PREKINDERGARTEN PROGRAMS ON KINDERGARTEN STUDENTS' ACADEMIC ACHIEVEMENT, 2015–2016

Executive Summary

In compliance with the Texas Education Code § 29.153, the Houston Independent School District (HISD) has provided free prekindergarten (Pre-K) classes for eligible Houston-area four-year old students since the 1985–1986 school year. Children are enrolled into either one of four HISD prekindergarten program models: (1) an early childhood center (ECC), (2) a school-based program, (3) an HISD and Head Start program, or (4) a Montessori program. With the exception of HISD Montessori prekindergarten programs, the district uses the *Frog Street Pre-K (FSPK)* curriculum. *Frog Street Pre-K* focuses on the physical, social, emotional, cognitive, and language development of preschool-age children (Schiller, n.d.). Presently, the HISD operates 155 school-based and ECC campuses that provide instruction for young children.

This report describes how well HISD prekindergarten programs are preparing young children to be school ready. Specifically, this report compared the academic achievement of kindergarten students who were previously enrolled in an HISD prekindergarten program to their peers who did not attend HISD during the 2014–2015 school year. Mean standard scores included in this report were retrieved from the Riverside Iowa Assessments and Logramos 3 language arts (LA) and mathematics subtests for kindergarten students.

Highlights

- During the 2015–2016 school year, 14,804 students attended an HISD prekindergarten program; the lowest prekindergarten student enrollment the district has experienced in ten years.

- HISD Pre-K students who were administered the Logramos LA and mathematics subtests achieved mean standard scores that were higher than those of their Non-HISD Pre-K peers. In contrast, Non-HISD Pre-K students achieved higher mean standard scores on the Iowa ELA and mathematics subtests than those of their HISD Pre-K students.

- Students who attended an HISD Pre-K program for two consecutive years achieved mean standard scores on the Iowa and Logramos (English) language arts and mathematics subtests that were either higher than or comparable to those of their peers who attended only one year of HISD Pre-K and district averages on the subtests.

- Small positive effects were observed for HISD Pre-K students who took the Logramos LA and mathematics subtests. With respect to demographic characteristics, small positive effects were observed for HISD Pre-K students who were identified as limited English proficient (LEP) on the Iowa and Logramos ELA and mathematics subtests. Conversely, small negative effects were observed for HISD Pre-K students who were identified as not at risk on the Iowa ELA and mathematics subtests.

- Moderate positive effects were observed for students who enrolled for two consecutive years in an HISD Pre-K program on the Logramos LA and mathematics subtests when compared to Non-HISD Pre-K students.

Recommendations

- Findings from this report suggest that the Early Childhood Department has made noteworthy efforts to prepare economically-disadvantaged and at-risk students, as well as students who were administered the Logramos LA and mathematics subtests during kindergarten to be school ready. Expansion of these efforts tailored to meet the needs of other subpopulations may include (a) HISD prekindergarten students who for the past two years have achieved lower academic outcomes on the Iowa ELA and mathematics subtests than their non-HISD Pre-K peers, (b) improving strategies to target young Black children and other underrepresented subpopulations for enrollment and retention in an HISD prekindergarten program, and (c) examining pedagogical practices and special services to determine if these educational supports are of high-quality and responsive to individual student's needs and abilities.

- To improve understanding about the variations in academic achievement among different subpopulations, the Early Childhood Department may consider designing and conducting a comprehensive, fidelity of implementation study to determine the extent to which HISD prekindergarten programs are being delivered as intended. Only by understanding and measuring whether an intervention has been implemented with fidelity can education stakeholders gain a better understanding of *how and why* an intervention may or may not work, and the extent to which children's academic achievement can be improved (Carroll, Patterson, Wood, Booth Rick, & Balain, 2007).

- To improve understanding about the academic achievement among students identified as eligible for special education services who may also receive prekindergarten instruction, the Early Childhood Department may consider examining outcomes for students coded as 'EE' in addition to students coded as 'PK' in PEIMS student databases.

- The Early Childhood Department may consider expanding students' measures to assess the foundational learning experiences and skills of the 'whole' child. The Early Childhood Department is currently expanding efforts to assess students' progress and needs to include social and emotional development. While focus on accountability it important, primary emphasis should be placed on using assessments as a means to determine progress, successes, and needs of each individual child to ensure they receive optimal learning experiences.

Introduction

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 school year. Children are enrolled into either one of four HISD prekindergarten program models: (1) an early childhood center (ECC), (2) a school-based program, (3) an HISD and Head Start collaborative program, or (4) a Montessori program. Home language surveys are also administered to either a parent or guardian of a child for completion and approval in order to place them in a linguistically-appropriate HISD prekindergarten classroom (i.e., Transitional Bilingual, English as a Second Language, English, or Dual Language). With the exception of HISD Montessori prekindergarten programs, the district uses *the Frog Street Pre-K (FSPK)* curriculum. Frog Street Pre-K focuses on the physical development, social and emotional development, cognitive development, and language development of preschool age children (Schiller, n.d.). Implementation of this curriculum forms the basis of children's future academic success. Presently, the HISD operates 155 campuses that provide instruction for young children (Houston Independent School District [HISD], 2016a).

Currently, HISD offers full-day prekindergarten programs to all eligible students within the attendance boundaries. To be eligible for participation in a district free prekindergarten program for the 2015-2016 report year, a child must (1) be four years old on or before September 1; (2) live within the HISD attendance boundary; (3) have an updated immunization record in accordance to state policy for students; and (4) meet at least one of the following criteria:

(a) Be homeless;
(b) Be unable to speak or understand English;
(c) Be economically disadvantaged;
(d) Be the child of an active-duty member of the U.S. military or one who has been killed, injured, or missing in action while on duty;
(e) Child is or ever has been the conservatorship of the Department of Family and Protective Services following an adversary hearing held as provided by Section 262.201. Family code; or
(f) All children who meet any eligibility criteria for Head Start, not only those who meet the low-income eligibility criteria for Head Start.

Children who meet the above criteria are determined by the Texas Legislature to be the most at-risk for school failure, and therefore would need more assistance to become school ready by the time they reach kindergarten. Additionally, the HISD also offers prekindergarten classes to children who do not meet the above eligibility requirements on a tuition basis. If space is available at a given school, tuition-based children can be enrolled into an HISD prekindergarten program only after all students eligible for free pre-K have been enrolled. A campus can also enroll up to five three-year-old children after all eligible four-year olds have been enrolled and if they have space available.

Literature Review

Researchers suggest that inequities in children's school readiness and academic success increase rather than diminish over time (Aber, Burnley, Cohen, Featherman, Phillips, Raudenbush, & Rowan as cited in the National Association for the Education of Young Children [NAEYC], 2009). Inequities in school readiness and academic achievement are more prevalent among vulnerable and disadvantaged populations, including girls, children with disabilities, children of color, children of low-income households, and those living in rural areas (National Research Council [NRC], 2009; United Nations Children's Fund [UNICEF], 2012). This evidence was substantiated by findings in the *Houston Independent School District State of Texas Assessments of Academic Readiness (STAAR) Performance, Grades 3-8 Spring 2016* report that indicated the achievement gap typically widened among African American, Hispanic, and White students in reading and mathematics across grade levels (Houston Independent School District [HISD], 2016b, p. 7). Furthermore, Magnuson and Waldfogel found evidence that suggested achievement disparities in mathematics were related to 'differences in mathematics learning experiences before school entry, and fewer meaningful pedagogical experiences once children of color entered school' (cited in NRC, 2009, p. 100). Public preschools that serve higher percentages of economically-disadvantaged children tend 'to provide fewer learning opportunities and supports for [literacy and] mathematical development than ones serving their more affluent peers' (Clements and Sarama, 2008 as cited in NRC, 2009, p. 98). The negative indicators associated with young children with disadvantaged backgrounds (e.g., at risk, poor access to resources, low income, limited parent education) can adversely alter their cognitive, socio-emotional, and physical developmental trajectories (Evans & Kim, 2013). Without high-quality comprehensive interventions, associations among these variables may affect children with disadvantaged backgrounds throughout their lifetime, thus perpetuating the impacts of negative indicators across generations.

Early childhood education researchers have found that young children who are at greater risk for school failure are more likely to succeed in school if they attend well-planned, high-quality early childhood programs (National Association of the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education [NAEYC & NAECS/SDE], 2003; National Research Council [NRC], 2001). High-quality prekindergarten programs enhance children's cognitive development and improve their academic achievement, particularly for students from disadvantaged backgrounds (Brooks-Gunn, 2003; Currie, 2000; Gormley, Gayer, Phillips, & Dawson, 2005; Magnuson, Ruhm, & Waldfogel, 2007; Shager, Schindler, Magnuson, Duncan, Yoshikawa, & Hart, 2013). Review of the literature concurs that the beneficial effects of early childhood interventions are typically much larger for more disadvantaged youth (Currie, 2000; Magnuson et al., 2007).

However, findings from previous research regarding the effectiveness of early childhood programs have varied considerably from negative or no effects, to substantial short- and long-term effects on young children's school readiness and achievement outcomes (Del Grosso, Akers, Esposito,& Paulsell, 2014; U.S. Advisory Committee on Head Start Research and Evaluation, 2012; Zhai, Brooks-Gunn, & Waldfogel, 2011). Reasons contributing to the divergence in findings regarding early childhood programs' true impact on young children's school readiness include (a) selection bias (U.S. Advisory Committee on Head Start Research and Evaluation, 2012; Gormley et al., 2005); (b) differences in research methodologies and scope (Del Grosso et al., 2014); and (c) variations in reliability and validity of psychometric measures.

Scope of the Evaluation

The purpose of this report was to inform HISD stakeholders about kindergarten students' achievement levels in English Language Arts and mathematics after enrollment in an HISD prekindergarten program the previous school year. This report uses a non-experimental research design to answer the following research questions:

1. What was the enrollment trend of HISD prekindergarten students over the last ten years? What was the ten-year trend in the percent of kindergarten students who were previously enrolled in an HISD prekindergarten program?

2. What were the demographic characteristics of HISD kindergarten students based on their prekindergarten program enrollment status in the 2014–2015 school year? Were there any differences in demographic characteristic trends when years of enrollment were taken into account?

3. What differences in academic achievement existed between kindergarten students who either enrolled or did not enroll in an HISD prekindergarten program during the 2014–2015 school year?

4. What differences in academic achievement existed between kindergarten students who enrolled in an HISD prekindergarten program when years of enrollment were taken into account?

5. What were the effects of HISD prekindergarten programs on kindergarten students' academic achievement when student demographic characteristics were taken into account?

6. What were the effects of HISD prekindergarten programs on kindergarten students' academic achievement when years of enrollment were taken into account?

Methods

Data Collection

- Data collection for Houston Independent School District kindergarteners who were previously enrolled in an HISD prekindergarten program during the 2014–2015 school year consisted of three phases. The first phase of data collection consisted of identifying all prekindergarten (coded 'PK') and kindergarten (coded 'KG') students who attended HISD during the 2013–2014, 2014–2015 and 2015–2016 school years, respectively. This information was retrieved from the Public Education Information Management System (PEIMS) 2013–2014, 2014–2015 and 2015–2016 HISD student databases. Although students coded as 'EE' may have also enrolled in an HISD prekindergarten classroom during the targeted time period, only statistics for students who were identified as 'PK' were included in this report.

- The second phase of data collection consisted of merging the student databases together, with the PEIMS 2015–2016 student database serving as the base file.

- The last phase of the data collection process consisted of merging the PEIMS 2013–2015 student data with the Riverside Iowa Assessments and Logramos 3 2015–2016 HISD student databases, in order to match students' demographic data provided in PEIMS to their test scores located in the assessment files.

Measures

- The academic achievement of HISD kindergarten students was measured and collected on the Riverside Iowa Assessments and Logramos 3rd Edition Norm Reference Tests (NRT). The Iowa is designed to provide a thorough assessment of a student's progress in skills and standards that are essential to successful learning (Houston Independent School District [HISD], 2015a). While the Logramos 3 parallels the scope and sequence of the Iowa as it measures the academic achievement of Spanish-speaking students, this assessment should not be interpreted as a direct translation of the Iowa. During the 2015–2016 school year, all HISD kindergarten students were administered either the Iowa or Logramos 3 in the month of December.

- The primary academic outcome measures of interest for this report included (English) language arts (LA) and mathematics subtests mean standard scores from the Iowa and Logramos assessments. The Iowa ELA is a composite score computed from students' achievement on the reading, language, and vocabulary subtests (Iowa Testing Programs [ITP], 2012). The Logramos LA is a composite score computed for student's achievement on the reading and language subtests (Aparicio & Nikolov, n.d.).

Statistical Analyses

- Descriptive statistics (i.e., counts, percentage, mean standard scores, standard deviations) were computed to determine kindergarteners' academic achievement in language arts and mathematics. Results emerging from this report describe comparisons of academic achievement of children who either enrolled or did not enroll in an HISD prekindergarten program during the 2014–2015 school year.

- Additional examination among these measures within the context of student demographic characteristics provided information regarding 'whom' from their respective programs had higher or lower academic achievement after enrolling into kindergarten. The demographic characteristics of HISD kindergarten students used for this report were collected from the PEIMS 2015–2016 HISD student database. Characteristics included gender, race and ethnicity, economic-disadvantaged status, students who qualified for special education services, limited English proficient (LEP) status, and at-risk status. HISD defines at-risk students as individuals who have an increased likelihood of dropping out of school.

- **Appendix A, Tables 1** to **4** show the mean standard scores, standard deviations, and counts for students based on demographic characteristics, academic achievement and prekindergarten program enrollment status.

- Effect sizes were also computed to measure the magnitude of HISD prekindergarten programs on students' academic achievement using Hedges' g. Hedge's g is a standard deviation-based measure used to compute the effect size for groups with different sample sizes. Hedge's g follows similar criteria to Cohen's d for determining the strength of an intervention with an effect size of 0.2 = small effect, 0.5= moderate effect, and 0.8=large effect.

Limitations

- Comparison groups were not matched by prior academic achievement levels because students within each of these groups were not administered the same assessments in the previous grades. Controlling for academic achievement levels prior to kindergarten would have helped explain some of the variance in academic outcomes among students.

- Data retrieved from PEIMS represents a 'snapshot' of students who were enrolled by the last Friday in October of each school year in HISD (Texas Education Agency [TEA], 2016). Students present for the 'snapshot' may not have been actively enrolled in an HISD prekindergarten program the entire year. In contrast, students who were not present during the 'snapshot' may have actually enrolled later into a program, but were not identified as having attended HISD prekindergarten during the 2013–2014 and 2014–2015 school years.

- The information in this report was collected for HISD prekindergarten students identified as 'PK' only in the PEIMS student databases. As such, one cannot assume kindergarten students who enrolled in HISD during the 2015–2016 school year did not receive an early childhood education from either a previous school district, a daycare, private school setting, or in the child's home environment. Further, the population of students identified as receiving prekindergarten instruction may be an underestimate as HISD students coded as 'EE' during 2013–2014 and 2014–2015 school years may have also received instruction from the Pre-K curriculum.

- Academic measures retrieved for prekindergarten students eligible for special education services may not truly reflect their 2015–2016 academic outcomes as a number of three and four year old students were coded as 'EE' during the 2013–2014 and 2014–2015 school years.

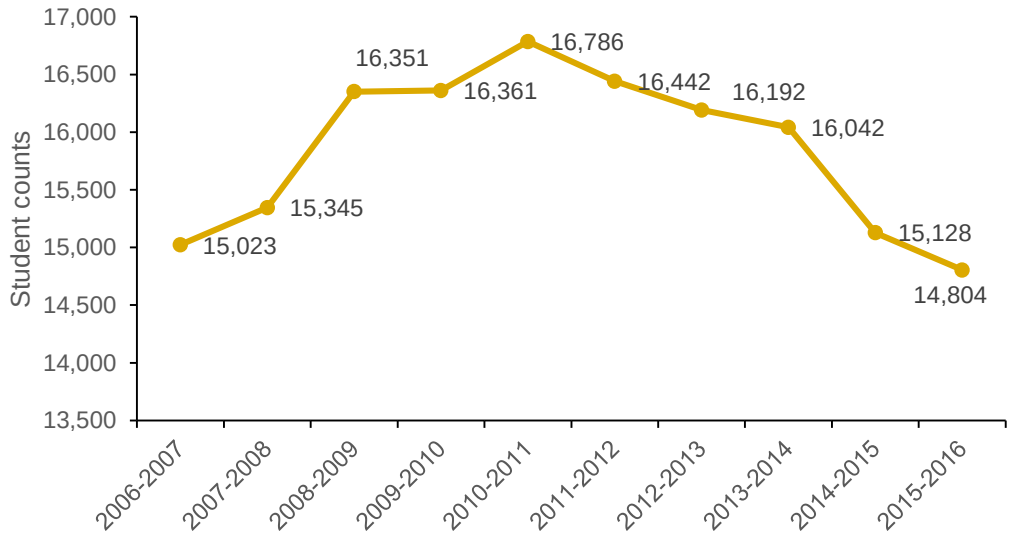
- A randomized, experimental research design was not conducted to evaluate the effects of HISD prekindergarten program intervention on students' academic achievement. As such, findings regarding the magnitude of the effect of HISD prekindergarten programs on students' short-term impact may be biased.

- The information in this report was primarily examined in the context of assessment outcomes, demographic characteristics, and prekindergarten program type. Because no components of the prekindergarten programs were included in this report, causal inferences in reference to program attributes and impact were not made.

Results

What was the enrollment trend of HISD prekindergarten students over the last ten years? What was the ten-year trend in the percent of kindergarten students who were previously enrolled in an HISD prekindergarten program?

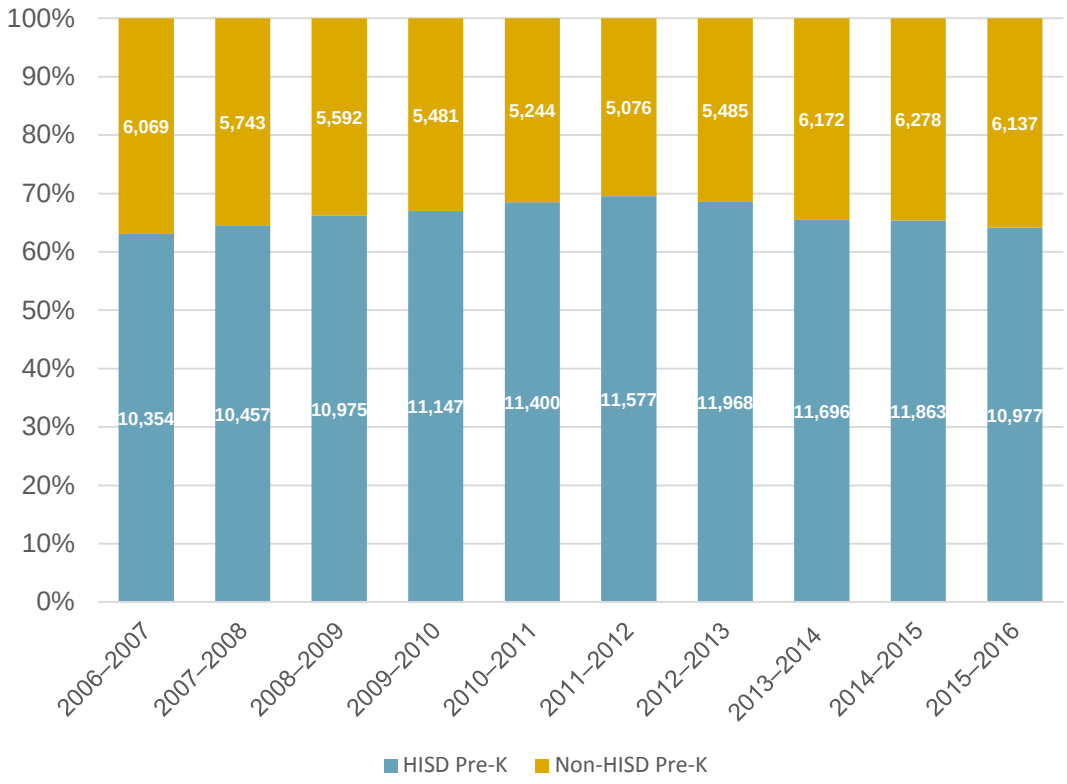
Figure 1. Enrollment trends of students who attended an HISD prekindergarten program between the 2006–2007 and 2015–2016 school years



Source. PEIMS 2006–2007 to 2015–2016 HISD student databases.

- **Figure 1** presents the prekindergarten enrollment trend of HISD students from 2006–2007 through the 2015–2016 school years. Results show 14,804 students enrolled into prekindergarten during 2015–2016; a 2.1% drop from 15,128 students the previous year. The current report year indicates HISD experienced the lowest student enrollment into a prekindergarten program in a ten-year period.

Figure 2. Enrollment trend of kindergarten students who attended an HISD prekindergarten program between the 2006–2007 and 2015–2016 school years



Source. PEIMS 2006–2007 to 2015–2016 HISD student databases.

- **Figure 2** depicts the percent of HISD kindergarten students who were enrolled in an HISD prekindergarten program between the 2006–2007 and 2015–2016 school years. Percentages of students who attended an HISD prekindergarten program ranged from 63.0% (2006–2007) to 69.5% (2011–2012) of the total kindergarten populations for each respective school year.

- At least seven out of ten students (72.6%) who attended prekindergarten in 2014–2015 (n= 10,977 of 15,128) enrolled in kindergarten at HISD the following school year.

- The percent of 2015–2016 kindergarten students who attended an HISD prekindergarten program the previous year was 64.1% (n= 10,977 of 17,114), a 1.3% reduction from the kindergarten population reported for the 2014–2015 school year (65.4%).

- Roughly 6.8% of kindergarten students (n= 1,160 of 17,114) attended HISD prekindergarten in both the 2013–2014 and 2014–2015 school years (data not shown).

What were the demographic characteristics of HISD kindergarten students based on their prekindergarten program enrollment status in the 2014–2015 school year? Were there any differences in demographic characteristic trends when years of enrollment were taken into account?

Table 1. Demographic characteristics of HISD kindergarten students by prekindergarten enrollment status the previous year, 2015–2016

		HISD Pre-K		Non-HISD Pre-K		Total kindergarten population	
Demographic Characteristics		**n**	**%**	**n**	**%**	**n**	**%**
Overall Sample		10,977	100.0	6,137	100.0	**17,114**	**100.0**
Gender	Female	5,452	49.7	2,934	47.8	**8,386**	**49.0**
	Male	5,525	50.3	3,203	52.2	**8,728**	**51.0**
Race & Ethnicity	Asian	240	2.2	501	8.2	**741**	**4.3**
	Black	2,447	22.3	1,425	23.2	**3,872**	**22.6**
	Hispanic	7,887	71.9	2,784	45.4	**10,671**	**62.4**
	White	321	2.9	1,257	20.5	**1,578**	**9.2**
	Other	82	0.7	170	2.8	**252**	**1.5**
Economically disadvantaged	No	1,411	12.9	2,691	43.8	**4,102**	**24.0**
	Yes	9,566	87.1	3,446	56.2	**13,012**	**76.0**
Special Education eligible	No	10,548	96.1	5,864	95.6	**16,412**	**95.9**
	Yes	429	3.9	273	4.4	**702**	**4.1**
Limited English Proficient (LEP)	No	5,088	46.4	4,484	73.1	**9,572**	**55.9**
	Yes	5,889	53.6	1,653	26.9	**7,542**	**44.1**
At risk	No	3,419	31.1	2,931	47.8	**6,350**	**37.1**
	Yes	7,558	68.9	3,206	52.2	**10,764**	**62.9**

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.

- Results shown in **Table 1** indicate that the percentage of demographic characteristics of HISD and Non-HISD prekindergarten students were relatively similar with respect to gender and special education eligibility status. Similar trends were also noted among students identified as Black.

- An overrepresentation of students who were characterized as either Hispanic (71.9%), economically disadvantaged (87.1%), limited English proficient (LEP, 53.6%), and at risk (68.9%) were identified among kindergarteners who attended an HISD prekindergarten program during the 2014–2015 school year when compared to students who had not attended an HISD prekindergarten program and to the total kindergarten subpopulation demographic results. These findings align with the district prekindergarten eligibility criteria.

- An underrepresentation of students who were characterized as either Asian (2.2%), White (2.9%), non-economically disadvantaged (12.9%), non-LEP (46.4%), and not at risk for school dropout (31.1%) were identified among kindergarteners who attended an HISD prekindergarten program during the 2014–2015 school year.

Table 2. Demographic characteristics of kindergarten students who previously attended an HISD prekindergarten program based on years of enrolment, 2015–2016

		HISD Pre-K (One year)		HISD Pre-K (Two years)		Total prekindergarten population	
Demographic Characteristics		**n**	**%**	**n**	**%**	**n**	**%**
Overall Sample		9,817	100.0	1,160	100.0	**10,977**	**100.0**
Gender	Female	4,866	50.2	586	50.5	**5,452**	**49.7**
	Male	4,951	51.1	574	49.5	**5,525**	**50.3**
Race & Ethnicity	Asian	231	2.4	9	0.8	**240**	**2.2**
	Black	2,125	21.9	322	27.8	**2,447**	**22.3**
	Hispanic	7,107	73.3	780	67.2	**7,887**	**71.9**
	White	282	2.9	39	3.4	**321**	**2.9**
	Other	72	0.7	10	0.9	**82**	**0.7**
Economically disadvantaged	No	1,248	12.9	163	14.1	**1,411**	**12.9**
	Yes	8,569	88.4	997	85.9	**9,566**	**87.1**
Special Education eligible	No	9,451	97.5	1,097	94.6	**10,548**	**96.1**
	Yes	366	3.8	63	5.4	**429**	**3.9**
Limited English Proficient (LEP)	No	4,512	46.5	576	49.7	**5,088**	**46.4**
	Yes	5,309	54.8	584	50.3	**5,893**	**53.7**
At Risk	No	3,009	31.0	410	35.3	**3,419**	**31.1**
	Yes	6,808	70.2	750	64.7	**7,558**	**68.9**

Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.

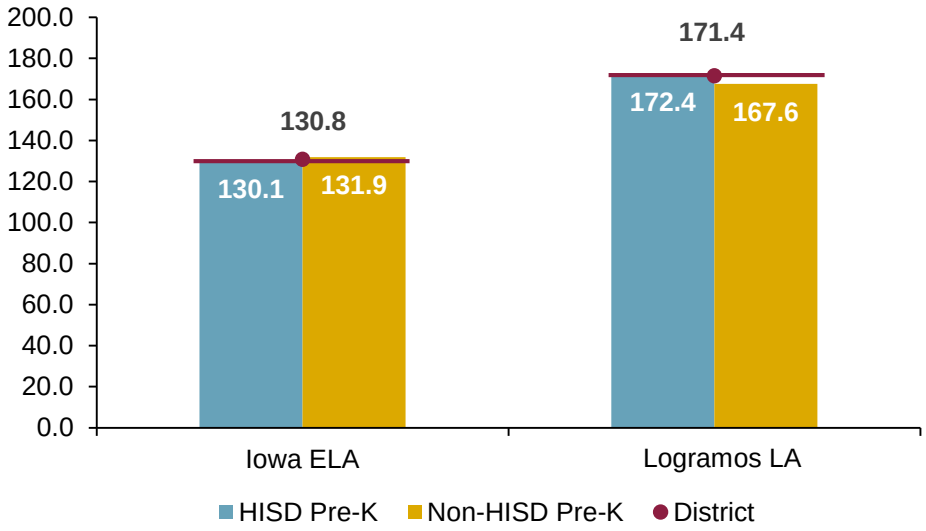
- Results shown in **Table 2** indicate that the percentage of demographic characteristics of kindergarten students who enrolled in an HISD prekindergarten program for one year and for two years were relatively similar with respect to gender and economically-disadvantaged status. Similar trends were also noted among students identified as Asian, White, or Other,

- An overrepresentation of students who were characterized as Black (27.8%), non-LEP (49.7%), and/or not at risk (35.3%) were identified among kindergarteners who attended an HISD prekindergarten program during the 2013–2015 school years when compared to students who had attended one year of an HISD prekindergarten program and to the total kindergarten subpopulation demographic results.

- An underrepresentation of students who were characterized as Hispanic (67.2%), not special education eligible (94.6%), LEP (50.3%), and/or at risk for school dropout (64.7%) were identified among kindergarteners who attended an HISD prekindergarten program during the 2013–2015 school years when compared to their respective peers who attended Pre-K for one year.

What differences in academic achievement existed between kindergarten students who either enrolled or did not enroll in an HISD prekindergarten program during the 2014–2015 school year?

Figure 1. Mean standard scores on the 2015–2016 Iowa and Logramos (English) language arts subtests for HISD kindergarten students by prekindergarten program enrollment status the previous year



Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Mean standard score differences between groups of less than 1.0 were determined comparable.

Iowa ELA Results

- **Figure 1** shows that students who were enrolled in an HISD prekindergarten program (M = 130.1) achieved a mean standard score on the Iowa ELA subtests that was lower than that of their peers who had not attended an HISD prekindergarten program (M = 131.9).

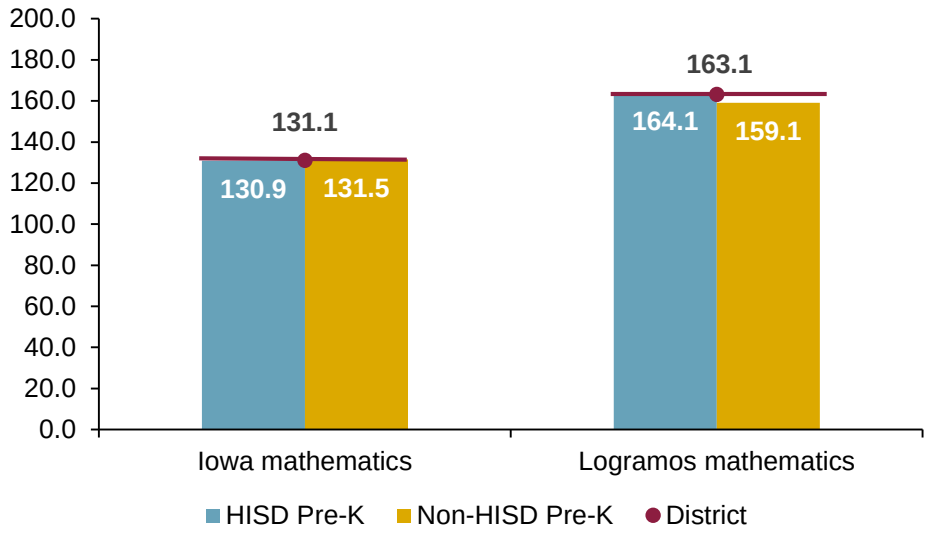
- Students who were enrolled in an HISD prekindergarten program achieved a mean standard score on the Iowa ELA subtests that was comparable to the district as a whole (M = 130.8).

Logramos LA Results

- Figure 1 shows that students who were enrolled in an HISD prekindergarten program (M = 172.4) achieved a mean standard score on the Logramos LA subtests that was higher than that of their peers who had not attended an HISD prekindergarten program (M = 167.6).

- Students who were enrolled in an HISD prekindergarten program achieved a mean standard score on the Logramos LA subtests that was higher than the district average (M = 171.4).

Figure 2. Mean standard scores on the 2015–2016 Iowa and Logramos mathematics subtests for HISD kindergarten students by prekindergarten program enrollment status the previous year



Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Mean standard score differences between groups of less than 1.0 were determined comparable.

Iowa Mathematics Results

- **Figure 2** shows that students who were enrolled in an HISD prekindergarten program (M = 130.9) achieved a mean standard score on the Iowa mathematics subtest that was comparable to those of their peers who had not attended an HISD prekindergarten program (M = 131.5).

- Students who were enrolled in an HISD prekindergarten program achieved a mean standard score on the Iowa mathematics subtest that was comparable to the district as a whole (M = 131.1).

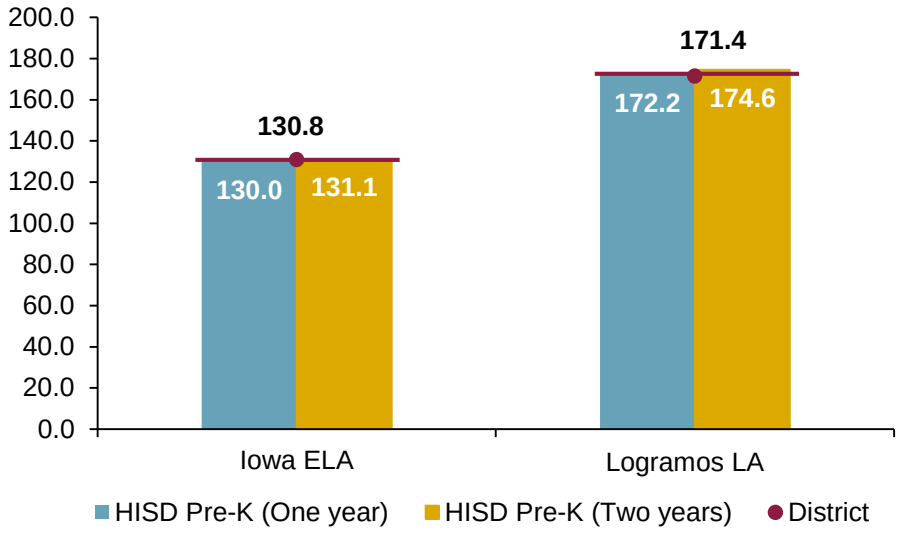
Logramos Mathematics Results

- Figure 2 shows that students who were enrolled in an HISD prekindergarten program (M = 164.1) achieved a mean standard score on the Logramos mathematics subtest that was higher than that of their peers who had not attended an HISD prekindergarten program (M = 159.1).

- Students who were enrolled in an HISD prekindergarten program achieved a mean standard score on the Logramos mathematics subtest that was higher than the district average (M = 163.1).

What differences in academic achievement existed between kindergarten students who enrolled in an HISD prekindergarten program when years of enrollment were taken into account?

Figure 3. Mean standard scores on the 2015–2016 Iowa and Logramos (English) language arts subtests for HISD kindergarten students by years of enrollment in an HISD prekindergarten program



Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Mean standard score differences between groups of less than 1.0 were determined comparable.

Iowa ELA Results

- **Figure 3** shows that students who were enrolled in an HISD prekindergarten program for two consecutive years (M = 131.1) achieved a mean standard score on the Iowa ELA subtests that was higher than that of their peers who attended HISD Pre-K for one year (M = 130.0).

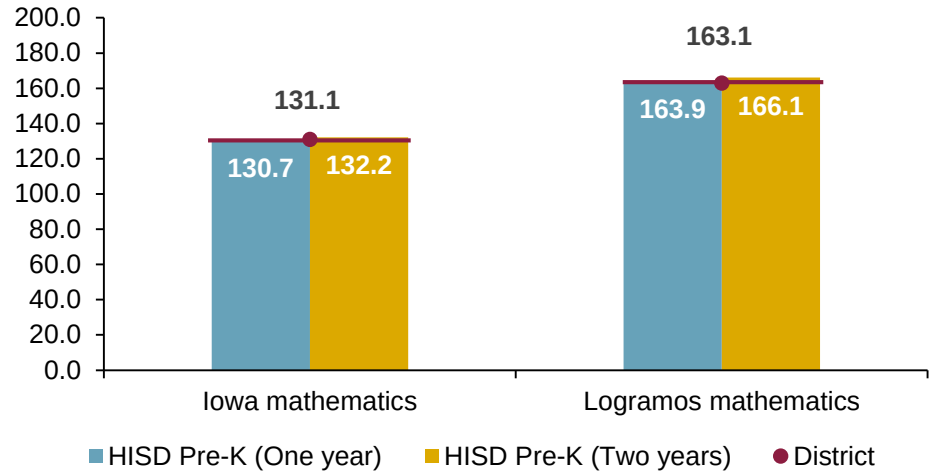
- Students who were enrolled in an HISD prekindergarten program for two years achieved a mean standard score on the Iowa ELA subtests that was comparable to the district average (M = 130.8).

Logramos LA Results

- Figure 3 shows that students who were enrolled in an HISD prekindergarten program for two consecutive years (M = 174.6) achieved a mean standard score on the Logramos LA subtests that was higher than that of their peers who attended HISD Pre-K for one year (M = 172.2).

- Students who were enrolled in an HISD prekindergarten program for two years achieved a mean standard score on the Logramos LA subtests that was higher than the district average (M = 171.4).

Figure 4. Mean standard scores on the 2015–2016 Iowa and Logramos mathematics subtests for HISD kindergarten students by years of enrollment in an HISD prekindergarten program



Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.

Iowa Mathematics Results

- **Figure 4** shows that students who were enrolled in an HISD prekindergarten program for two consecutive years (M = 132.2) achieved a mean standard score on the Iowa mathematics subtest that was higher than that of their peers who attended an HISD prekindergarten program for one year (M = 130.7).

- Students who were enrolled in an HISD prekindergarten program for two years achieved a mean standard score on the Iowa mathematics subtest that was higher than the district average (M = 131.1).

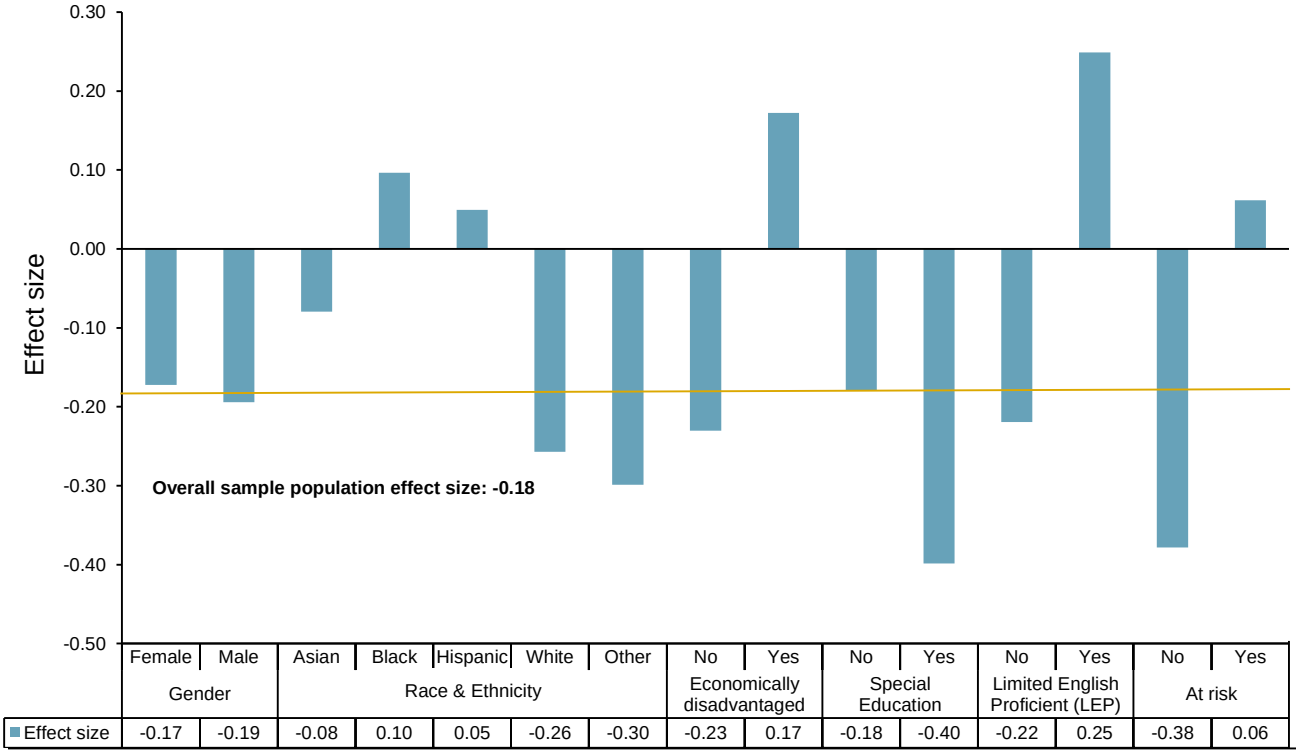
Logramos Mathematics Results

- Figure 4 shows that students who were enrolled in an HISD prekindergarten program for two consecutive years (M = 166.1) achieved a mean standard score on the Logramos mathematics subtest that was higher than that of their peers who attended an HISD prekindergarten program for one year (M = 163.9).

- Students who were enrolled in an HISD prekindergarten program for two years achieved a mean standard score on the Logramos mathematics subtest that was higher than the district average (M = 163.1).

What were the effects of HISD prekindergarten programs on kindergarten students' academic achievement when student demographic characteristics were taken into account?

Figure 5. Effect of HISD prekindergarten programs on kindergarten students' achievement on the 2015–2016 Iowa English language arts subtests by student demographic characteristics



	Female	Male	Asian	Black	Hispanic	White	Other	No	Yes	No	Yes	No	Yes	No	Yes
	Gender		Race & Ethnicity					Economically disadvantaged		Special Education		Limited English Proficient (LEP)		At risk	
Effect size	-0.17	-0.19	-0.08	0.10	0.05	-0.26	-0.30	-0.23	0.17	-0.18	-0.40	-0.22	0.25	-0.38	0.06

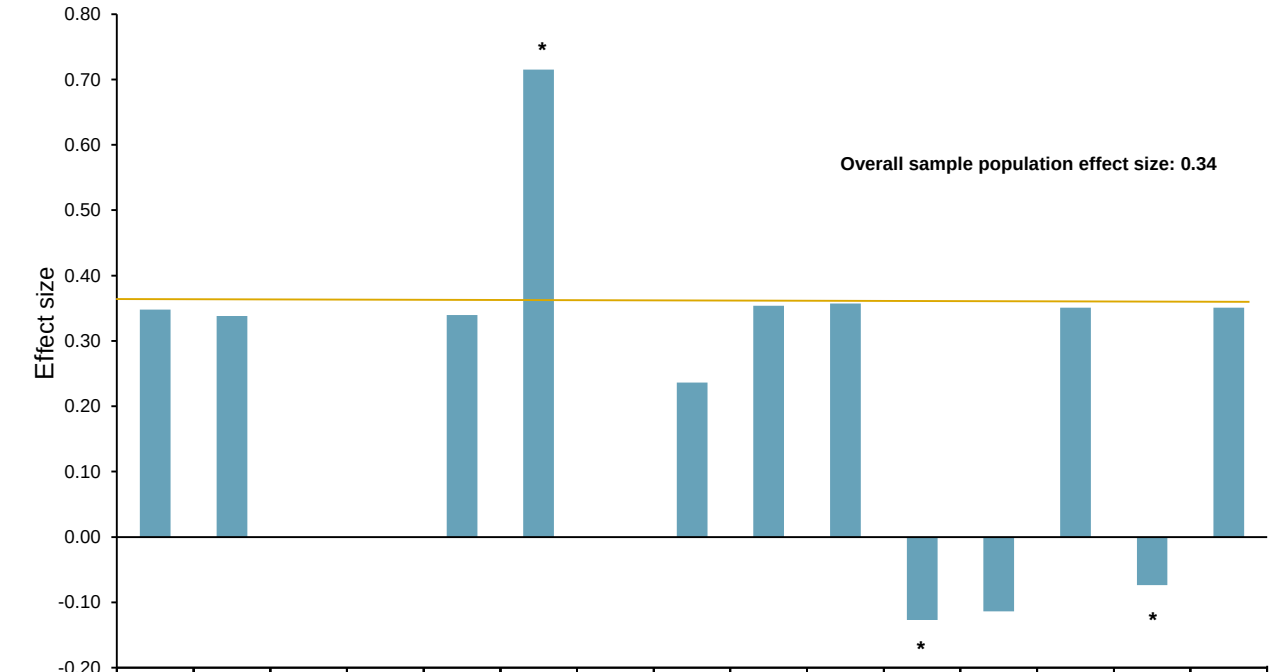
Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015-2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

- **Figure 5** (see **Appendix A, Table 1**, p. 25) shows a small positive effect was observed for students administered the Iowa ELA subtests who were identified as LEP (0.25). Negligible effects were noted to occur among student demographic characteristics whose effects sizes fell between 0.20 and -0.20.

- Small negative effects were noted to occur among students who were identified as White (-0.26), Other (-0.30), not economically disadvantaged (-0.23), eligible for special education services (-0.40), non-LEP (-0.22), and/or not identified as at risk (-0.38).

- An overall sample population effect size of -0.18 indicated that HISD prekindergarten programs had a negligible effect on students who took the Iowa ELA subtests.

Figure 6. Effect of HISD prekindergarten programs on kindergarten students' achievement on the 2015–2016 Logramos language arts subtests by student demographic characteristics



	Female	Male	Asian	Black	Hispanic	White	Other	No	Yes	No	Yes	No	Yes	No	Yes
	Gender		Race & Ethnicity					Economically disadvantaged		Special Education		Limited English Proficient (LEP)		At risk	
Effect size	0.35	0.34	0	0	0.34	0.72	0	0.24	0.35	0.36	-0.13	-0.11	0.35	-0.07	0.35

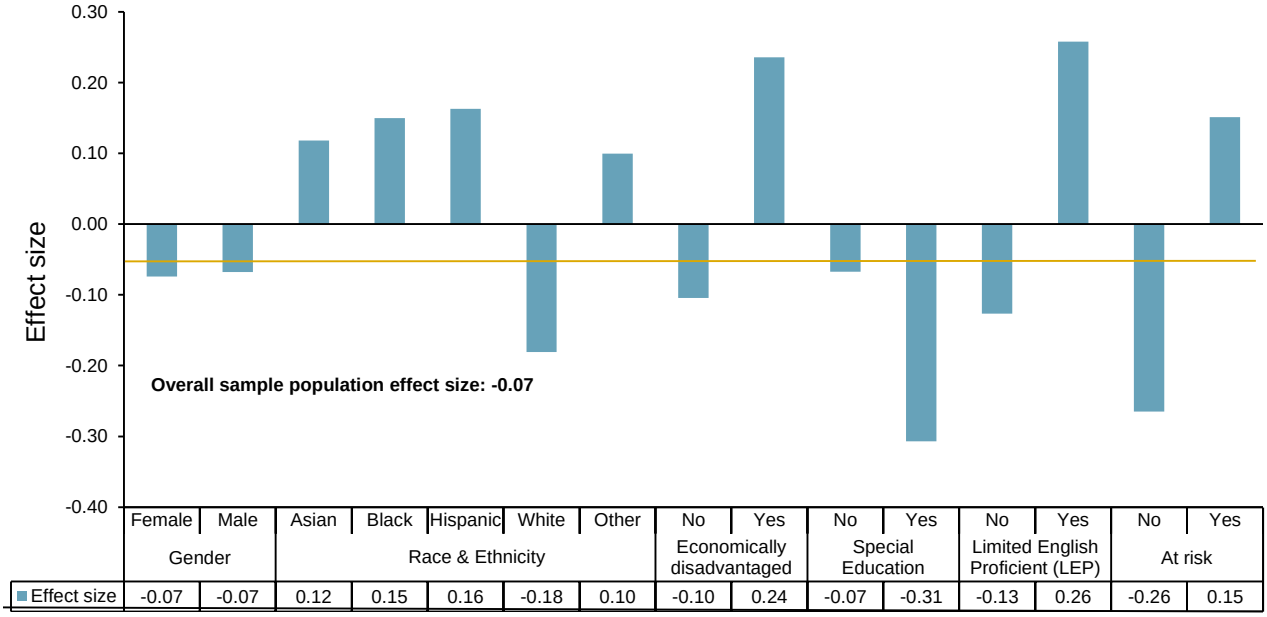
Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.
Note. * denotes sample size of n < 30 were used to compute effect size. As such caution should be used when interpreting results.

- **Figure 6** (see **Appendix A, Table 2**, p. 26) shows small positive effects were observed for students on the Logramos LA subtests regardless of gender and economic status. Additionally, small positive effects were observed to occur among students who were identified as Hispanic (0.34), not eligible for special education services (0.36), LEP (0.35), and/or at risk (0.35).

- A moderate positive effect was observed for White students who were administered the Logramos LA subtests (0.72). However, due to sample sizes of White students who either attended an HISD prekindergarten program (n = 17) or did not attend (n = 5), caution should be exercised regarding the interpretation of HISD prekindergarten programs' effect on this student population's academic achievement.

- With the exception of male and Hispanic students, the majority of small positive effects HISD prekindergarten programs' had on student subpopulations' achievement on the Logramos LA was typically greater than the overall sample population effect size of 0.34.

Figure 7. Effect of HISD prekindergarten programs on kindergarten students' achievement on the 2015–2016 Iowa mathematics subtest by student demographic characteristics



	Female	Male	Asian	Black	Hispanic	White	Other	No	Yes	No	Yes	No	Yes	No	Yes
	Gender		Race & Ethnicity					Economically disadvantaged		Special Education		Limited English Proficient (LEP)		At risk	
Effect size	-0.07	-0.07	0.12	0.15	0.16	-0.18	0.10	-0.10	0.24	-0.07	-0.31	-0.13	0.26	-0.26	0.15

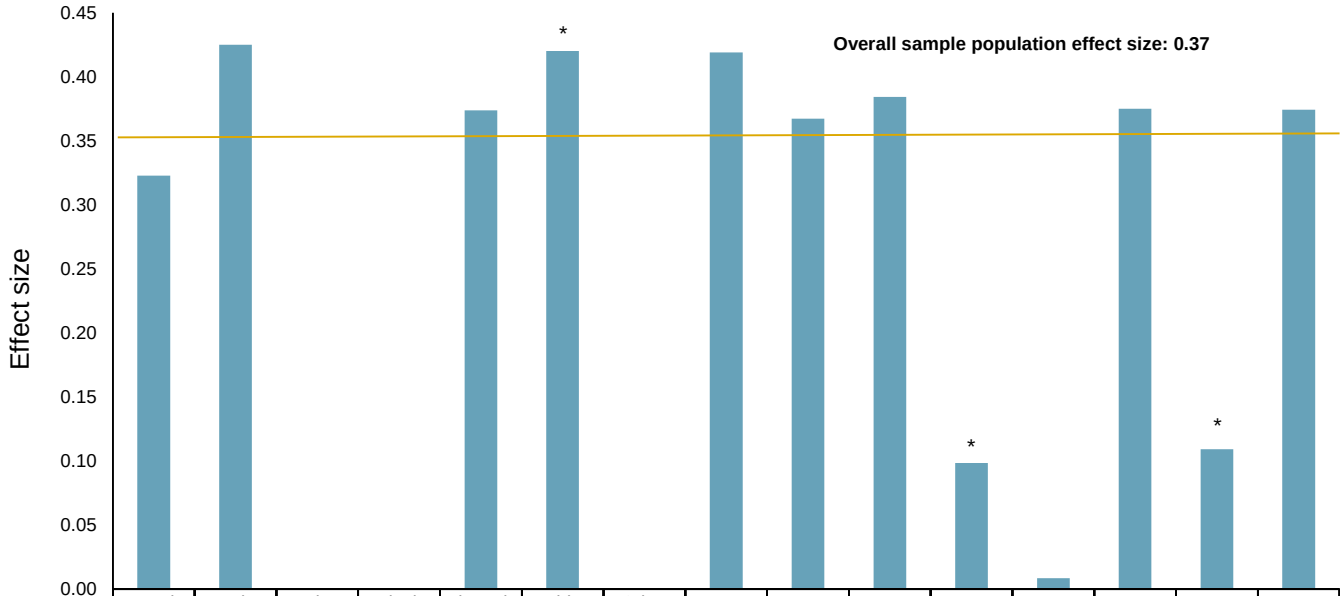
Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

- **Figure 7** (see **Appendix A, Table 3**, p. 27) shows small positive effects were observed for students administered the Iowa mathematics subtest who were identified as economically disadvantaged (0.24) and/or LEP (0.26). Negligible effects were noted to occur among student demographic characteristics whose effects sizes fell between 0.20 and -0.20.

- Small negative effects occurred among students who were identified as eligible for special education services (-0.31), and/or students who were not identified as at risk (-0.26).

- An overall sample population effect size of -0.07 indicated that HISD prekindergarten programs had a negligible effect on students who took the Iowa mathematics subtest.

Figure 8. Effect of HISD prekindergarten programs on kindergarten students' achievement on the 2015–2016 Logramos mathematics subtest by student demographic characteristics



	Female	Male	Asian	Black	Hispanic	White	Other	No	Yes	No	Yes	No	Yes	No	Yes
	Gender		Ethnicity					Economically disadvantaged		Special Education		Limited English Proficient (LEP)		At risk	
Effect size	0.32	0.43	0	0	0.37	0.42	0	0.42	0.37	0.38	0.10	0.01	0.38	0.11	0.37

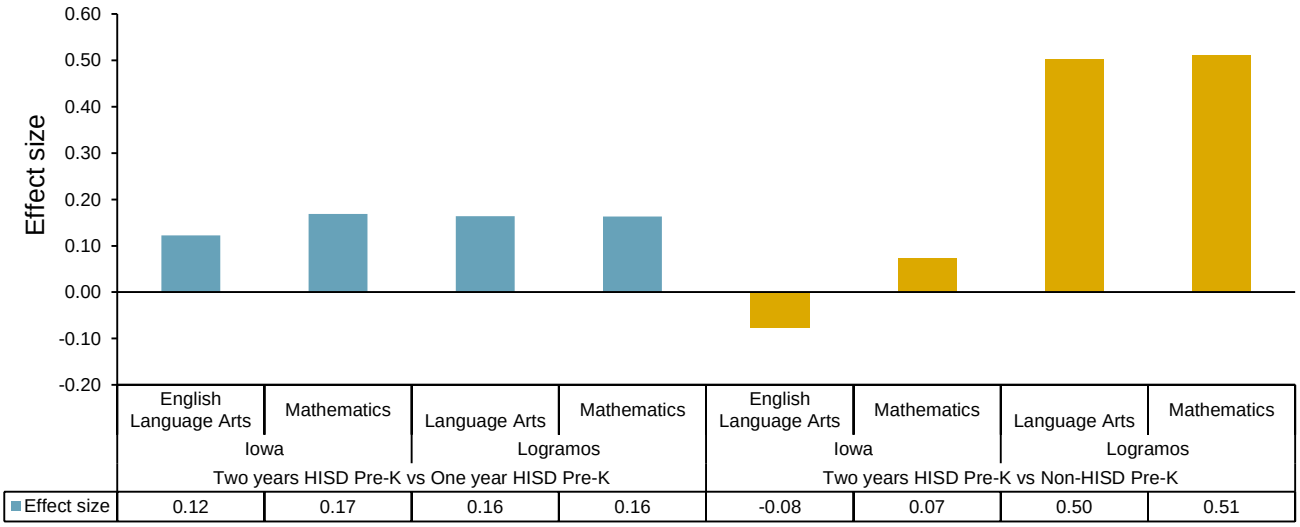
Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.
Note. * denotes sample size of n < 30 were used to compute effect size. As such caution should be used when interpreting results.

- **Figure 8** (see Appendix A, Table 4, p. 28) shows small positive effects were observed for students on the Logramos mathematics subtest regardless of gender and economic status. Additionally, small positive effects were observed to occur among students who were identified as Hispanic (0.34), White (0.42), not eligible for special education services (0.38), LEP (0.38), and/or at risk (0.37).

- With the exception of female students, small positive effects HISD prekindergarten programs' had on student subpopulations' achievement on the Logramos mathematics was typically greater than or comparable to the overall sample population effect size of 0.37. No negative effects were observed to occur among these students.

What were the effects of HISD prekindergarten programs on kindergarten students' academic achievement when years of enrollment were taken into account?

Figure 9. Effect of HISD prekindergarten programs on kindergarten students' achievement on the 2015–2016 Iowa and Logramos (English) language arts and mathematics assessments based on years of enrollment



Source. PEIMS 2013–2014 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

- **Figure 9** and **Appendix B-Table 1** show moderate positive effects were observed for students who enrolled for two consecutive years (2013–2014 and 2014–2015) in an HISD prekindergarten program on the Logramos LA (0.50) and mathematics (0.51) subtests when compared to peers who had not attended an HISD Pre-K program.

- HISD prekindergarten programs were observed to have negligible effects on the academic achievement of students who were enrolled for two consecutive years in HISD Pre-K regardless of assessment type or subject when compared to peers who only attended one year of HISD Pre-K.

Discussion

"An effective system of early childhood education [supports the] reciprocal relationship among curriculum, child assessment, and program evaluation" (NAEYC & NAECS/SDE, 2003, p. 1). The prekindergarten program is a complex subsystem of early childhood education that is situated within the walls of an elementary school, charged with making and implementing decisions to promote the equitable development, learning, and school readiness of all children. Each child-whatever her or his abilities and differences- should be respected and taken into careful consideration in order for her or him to be included in prekindergarten to the fullest extent with the highest expectations (NAEYC & NAECS/SDE, 2003). For this report, descriptive statistical analyses and effect size computations were used to examine relationships among students' academic achievement and prekindergarten program enrollment status. Specifically, variables were analyzed to determine the mean academic achievement of kindergarten students who had either enrolled or did not enroll in an HISD prekindergarten program in previous school years.

Findings from this study indicated that during the 2015–2016 school year HISD had the lowest student enrollment into prekindergarten programs in ten years. The enrollment trend shows a steady increase in students enrolling into HISD Pre-K from the 2006–2007 to 2011–2012 school years. Coincidentally, declines in HISD prekindergarten student enrollment also occurred not long after Pre-K through twelfth grades "took a substantial hit in 2011 when the Texas Legislature cut $4 billion from formula funding and $1.3 billion from educational grant programs outside of formula funding" (Villanueva, 2016).

Results from this study also revealed that students who were enrolled in an HISD prekindergarten program were usually identified as economically disadvantaged, LEP, and/or at risk for dropping out of school. These findings were substantiated by prior evidence presented in the *District and School Profiles 2014–2015* report that indicated the majority of students enrolled in the district qualified for free or reduced lunch (71.6 %) and were at risk (71.6%; Houston Independent School District [HISD], 2015b, p. 17). Overrepresentation of these demographic subpopulations (see Table 1, pg. 10) was expected as these students were targeted to receive a free prekindergarten education in HISD. Interestingly, underrepresentation of LEP and at risk students who receive at least two years of prekindergarten, as well as Asian and White students in general were also observed in this study (see Table 2).

Implications

With respect to academic achievement, the majority of students who were enrolled in an HISD prekindergarten program achieved higher mean standard scores and experienced more positive effects on the Logramos LA and mathematics subtests than their peers who were administered the Iowa ELA and mathematics subtests. Similar academic outcomes were also presented in the *Prekindergarten Education Program: Effects of HISD Prekindergarten on Kindergarten Performance, 2014–2015* report (Houston Independent School District [HISD], 2015c). Number of years of enrollment also appears to be related to school readiness for students who were administered the Logramos LA and mathematics subtests (see Figure 9). These findings highlight noteworthy efforts made by the Early Childhood Department to prepare students who take the Logramos LA and mathematics to be school ready. An explanation for this phenomenon may be due in part to the cultural responsiveness of HISD prekindergarten programs and HISD district's support of diverse linguistic programs. Prekindergarten students who are placed in the 'best fit' program that supports their English-language and literacy development and provide responsive, individualized accommodations are more likely to succeed in school (National Research Council [NRC], 2007).

As such, one implication from this study is that the Early Childhood Department may consider expanding their efforts to create sustainable, high-quality programs to meet the needs of students who take the Iowa ELA and mathematics subtests. Subpopulations who would benefit from these efforts include students who

endemically have lower achievement levels on the Iowa Assessments (e.g., young Black students, students eligible for special education services), or underrepresented subpopulations in HISD prekindergarten classrooms. These efforts may include: (a) improving strategies that target these student subgroups for enrollment and retention in prekindergarten to improve their school readiness, and reduce achievement gaps; and (b) examining current pedagogical practices to determine whether they are culturally sensitive and respond positively to individual student's needs and abilities, making improvements where needed.

With regards to students eligible for special education services, the Early Childhood Department and Research & Accountability may also consider, prior to examining the academic outcomes of these students, determining *when* these students were flagged to receive special services to support their Pre-K education experiences. The variability in when students received services and what type and quality of services may influence the academic outcomes of these children once they reach kindergarten. The Early Childhood Department may also consider including students coded as 'EE' in subsequent reports, as PEIMS database records indicated the majority of these students were flagged eligible for special education services prior to the 2015–2016 school year.

Empirical evidence serves as the cornerstone for reform efforts in education. Education stakeholders "cannot expect reform efforts in education to have significant effects without research-based knowledge to guide them" (National Research Council [NRC], 2002, p.1). A third implication emerging from report findings is that the Early Childhood Department may consider conducting an implementation fidelity study grounded in best practices in early education to determine to what degree HISD prekindergarten programs are being delivered as intended to improve school readiness and to close the achievement gap among young children subpopulations (NAEYC & NAECS/SDE, 2003). Only by understanding and measuring whether an intervention has been implemented with fidelity can education stakeholders gain a better understanding of *how and why* an intervention may or may not work, and the extent to which children's school readiness can be improved (Carroll et al., 2007). Examining district-, school- and classroom-level variables associated with students' academic success (e.g., district policies, administrators' support, teacher quality, professional culture), will be necessary in order to determine which variables have the strongest relationship for improving (or depreciating) prekindergarten students' learning experiences and school readiness outcomes both across the district and within the context of demographic subpopulations.

A fourth implication from this report is that the Early Childhood Department may consider expanding student measures it uses to assess foundational learning experiences that are crucial to the school readiness of children. The Early Childhood Department is currently in the process of expanding efforts to assess students' progress and needs to include social and emotional development, supported by funds from the House Bill 4 High Quality Prekindergarten grant. While focus on accountability is important, primary emphasis should be placed on using assessments as a means to determine progress, successes, and needs of each individual child to ensure they receive optimal learning experiences (NAEYC & NAECS/SDE, 2003).

References

Aparicio, E. & Nikolov, S. (n.d.). *The importance of equity assessments: The development of Logramos TERCERA EDICION, a comprehensive assessment of achievement in Spanish*. White paper. Houghton Mifflin Harcourt: Boston, Massachusetts.

Brooks-Gunn, J. (2003). *Do you believe in magic? What we can expect from early childhood intervention programs*. Society for Research in Child Development, 17(1): 3-14.

Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). *A conceptual framework for implementation fidelity*. Implementation Science, 2(40), 1-9. doi:10.1186/1748-5908-2-40

Currie, J. (2000). *Early childhood intervention programs: What do we know?* JCPR-WP-169, p. 1-39. Joint Center for Poverty Research, IL. Retrieved from http://files.eric.ed.gov/fulltext/ED451915.pdf

Del Grosso, P., Akers, L., Esposito, A.M., & Paulsell, D. (2014). *Early care and education partnerships: A review of the literature*. OPRE Report #2014-64. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research and Evaluation.

Evans, G.W., & Kim, P. (2013). *Childhood poverty, chronic stress, self-regulation and coping.* Child development perspectives, 7(1), p. 43-48.

Gormley, W.T., Gayer, T., Phillips, D. & Dawson, B. (2005). *The effects of universal pre-k on cognitive development*. *Developmental Psychology*, 41(6): 872-884.

Houston Independent School District. (2015a). *District and school Iowa and Logramos 3 performance report for grades 1-8, Spring 2005. Department of Research and Accountability*. Houston, TX: Houston Independent School District. Retrieved from http://www.houstonisd.org/Page/133189

Houston Independent School District. (2015b). *District and School Profiles 2014–2015.* Retrieved from http://www.houstonisd.org/Page/38525.

Houston Independent School District. (2015c). *Prekindergarten education program: Effects of HISD prekindergarten on kindergarten performance, 2014–2015*. Retrieved from http://www.houstonisd.org/cms/lib2/TX01001591/Centricity/Domain/8269/PE_Cirriculum/prek%20education%20program%20eval_2014_15_final.pdf

Houston Independent School District. (2016a). *HISD Early Childhood Education Program*. Retrieved from http://www.houstonisd.org/prek

Houston Independent School District. (2016b). *Houston Independent School District State of Texas Assessments of Academic Readiness (STAAR) performance, grades 3-8 spring 2016*. Department of Research and Accountability: Houston Independent School District.

Iowa Testing Programs. (October 2012). *Iowa assessment: Score totals*. University of Iowa: Iowa City, IA Retrieved from https://itp.education.uiowa.edu/ia/IowaAssessmentScoreTotalsAndComposites.aspx

Magnuson, K., Ruhm, C., & Waldfogel, J. (2007). *The persistence of preschool effects: Do subsequent classroom experiences matter?* Early Childhood Research Quarterly, 22(1), 18-38.

National Association for the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education. (2003). *Early childhood curriculum, assessment, and program evaluation: Building an effective, accountable system in programs for children birth through age 8*. Position Statement. Washington DC: National Association for the Education of Young Children.

National Association for the Education of Young Children. (2009). Developmentally appropriate practice in early childhood programs serving children from birth through age 8. Position statement. Washington, DC: NAEYC.

National Research Council. (2001). *Eager to learn: Educating our preschoolers.* Committee on Early Childhood Pedagogy. Bowman, B.T., Donovan, M.S., & Burns, M.S. editors. Commission on Behavioral and Social Science and Education. Washington, DC: The National Academies Press.

National Research Council. (2002). *Scientific research in education: Committee on scientific principles for education research.* Washington, DC: The National Academy Press.

National Research Council. (2007). *Taking Science to School: Learning and Teaching Science in Grades K-8*. Washington, DC: The National Academies Press. doi:10.17226/11625

National Research Council. (2009). *Mathematics learning in early childhood: Paths toward excellence and equity*. Committee on Early Childhood Mathematics, Christopher T.Cross, Taniesha A. Woods, and Heidi Schweingruber, Editors. Center for Education, Division of Behavioral and Social Science and Education. Washington, DC: The National Academies Press.

Schiller, P. (n.d.). *Getting a jump on Head Start readiness: Frog Street Pre-k and closing the early achievement gap*. White Paper. Retrieved from http://www.frogstreet.com/wp-content/uploads/2015/03/Frog-Street-White-Paper-II-Final-Schiller-Patterson.pdf

Shager, H.M., Schindler, H.S., Magnuson, K.A., Duncan, G.J., Yoshikawa, H., & Hart, C.M.D. (2013*). Can research design explain variation in Head Start research results? A meta-analysis of cognitive and achievement outcomes*. Educational Evaluation and Policy Analysis, 35, 76-95.

Texas Education Agency. (2016). *PEIMS 2015-2016 data collection schedules*. Retrieved from http://tea.texas.gov/Reports_and_Data/Data_Submission/PEIMS/PEIMS_Data_Standards/PEIMS_2015-2016_Data_Collection_Schedule/

United Nations Children's Fund. (April 2012). *School readiness: A conceptual framework*. Retrieved at http://www.unicef.org/education/files/Chil2Child_ConceptualFramework_FINAL(1).pdf

U.S. Advisory Committee on Head Start Research and Evaluation. (2012). *Advisory Committee on Head Start Research and Evaluation Final report.* U.S. Department of Health and Human Services: Washington, DC. Retrieved from http://www.acf.hhs.gov/opre/resource/advisory-committee-on-head-start-research-and-evaluation-final-report

Villanueva, C.K. (July 2016). *Texas Pre-K: Looking ahead to the 2017 Legislative Session*. Center for Public Policy Priorities. Retrieved from http://forabettertexas.org/images/EO_2016_PP_PreK.pdf

Zhai, Brooks-Gunn, & Waldfogel. (2011). *Head Start and urban children's school readiness: a birth cohort study in 18 cities*. Developmental Psychology, 45(1): 134-152. doi:10.1037/a0020784

Appendix A

Table 1. Academic achievement of kindergarten students on the 2015–2016 Iowa English language arts subtests based on HISD prekindergarten enrollment status and demographic characteristics

Demographic Characteristics		HISD Pre-K			Non-HISD Pre-K			Mean Difference	Effect Size
		Mean	SD	n	Mean	SD	n		
Overall Sample		130.1	8.9	5,353	131.9	10.5	3,746	-1.7	-0.18
Gender	Female	131.0	9.0	2,674	132.7	10.3	1,807	-1.6	-0.17
	Male	129.2	8.8	2,679	131.1	10.6	1,939	-1.9	-0.19
Race & Ethnicity	Asian	132.7	8.8	157	133.6	11.5	312	-0.9	-0.08
	Black	130.0	9.2	2,080	129.1	9.3	1,148	0.9	0.10
	Hispanic	129.6	8.4	2,828	129.2	9.3	1,261	0.4	0.05
	White	135.0	10.8	230	137.7	10.3	898	-2.7	-0.26
	Other	131.2	6.5	58	134.0	10.2	127	-2.8	-0.30
Economically disadvantaged	No	133.5	9.9	831	135.9	10.7	1,830	-2.4	-0.23
	Yes	129.5	8.6	4,522	128.0	8.7	1,916	1.5	0.17
Special Education eligible	No	130.3	8.9	5,232	132.0	10.5	3,634	-1.7	-0.18
	Yes	123.3	7.8	121	126.9	10.3	112	-3.6	-0.40
Limited English Proficient (LEP)	No	130.5	8.9	4,377	132.6	10.4	3,306	-2.1	-0.22
	Yes	128.4	8.8	976	126.2	9.4	440	2.2	0.25
At risk	No	132.5	8.7	2,936	136.0	10.0	2,066	-3.5	-0.38
	Yes	127.3	8.3	2,417	126.8	8.6	1,680	0.5	0.06

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

Table 2. Academic achievement of kindergarten students on the 2015–2016 Logramos language arts subtests based on HISD prekindergarten enrollment status and demographic characteristics

Demographic Characteristics		HISD Pre-K			Non-HISD Pre-K			Mean Difference	Effect Size
		Mean	SD	n	Mean	SD	n		
Overall Sample		172.4	14.4	4,532	167.6	13.2	1,109	4.8	0.34
Gender	Female	173.4	14.1	2,255	168.6	13.1	566	4.8	0.35
	Male	171.4	14.6	2,277	166.6	13.3	543	4.9	0.34
Race & Ethnicity	Asian	–	–	0	–	–	0	–	–
	Black	*	*	4	–	–	0	–	–
	Hispanic	172.4	14.4	4,507	167.6	13.2	1,103	4.8	0.34
	White	173.5	17.0	17	161.6	15.0	5	11.9	0.72
	Other	*	*	4	*	*	1	*	*
Economically disadvantaged	No	172.1	13.4	305	168.9	13.7	133	3.2	0.24
	Yes	172.4	14.4	4,227	167.4	13.2	976	5.0	0.35
Special Education eligible	No	172.7	14.3	4,432	167.6	13.2	1,100	5.0	0.36
	Yes	161.1	12.8	100	162.7	11.0	9	-1.6	-0.13
Limited English Proficient (LEP)	No	166.7	14.4	41	168.4	15.2	98	-1.7	-0.11
	Yes	172.5	14.4	4,491	167.5	13.0	1,011	5.0	0.35
At risk	No	168.6	17.0	25	169.9	16.4	56	-1.2	-0.07
	Yes	172.4	14.4	4,507	167.5	13.0	1,053	5.0	0.35

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.

Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

Note. Caution should be used when interpreting effect size results that were computed with sample sizes of n > 30.

'*' denotes fewer than five students tested.

'–' denotes not data available for students.

Table 3. Academic achievement of kindergarten students on the 2015–2016 Iowa mathematics subtest based on HISD prekindergarten enrollment status and demographic characteristics

Demographic Characteristics		HISD Pre-K			Non-HISD Pre-K			Mean Difference	Effect Size
		Mean	SD	n	Mean	SD	n		
Overall Sample		130.9	9.4	5,541	131.5	10.3	3,928	-0.7	-0.07
Gender	Female	131.5	9.2	2,765	132.2	10.1	1,872	-0.7	-0.07
	Male	130.3	9.5	2,776	130.9	10.4	2,056	-0.7	-0.07
Race & Ethnicity	Asian	135.9	9.2	164	134.7	10.8	322	1.2	0.12
	Black	129.9	9.5	2,203	128.5	9.4	1,223	1.4	0.15
	Hispanic	131.0	9.0	2,870	129.5	9.6	1,322	1.5	0.16
	White	134.9	9.8	243	136.7	9.6	928	-1.7	-0.18
	Other	132.7	9.3	61	131.8	9.0	133	0.9	0.10
Economically disadvantaged	No	134.2	9.8	860	135.2	9.9	1,893	-1.0	-0.10
	Yes	130.3	9.1	4,681	128.1	9.4	2,035	2.2	0.24
Special Education eligible	No	131.0	9.3	5,416	131.6	10.3	3,811	-0.6	-0.07
	Yes	125.0	8.9	125	127.8	9.7	117	-2.8	-0.31
Limited English Proficient (LEP)	No	130.7	9.0	4,534	131.9	10.0	3,460	-1.2	-0.13
	Yes	131.7	10.7	1,007	128.8	11.7	468	2.8	0.26
At Risk	No	132.8	8.8	3,020	135.2	9.5	2,140	-2.4	-0.26
	Yes	128.6	9.5	2,521	127.2	9.4	1,788	1.4	0.15

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.

Table 4. Academic achievement of kindergarten students on the 2015–2016 Logramos mathematics subtest based on HISD prekindergarten enrollment status and demographic characteristics

Demographic Characteristics		HISD Pre-K			Non-HISD Pre-K				
		Mean	SD	n	Mean	SD	n	Mean Difference	Effect Size
Overall Sample		164.1	13.2	4,606	159.1	13.7	1,148	5.0	0.37
Gender	Female	164.6	13.3	2,298	160.3	13.5	574	4.3	0.32
	Male	163.6	13.2	2,308	157.9	13.7	574	5.7	0.43
Race & Ethnicity	Asian	–	–	0	–	–	0	–	–
	Black	*	*	4	–	–	0	–	–
	Hispanic	164.1	13.2	4,581	159.1	13.7	1,142	5.0	0.37
	White	165.2	13.4	17	159.6	12.8	5	5.6	0.42
	Other	*	*	4	*	*	1	*	*
Economically disadvantaged	No	164.0	12.3	312	158.7	12.9	138	5.2	0.42
	Yes	164.1	13.3	4,294	159.2	13.8	1,010	4.9	0.37
Special Education eligible	No	164.3	13.2	4,504	159.2	13.7	1,138	5.1	0.38
	Yes	156.1	12.7	102	154.9	9.2	10	1.2	0.10
Limited English Proficient (LEP)	No	159.0	13.4	41	158.9	12.53	102	0.1	0.01
	Yes	164.1	13.2	4,565	159.1	13.8	1,046	5.0	0.38
At risk	No	160.5	15.7	23	159.1	11.5	59	1.4	0.11
	Yes	164.1	13.2	4,583	159.1	13.8	1,089	5.0	0.37

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.
Note. Caution should be used when interpreting effect size results that were computed with sample sizes of n > 30.
'*' denotes fewer than five students tested.
'–' denotes not data available for students.

Appendix B

Table 1. Academic achievement of kindergarten students on the 2015–2016 Iowa and Logramos (English) language arts and mathematics subtests based on HISD prekindergarten enrollment status and years of attendance

		HISD Pre-K (Two years)			HISD Pre-K (One year)				
	Assessment	**Mean**	**SD**	**n**	**Mean**	**SD**	**n**	**Mean Difference**	**Effect Size**
Two years HISD Pre-K vs. One year HISD Pre-K	Iowa ELA	131.1	9.1	696	130.0	8.9	4,657	1.1	0.12
	Iowa mathematics	132.2	10.0	713	130.7	9.2	4,828	1.6	0.17
	Logramos LA	174.6	15.9	374	172.2	14.2	4,158	2.4	0.16
	Logramos mathematics	166.1	13.5	376	163.9	13.2	4,230	2.2	0.16
		HISD Pre-K (Two years)			**Non-HISD Pre-K**				
Two years HISD Pre-K vs. Non-HISD Pre-K	Iowa ELA	131.1	9.082	696	131.9	10.478	3,746	-0.8	-0.08
	Iowa mathematics	132.2	9.983	713	131.5	10.261	3.928	0.7	0.07
	Logramos LA	174.6	15.858	374	167.6	13.240	1,109	7.0	0.50
	Logramos mathematics	166.1	13.46	376	159.1	13.739	574	7.0	0.51

Source. PEIMS 2014–2015 to 2015–2016 HISD student databases and Iowa and Logramos 2015–2016 Kindergarten student databases.
Note. Effect size criteria indicates 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect.