MEMORANDUM March 21, 2017

TO: Lance Menster
Officer, Elementary Curriculum & Development

FROM: Carla Stevens
Assistant Superintendent, Research and Accountability

SUBJECT: **COMPARISONS OF ACADEMIC ACHIEVEMENT AMONG PREKINDERGARTEN STUDENTS ENROLLED IN HISD EARLY CHILDHOOD CENTERS AND SCHOOL-BASED PROGRAMS, 2015–2016**

This report compared the academic achievement of prekindergarten students who were enrolled in HISD early childhood centers (ECC) during the 2015–2016 school year to their peers who attended school-based programs. Academic achievement was measured on the HISD CIRCLE English and Spanish language, literacy, and mathematics subtests.

Key findings include:

- The overall increase of student's ages 3.5 to < 4.0 years old who achieved proficiency in English and Spanish language, literacy, and mathematics was typically higher from the middle-of year (MOY) to end-of-year (EOY), regardless of prekindergarten program attended.
- The overall increase of student's ages 4.0 years and older achieving proficiency in English and Spanish language, literacy, and mathematics was typically higher from the beginning-of-year (BOY) to MOY for students who attended an ECC.
- A positive, statistically significant relationship was found between students' BOY total score and their proficiencies in language, literacy, and mathematics by the EOY regardless of age group and language version of the subtests administered.
- Prekindergarten program type was observed to predict proficiencies in language, literacy, and mathematics for students ages 4.0 years old and older, regardless of language version of the 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

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HOUSTON INDEPENDENT SCHOOL DISTRICT

RESEARCH

Educational Program Report

COMPARISONS OF ACADEMIC ACHIEVEMENT AMONG PREKINDERGARTEN STUDENTS ENROLLED IN HISD EARLY CHILDHOOD CENTERS AND SCHOOL-BASED PROGRAMS, 2015-2016

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COMPARISONS OF ACADEMIC ACHIEVEMENT AMONG PREKINDERGARTEN STUDENTS ENROLLED IN HISD EARLY CHILDHOOD CENTERS AND SCHOOL-BASED PROGRAMS, 2015–2016

Executive Summary

Program Description

In compliance with 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 an early childhood center (ECC) or a school-based program (SBP; early childhood center within a school). 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 Montessori schools within HISD, the district uses *the Frog Street Pre-K (FSPK)* curriculum. The *Frog Street Pre-K* curriculum focuses on the physical, social, emotional, cognitive, and language development of preschool-age children (Schiller, n.d.). The quality of implementation of education curriculum affects 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 its attendance boundaries. To be eligible for participation in a free prekindergarten program in HISD 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, HISD also offers prekindergarten classes on a tuition basis to children who do not meet the above eligibility requirements. 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 students after all eligible four-year old students have been enrolled and if space is available (HISD, 2016a).

This report describes how well HISD early childhood centers (ECC) and school-based programs (SBP) are preparing young children to be school ready. Specifically, this report compared the language, literacy, and mathematics proficiency levels of prekindergarten students who were enrolled in ECCs to those of their peers enrolled in SBPs during the 2015–2016 school year.

Highlights

- Results from descriptive analyses indicated that increases in HISD Pre-K students' proficiency in language, literacy, and mathematics occurred from the beginning-of-year (BOY; Wave 1), middle-of-year (MOY; Wave 2), and end-of-year (EOY; Wave 3), regardless of prekindergarten program type and language version of the HISD CIRCLE subtests administered to students.

- Comparisons of proficiency attainment in language, literacy, and mathematics by the EOY indicated notable differences between students who were in their 3.5 to < 4.0 year old and 4.0 to < 4.5 year old developmental periods.

- The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in English and Spanish language, literacy, and mathematics was typically higher from the MOY to EOY, regardless of prekindergarten program attended. Conversely, increases of students ages 4.0 years old and older achieving academic proficiency was typically higher from the BOY to MOY for students who attended an ECC.

- Students who were 3.5 to < 4.0 years old and attended an SBP were more likely than their peers who attended an ECC to achieve proficiency in language, literacy, and mathematics throughout the school year. In contrast, students ages 4.0 to < 4.5 years old and 4.5 or above years olds were more likely to achieve proficiency in language, literacy, and mathematics by the EOY if they had attended an ECC compared to their peers who attended an SBP.

- A positive, statistically significant relationship was found between the BOY total score and students' proficiencies in language, literacy, and mathematics by the EOY regardless of age group and language version of the subtests administered. This indicates the presence of an achievement gap, as HISD Pre-K students who have lower achievement on the BOY total score in language, literacy, and mathematics were less likely to achieve proficiency by the EOY compared to their higher performing peers.

- Prekindergarten program type was also observed to predict proficiencies in language, literacy, and mathematics for students ages 4.0 to < 4.5 years old and 4.5 or above years old, regardless of language version of the subtests. Specifically, students who were at least four-years old and attended an ECC were more likely to achieve academic proficiency by the EOY compared to their peers who attended an SBP.

Recommendations

- The Early Childhood Department may want to identify and monitor factors that impact the educational experiences of students once they enroll in HISD Pre-K programs to provide further insight as to why 3.5 to < 4.0 year-old students were more likely to achieve higher proficiency in language, literacy, and mathematics at a school-based program (SBP), in contrast to 4.0 to < 4.5 year-old and 4.5 or above year-old students were more likely to achieve higher proficiency if they attended an early childhood center (ECC).

- The Early Childhood and Research and Accountability departments may want to monitor the academic growth and achievement gaps of students in the context of demographic characteristics and content area.

- The Early Childhood Department may consider working with the Student Assessment Department, Special Education Department and/or Research and Accountability Department to identify and implement with fidelity an inclusive, monitored assessment to measure all children's strengths, progress, and needs upon entering and exiting HISD prekindergarten programs.

Introduction

Researchers suggest that high-quality early childhood centers (ECC) promote students' school readiness, enhance students' cognitive development, and reduce the risk of students' having reading and writing difficulties as they progress through school (see Butin & Woolums, 2009). School readiness refers to children being prepared to succeed in a structured learning setting (United Nations Children's Fund [UNICEF], 2012). While school readiness is important for all children, it is especially important for vulnerable and disadvantaged populations, including "girls, children with disabilities, ethnic minorities, and those living in rural areas" (UNICEF, 2012, p. 9). Students from disadvantaged backgrounds gain the most benefits from early childhood programs when compared to their non-disadvantaged peers (Brooks-Gunn, 2003; Currie, 2000; Gormley, Gayer, Phillips, & Dawson, 2005; Magnuson, Ruhm, & Waldfogel, 2007). Researchers suggest students who attend prekindergarten have higher completion rates in high school and lower dropout rates than their disadvantaged peers who did not attend preschool (see Currie, 2000; UNICEF, 2012). Review of the literature concurs that the beneficial effects of an early childhood education are typically larger for disadvantaged youth compared to their non-disadvantaged peers (Currie, 2000).

The rising number of early childhood centers (ECCs) was in part attributed to the brain research highlighting the integral role early childhood education has in promoting the healthy development of children (Center on the Developing Child at Harvard University, 2010). The Houston Independent School District [HISD] provided the following eight ECCs focused on serving young children (not to exceed second grade) during the 2015–2016 school year: Bellfort; Farias; Fonwood; Halpin; Martin Luther King, Jr.; Laurenzo; Mistral; and Neff. Early childhood centers within schools, here in after referred to as school-based programs (SBP), were also offered at HISD bringing the total number of campuses that provide instruction to young children to 155 (HISD, 2016a).

The purpose of this evaluation report was to provide both HISD and other early childhood stakeholders with information about the academic achievement of HISD prekindergarten students who attended either an ECC or SBP during the 2015–2016 school year. This observational study answered the following research questions:

1. What differences in academic achievement existed between HISD prekindergarten students who attended an early childhood center compared to students who enrolled in a school-based program during the 2015–2016 school year?

2. What were the effects of HISD early childhood centers and school-based programs on prekindergarten students' academic achievement in language, literacy, and mathematics by the end of the 2015–2016 school year?

3. What differences in proficiency in language, literacy, and mathematics were observed among students enrolled in HISD early childhood centers and school-based programs during the 2015–2016 school year?

4. What variables predict the likelihood that HISD prekindergarten students would achieve proficiency in language, literacy, and mathematics by the end of the 2015–2016 school year?

Proficiency in language, literacy, and mathematics were controlled for by age group; i.e., 3.5 to < 4.0 years old; 4.0 to < 4.5 years old; and 4.5 or above years old to account for differences in students' developmental expectations.

Methods

Data Collection

- Data collection for prekindergarten students who were enrolled in an HISD prekindergarten program during the 2015–2016 school year was conducted in two phases. The first phase of data collection identified all prekindergarten students (coded 'PK') who attended HISD during the 2015–2016 school year. This information, retrieved from the Public Education Information Management System (PEIMS) 2015–2016 HISD student database, revealed that 14,804 Pre-K students attended HISD.

- The second phase of data collection involved merging students' PEIMS data to their academic data located in the HISD CIRCLE 2015–2016 student database. "The CIRCLE assessment is a revision of the Center for Improving the Readiness of Children for Learning and Education (CIRCLE) Phonological Awareness Language and Literacy System that now incorporates Science, Technology, Engineering and Math skills [(C-PALLS+STEM)]" (Landry, Assel, Williams, Zucker, Swank, & Gunnewig, 2014, p. 2).

Sample

- The PEIMS 2015–2016 HISD student database includes 14,804 prekindergarten students who had an Average Daily Attendance (ADA) eligibility classification greater than '0'-enrolled, no membership. After merging the PEIMS 2015–2016 HISD student database with the HISD CIRCLE 2015–2016 student database, and removing students who had either incomplete, no scores or had not achieved a minimum score greater than zero on the language, literacy, and mathematics subtests throughout the year, the size of the sample evaluated in this report was reduced by 22.6 percent to 11,460 students (77.4%). Because some students were administered both language versions of the HISD CIRCLE subtests, cumulative overall sample counts shown in **Appendices C, D, E** and **F-Tables 1** to **3** may render overestimates of actual counts of students tested.

- Data retrieved from PEIMS represent a 'snapshot' of students who were enrolled by the last Friday in October of each school year in HISD (Texas Education Agency [TEA], 2016a). Students present for the 'snapshot' may not have been actively enrolled in a specific 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 either a SPB or ECC during the 2015–2016 school year. Because these students were most likely not present for each assessment wave, they were not included in this report.

Measures

- The academic achievement of HISD prekindergarten students was measured on the CIRCLE assessment. CIRCLE is an online assessment tool designed to monitor the academic progress of prekindergarten children ages three years and six months to four years and eleven months. HISD currently uses this criterion-referenced assessment to determine children's understanding in the areas of language, literacy, and mathematics. The following CIRCLE Progress Monitoring System subtests that were administered to prekindergarten students included: Phonological Awareness, Rapid Letter Naming, Rapid Vocabulary Naming, and Mathematics. Phonological Awareness and Rapid Letter Naming subtests are measures for literacy, while Rapid Vocabulary Naming measures children's progress in language. **Appendix A** (**p. 29**) shows the complete list of subtests HISD administered to

students during the 2015–2016 school year.

- ABC Names and ABC Sounds were subtests originally designed by CIRCLE that were also administered to Pre-K students. However, because HISD decided not to 'time' these subtests during administration, ABC Names and ABC Sounds were considered outside the CIRCLE Progress Monitoring System (see Appendix A). While the Early Writing Checklist and Book and Print Awareness subtests were also administered to Pre-K students, data were not available to include in this report.

- English and Spanish versions of the CIRCLE assessment were administered three times a year to HISD prekindergarten students depending on their instructional program. Assessment "waves" occurred at the beginning-of-year (BOY; Wave 1), middle-of-year (MOY; Wave 2), and end-of-year (EOY; Wave 3). Cut-point scores determined by researchers who developed the CIRCLE assessment to measure Pre-K students' proficiency and academic risk in the areas of language, literacy, and mathematics by age group and subtest type are provided in **Table 1** (**p. 7**). Appendix A (p. 30) provides details regarding which subtest measures were included in the composite language and literacy score and mathematics score for each wave. However, if a student scored at or above the cut-point score determined for an academic domain, she or he was considered proficient in that area. If a student scored below the cut point, she or he was considered either 'developing' (referring to students younger than four years old) or 'emerging' (referring to students four years old and older), and therefore at academic risk (Landry et al., 2014).

- The demographic characteristics of HISD prekindergarten students used for this report were collected from the PEIMS 2015–2016 HISD student database. Characteristics included gender, ethnicity, economically-disadvantaged status, special education eligibility status, 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. It is a composite measure based on the thirteen indicators shown in **Appendix B** (p. 30; Texas Education Agency [TEA], 2016b).

Table 1. Cut-point scores on the HISD CIRLCE English and Spanish subtests to determine prekindergarten students' proficiency and academic risk based on assessment type, wave and age group, 2015–2016

Assessment Type	Wave	3.5 to < 4.0 years old cut points	4.0 to < 4.5 years old cut points	4.5 or above years old cut points
English language and literacy	BOY	84	90	94
	MOY	90	98	101
	EOY	91	101	103
Spanish language and literacy	BOY	71	76	83
	MOY	79	85	92
	EOY	80	87	93
English mathematics	BOY	20	20	20
	MOY	23	23	23
	EOY	23	23	23
Spanish mathematics	BOY	20	20	20
	MOY	23	23	23
	EOY	23	23	23

Source. Adapted from Children's Learning Institute (September 2016). *CIRCLE Progress Monitoring Cut Points*. University of Texas Children's Learning Institute: Houston, TX.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for English language and literacy, under-estimates of students' proficiency levels may be present.

Statistical Analyses

- Summary statistics (i.e., count, mean, standard deviation, and percent) were computed to determine whether or not prekindergarten students were proficient in language, literacy, and mathematics by the end-of-year (EOY) on the HISD CIRCLE English and Spanish subtests. Proficiency levels were in the context of age group.

- Effect sizes were also computed to measure the magnitude HISD early childhood centers (ECC) had on students' academic achievement when compared to students who attended a school-based program (SBP) using Hedge's g. Hedge's g is a standard deviation-based measure used to compute the effect size for 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.

- Logistic regression models were used to predict the likelihood that HISD prekindergarten students would reach proficiency in language, literacy, and mathematics by the EOY. The eight predictor variables included in the models were: the BOY total score in language and literacy or mathematics, prekindergarten program type, race and ethnicity (i.e., Black and Hispanic), gender, economically-

disadvantaged status, LEP status, and special education eligibility status. At-risk status was not included in the logistic regression models as this variable is determined by thirteen indicators, one of which is LEP status as defined by TEC § 29.052 (TEA, 2016b; see Appendix B). Each model was categorized by age group.

- Data were not examined to determine if children participated in either an ECC or school-based program in years prior to 2015–2016. Thus, findings should be interpreted as the average impact of prekindergarten programs compared to each other (Zhai, Brooks-Gunn, & Waldfogel, 2011).

- Item analyses were not conducted to determine the academic achievement for students based on sub-measures within language, literacy, and mathematics content areas. Thus, findings should be interpreted as average achievement of prekindergarten students on HISD CIRCLE subtests.

Limitations

- The information in this report was collected for HISD prekindergarten students identified as 'PK' only in the PEIMS 2015–2016 HISD student database. The population of students identified as receiving prekindergarten instruction may be an underestimate as HISD students coded as 'EE' during 2015–2016 may have also received some Pre-K instruction.

- 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 who attended ECCs and SBPs were coded as 'EE' during the 2015–2016 school year, and were therefore not included in the study sample.

- The information in this report was primarily examined in the context of academic outcomes, demographic characteristics, and prekindergarten program type. Because no components of the prekindergarten programs were included in this report, variance explained by predictor variables in statistical models were limited.

- The CIRCLE assessment was "not designed or evaluated for use for children with disabilities, e.g., language delays, [autism] spectrum disorders, or intellectual disabilities" (Landry et al., 2014, p. 4). As such, HISD currently does not have an inclusive assessment to monitor all children's strengths, progress, and needs upon entering and exiting prekindergarten programs (National Association for the Education of Young Children & National Association of Early Childhood Specialists in State Departments of Education [NAEYC & NAECS/SDE], 2003). Caution should be exercised, therefore, when interpreting results in the context of special education status.

- The ABC Sounds sub-measure was not included in the overall cut-point total score for English and Spanish language and literacy in the HISD CIRCLE 2015–2016 database. Underestimates of students' proficiency levels in language and literacy may be present (Houston Independent School District [HISD], 2016b).

Results

What differences in academic achievement existed between HISD prekindergarten students who attended an early childhood center compared to students who enrolled in a school-based program during the 2015–2016 school year?

Table 2. Academic achievement of HISD prekindergarten students on the End-of-Year, HISD CIRCLE English and Spanish assessments based on prekindergarten program, subtest type and age group, 2015–2016

		Early Childhood Center			School-based Program				
Subtest type	**Age group**	**n**	**Mean**	**SD**	**n**	**Mean**	**SD**	**Mean difference**	**Effect size**
English language and literacy	3.5 to < 4.0 years old	89	64.4	33.4	452	72.9	34.5	-8.5	-0.25
	4.0 to < 4.5 years old	382	106.7	20.4	2,162	98.0	24.4	8.7	0.37
	4.5 or above years old	432	114.4	17.6	2,464	103.8	22.5	10.6	0.48
Spanish language and literacy	3.5 to < 4.0 years old	166	70.3	28.6	285	69.1	28.0	1.2	0.04
	4.0 to < 4.5 years old	477	99.2	20.6	1,847	92.6	25.2	6.7	0.27
	4.5 or above years old	549	104.9	18.2	2,155	99.4	23.2	5.6	0.25
English mathematics	3.5 to < 4.0 years old	89	20.1	5.7	452	21.4	5.7	-1.3	-0.22
	4.0 to < 4.5 years old	382	25.9	3.0	2,162	24.8	3.9	1.1	0.30
	4.5 or above years old	432	26.8	2.2	2,464	25.7	3.3	1.1	0.36
Spanish mathematics	3.5 to < 4.0 years old	166	20.9	5.5	285	21.4	5.4	-0.6	-0.10
	4.0 to < 4.5 years old	477	25.8	3.3	1,847	24.7	4.1	1.1	0.27
	4.5 or above years old	549	26.5	5.5	2,155	25.8	3.3	0.7	0.18

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Table 2 shows descriptive statistics and effect size results based on students' language, literacy, and mathematics achievement on the HISD CIRCLE English and Spanish subtests by age group and prekindergarten program. Additionally, Appendices C, D, E, and F Tables 1 to 3 show students' academic achievement by demographic characteristic.

- Comparisons of cut-point scores (Table 1) and HISD CIRCLE English and Spanish subtest results shown in Table 2 indicate that 3.5 to < 4.0 year old students on average had not achieved proficiency in language, literacy, and mathematics regardless of prekindergarten program they had attended by the end of the school year. Further, students ages 3.5 to < 4.0 years old who attended an early childhood center (ECC) on average typically scored lower on the English language, literacy, and mathematics subtests than their peers who attend school-based programs (SBP). The converse was true for students who took the Spanish language and literacy subtests.

- Pre-K students ages 4.0 to < 4.5 years old who attended school-based programs (SBP) achieved a mean score (Mean = 98.0, SD = 24.4) on the English language and literacy subtests that fell below the benchmark minimum score of 101 (see Table 1).

- Pre-K students ages 4.5 years old and older met the cut-point score for proficiency in all content areas not matter which prekindergarten program they were served by. Additionally, students ages 4.0 years old and older who attended an early childhood center (ECC) on average typically scored higher on the English and Spanish language, literacy, and mathematics subtests than their peers who attend school-based programs (SBP).

What were the effects of HISD early childhood centers and school-based programs on prekindergarten students' academic achievement in language, literacy, and mathematics by the end of the 2015–2016 school year?

- Effect sizes shown in Table 2 indicate that small negative effects occurred among 3.5 to < 4.0 year old students who attended an ECC and were administered the English language, literacy, and mathematics subtests when compared to their peers who had attended an SBP.

- However, academic achievement by student demographic characteristics shown in Appendices C and E, **Table 1** (pages 31 and 37) indicate positive effects occurred among LEP students who attended an ECC and were administered the English language, literacy, and mathematics subtests (1.06 and 0.42, respectively). However, due to the sample size of LEP students (n= 6) who attended an ECC prekindergarten program and took the English subtests, caution should be exercised regarding the interpretation of HISD prekindergarten programs' effect on this student subpopulation's academic achievement.

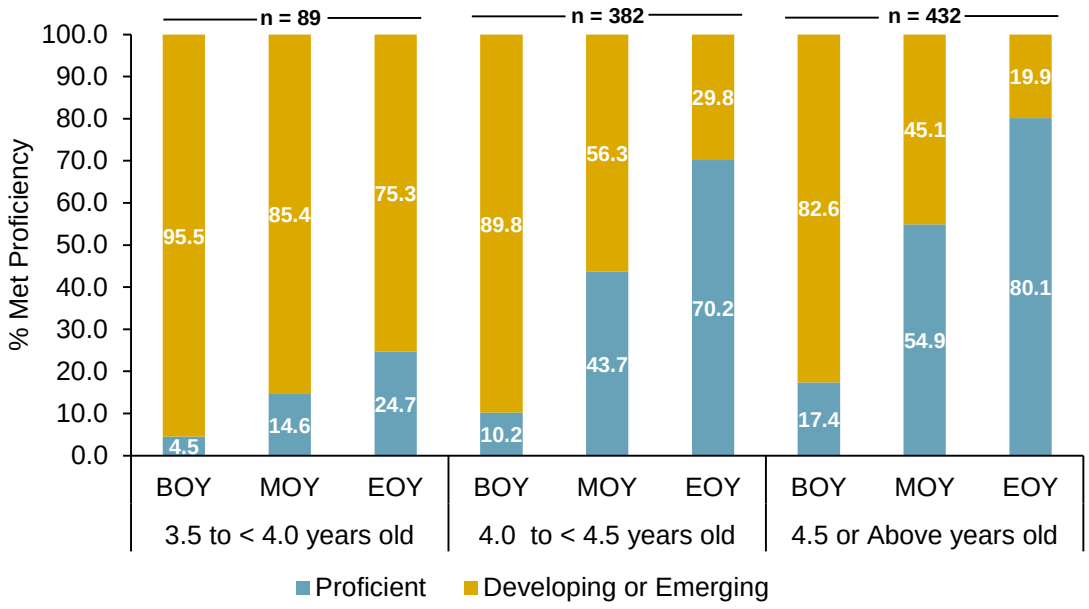
- Effect sizes shown in Table 2 (p. 9) also indicated small positive effects for students age 4.0 to < 4.5 years old and 4.5 or above years old who attended an ECC when compared to their peers who attended an SBP on the English and Spanish language, literacy, and mathematics subtests. Small to moderate effects were particularly noted to occur among students identified as female or Black on the English version only (see Appendices C, D, E, and F, **Tables 2** and **3**).

- Negligible and small negative effects were observed among students age 4.0 to < 4.5 years old and 4.5 or above years old identified as Asian on the English subtests, and students identified as not economically disadvantaged on the Spanish subtests (see Appendices C, D, E, and F, Tables 2 and 3).

What differences in proficiency in language, literacy, and mathematics were observed among students enrolled in HISD early childhood centers and school-based programs during the 2015–2016 school year?

Figures 1 through **8** show the percentages of students who attained proficiency in language, literacy, and mathematics from the BOY to EOY by age group and prekindergarten program.

Figure 1. Percent of HISD prekindergarten students who attended an Early Childhood Center and met proficiency on the HISD CIRCLE English language and literacy subtests based on age group, 2015–2016



Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present.

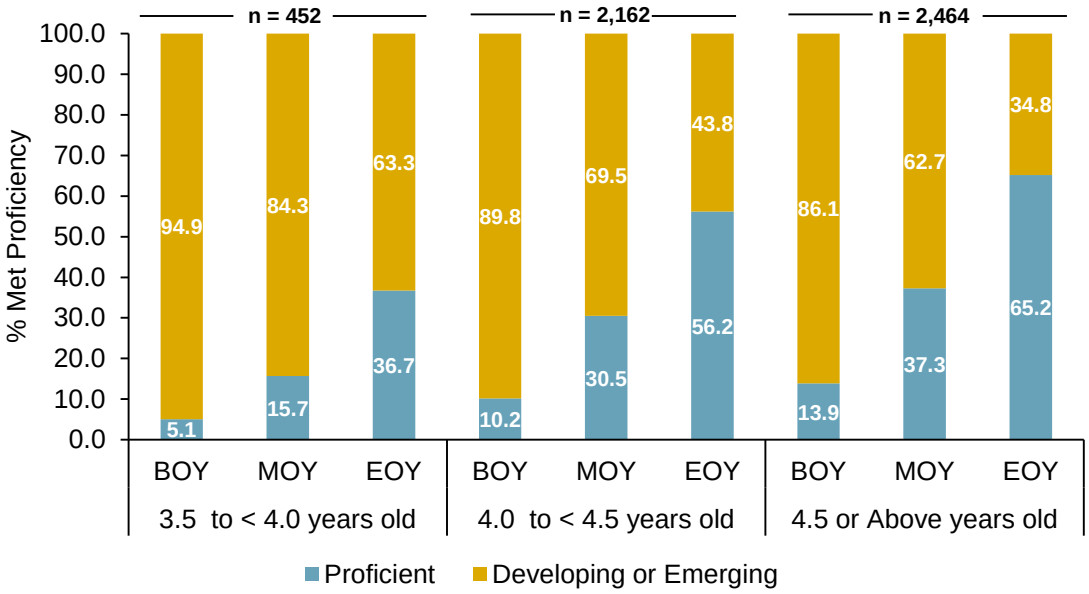
- The percentage of HISD prekindergarten (Pre-K) students ages 3.5 to < 4.0 years old who attended an ECC and had attained proficiency in English language and literacy increased from 4.5 percent (BOY) to 14.6 percent (MOY) to 24.7 percent (EOY); a difference of 10.1 percentage points from the BOY to MOY and 10.1 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in English language and literacy was 20.2 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an ECC and had attained proficiency in English language and literacy increased from 10.2 percent (BOY) to 43.7 percent (MOY) to 70.2 percent (EOY); a difference of 33.5 percentage points from the BOY to MOY and 26.5 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in English language and literacy was 60.0 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an ECC and had attained proficiency in English language and literacy increased from 17.4 percent (BOY) to 54.9 percent (MOY)

to 80.1 percent (EOY); a difference of 37.5 percentage points from the BOY to MOY and 25.2 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in English language and literacy was 62.7 percentage points.

Figure 2. Percent of HISD prekindergarten students who attended a School-based program and met proficiency on the HISD CIRCLE English language and literacy subtests based on age group, 2015–2016



Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present.

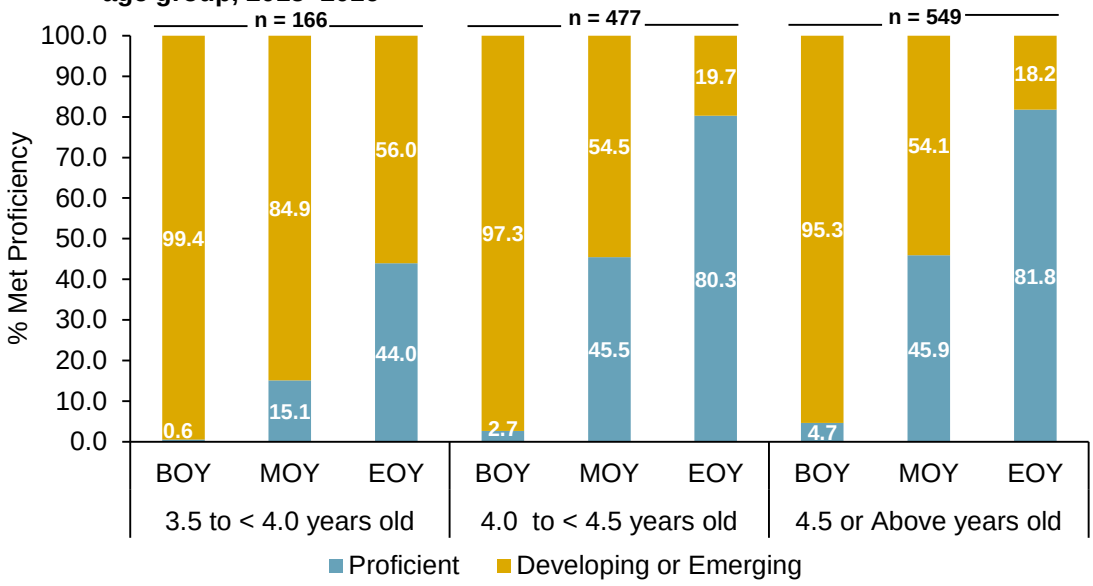
- The percentage of prekindergarten students ages 3.5 to < 4.0 years old who attended an SBP and had attained proficiency in English language and literacy increased from 5.1 percent (BOY) to 15.7 percent (MOY) to 36.7 percent (EOY); a difference of 10.6 percentage points from the BOY to MOY and 21.0 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in English language and literacy was 31.6 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an SBP and had attained proficiency in English language and literacy increased from 10.2 percent (BOY) to 30.5 percent (MOY) to 56.2 percent (EOY); a difference of 20.3 percentage points from the BOY to MOY and 25.7 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in English language and literacy was 46.0 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an SBP and had attained proficiency in English language and literacy increased from 13.9 percent (BOY) to 37.3 percent (MOY) to 65.2 percent (EOY); a difference of 23.4 percentage points from the BOY to MOY and 27.9

percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in English language and literacy was 51.3 percentage points.

Figure 3. Percent of HISD prekindergarten students who attended an Early Childhood Center and met proficiency on the HISD CIRCLE Spanish language and literacy subtest based on age group, 2015–2016



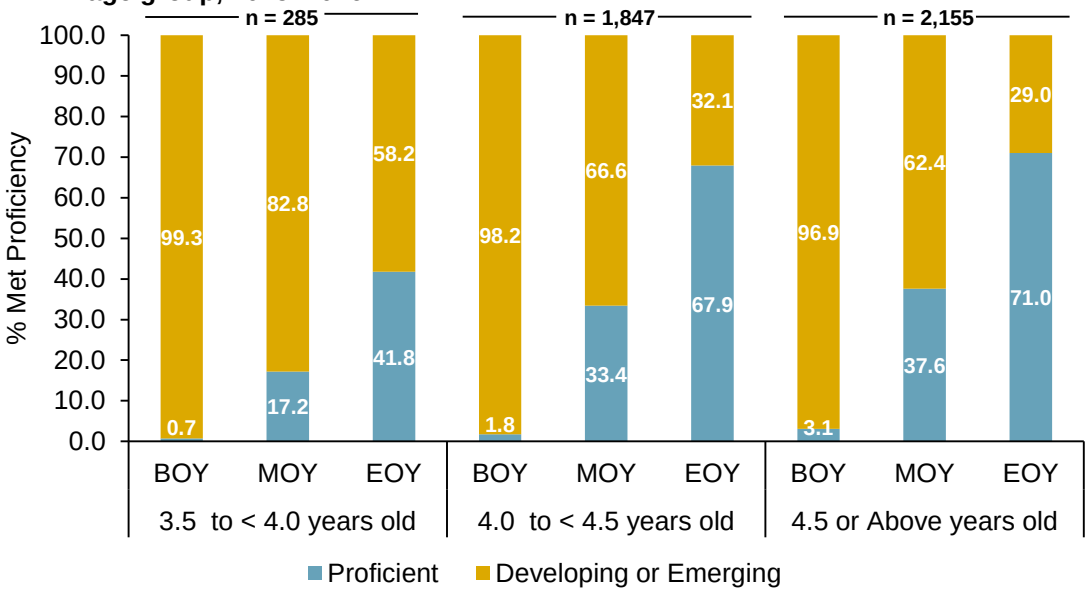
Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for Spanish language and literacy, underestimates of students' proficiency levels may be present.

- The percentage of prekindergarten students ages 3.5 to < 4.0 years old who attended an ECC and had attained proficiency in Spanish language and literacy increased from 0.6 percent (BOY) to 15.1 percent (MOY) to 44.0 percent (EOY); a difference of 14.5 percentage points from the BOY to MOY and 28.9 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in Spanish language and literacy was 43.4 percentage points.

- The percentage of prekindergarten students ages 4.0 to < 4.5 years old who attended an ECC and had attained proficiency in Spanish language and literacy increased from 2.7 percent (BOY) to 45.5 percent (MOY) to 80.3 percent (EOY); a difference of 42.8 percentage points from the BOY to MOY and 34.8 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in Spanish language and literacy was 77.6 percentage points.

- The percentage of prekindergarten students ages 4.5 or above years old who attended an ECC and had attained proficiency in Spanish language and literacy increased from 4.7 percent (BOY) to 45.9 percent (MOY) to 81.8 percent (EOY); a difference of 41.2 percentage points from the BOY to MOY and 35.9 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in Spanish language and literacy was 77.1 percentage points.

Figure 4. Percent of HISD prekindergarten students who attended a School-based program and met proficiency on the HISD CIRCLE Spanish language and literacy subtests based on age group, 2015–2016



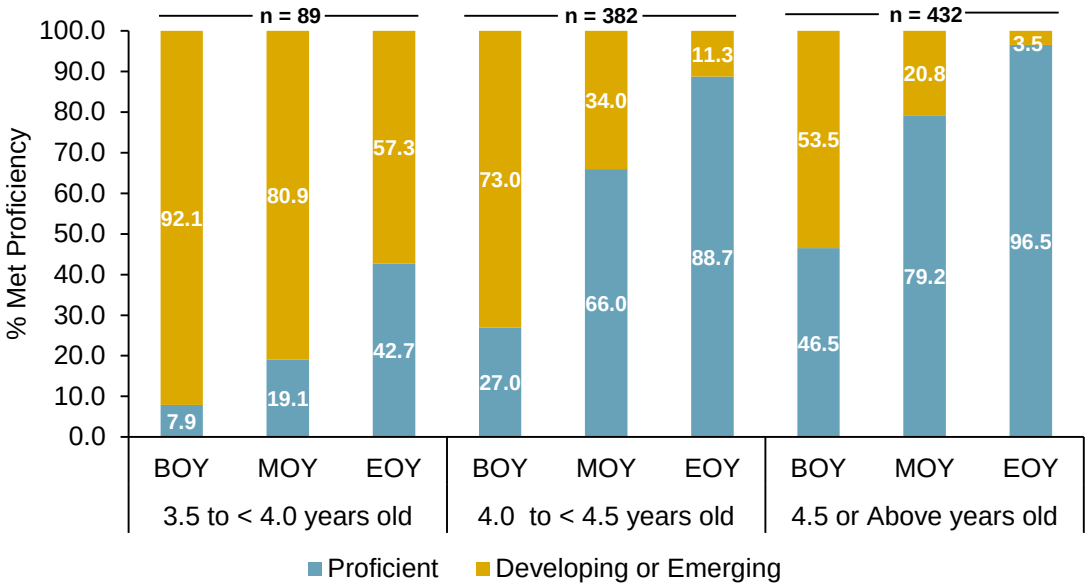
Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Because the 'ABC Sounds' sub-measure score was not included in the overall cut-point total score for Spanish language and literacy, underestimates of students' proficiency levels may be present.

- The percentage of prekindergarten students ages 3.5 to < 4.0 years old who attended an SBP and had attained proficiency in Spanish language and literacy increased from 0.7 percent (BOY) to 17.2 percent (MOY) to 41.8 percent (EOY); a difference of 16.5 percentage points from the BOY to MOY and 24.6 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in Spanish language and literacy was 41.1 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an SBP and had attained proficiency in Spanish language and literacy increased from 1.8 percent (BOY) to 33.4 percent (MOY) to 67.9 percent (EOY); a difference of 31.6 percentage points from the BOY to MOY and 34.5 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in Spanish language and literacy was 66.1 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an SBP and had attained proficiency in Spanish language and literacy increased from 3.1 percent (BOY) to 37.6 percent (MOY) to 71.0 percent (EOY); a difference of 34.5 percentage points from the BOY to MOY and 33.4 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in Spanish language and literacy was 67.9 percentage points.

Figure 5. Percent of HISD prekindergarten students who attended an Early Childhood Center and met proficiency on the HISD CIRCLE English mathematics subtests based on age group, 2015–2016



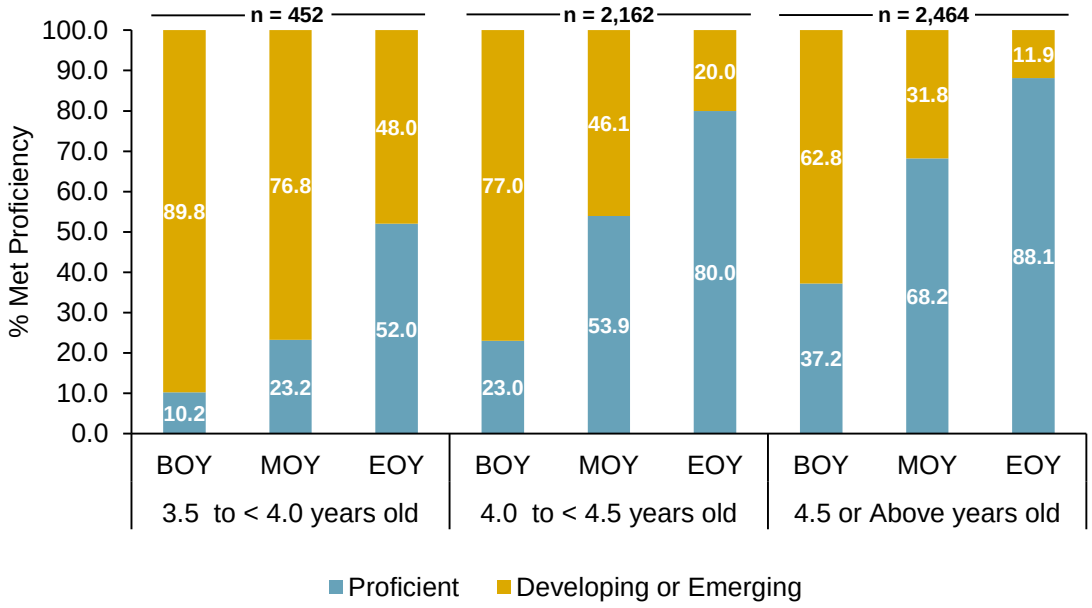
Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older).

- The percentage of HISD Pre-K students ages 3.5 to < 4.0 years old who attended an ECC and had attained proficiency in English mathematics increased from 7.9 percent (BOY) to 19.1 percent (MOY) to 42.7 percent (EOY); a difference of 11.2 percentage points from the BOY to MOY and 23.6 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in English mathematics was 34.8 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an ECC and had attained proficiency in English mathematics increased from 27.0 percent (BOY) to 66.0 percent (MOY) to 88.7 percent (EOY); a difference of 39.0 percentage points from the BOY to MOY and 22.7 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in English mathematics was 61.7 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an ECC and had attained proficiency in English mathematics increased from 46.5 percent (BOY) to 79.2 percent (MOY) to 96.5 percent (EOY); a difference of 32.7 percentage points from the BOY to MOY and 17.3 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in English mathematics was 50.0 percentage points.

Figure 6. Proficiency and growth of HISD prekindergarten students attending a School-based program on the HISD CIRCLE English mathematics subtests based on age group, 2015–2016



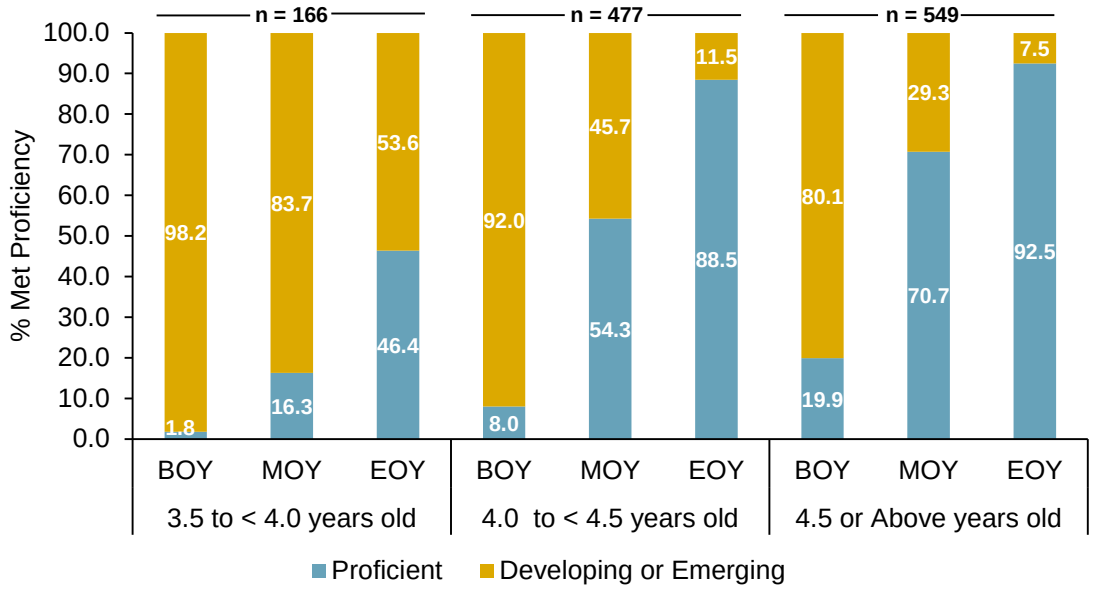
Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older).

- The percentage of HISD Pre-K students ages 3.5 to < 4.0 years old who attended an SBP and had attained proficiency in English mathematics increased from 10.2 percent (BOY) to 23.2 percent (MOY) to 52.0 percent (EOY); a difference of 13.0 percentage points from the BOY to MOY and 28.8 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in English mathematics was 41.8 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an SBP and had attained proficiency in English mathematics increased from 23.0 percent (BOY) to 53.9 percent (MOY) to 80.0 percent (EOY); a difference of 30.9 percentage points from the BOY to MOY and 26.1 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in English mathematics was 57.0 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an SBP and had attained proficiency in English mathematics increased from 37.2 percent (BOY) to 68.2 percent (MOY) to 88.1 percent (EOY); a difference of 31.0 percentage points from the BOY to MOY and 19.9 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in English mathematics was 50.9 percentage points.

Figure 7. Percent of HISD prekindergarten students who attended an Early Childhood Center and met proficiency on the HISD CIRCLE Spanish mathematics subtests based on age group, 2015–2016



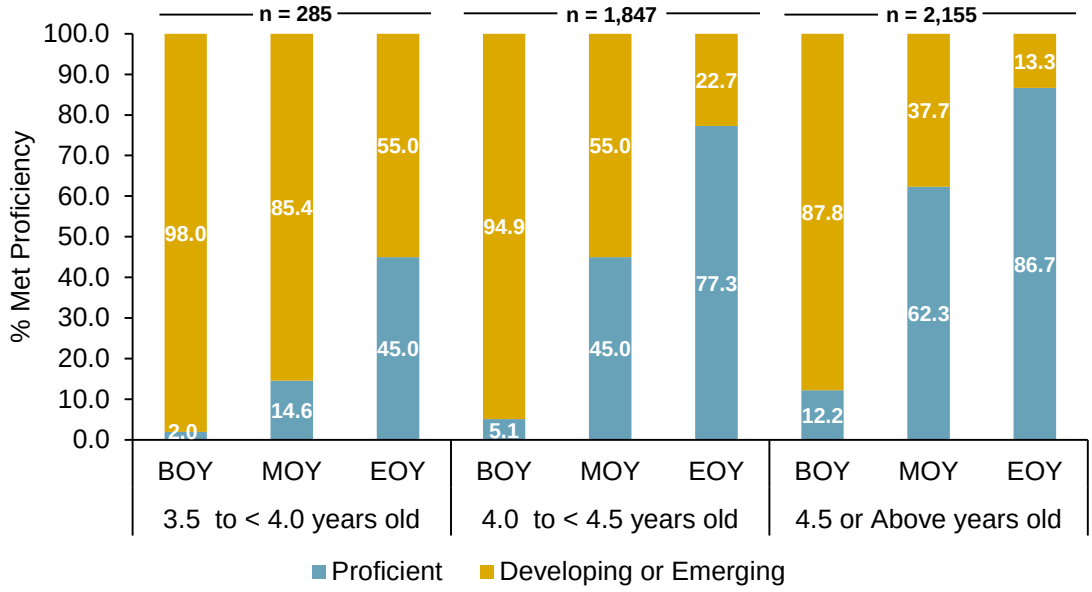
Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older).

- The percentage of prekindergarten students ages 3.5 to < 4.0 years old who attended an ECC and had attained proficiency in Spanish mathematics increased from 1.8 percent (BOY) to 16.3 percent (MOY) to 46.4 percent (EOY); a difference of 14.5 percentage points from the BOY to MOY and 30.1 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in Spanish mathematics was 44.6 percentage points.

- The percentage of Pre-K students ages 4.0 to < 4.5 years old who attended an ECC and had attained proficiency in Spanish mathematics increased from 8.0 percent (BOY) to 54.3 percent (MOY) to 88.5 percent (EOY); a difference of 46.3 percentage points from the BOY to MOY and 34.2 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in Spanish mathematics was 80.5 percentage points.

- The percentage of Pre-K students ages 4.5 or above years old who attended an ECC and had attained proficiency in Spanish mathematics increased from 19.9 percent (BOY) to 70.7 percent (MOY) to 92.5 percent (EOY); a difference of 50.8 percentage points from the BOY to MOY and 21.8 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in Spanish mathematics was 72.6 percentage points.

Figure 8. Percent of HISD prekindergarten students who attended a School-based program and met proficiency on the HISD CIRCLE Spanish mathematics subtests based on age group, 2015–2016



Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scores below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students years old and older).

- The percentage of prekindergarten students ages 3.5 to < 4.0 years old attending an SBP who were proficient in Spanish mathematics increased from 2.0 percent (BOY) to 14.6 percent (MOY) to 45.0 percent (EOY); a difference of 12.6 percentage points from the BOY to MOY and 30.4 percentage points from the MOY to EOY, respectively. The overall increase of students ages 3.5 to < 4.0 years old who achieved proficiency in Spanish mathematics was 43.0 percentage points.

- The percentage of prekindergarten students ages 4.0 to < 4.5 years old attending an SBP who were proficient in Spanish mathematics increased from 5.1 percent (BOY) to 45.0 percent (MOY) to 77.3 percent (EOY); a difference of 39.9 percentage points from the BOY to MOY and 32.3 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.0 to < 4.5 years old who achieved proficiency in Spanish mathematics was 72.2 percentage points.

- The percentage of prekindergarten students ages 4.5 or above years old attending an SBP who were proficient in Spanish mathematics increased from 12.2 percent (BOY) to 62.3 percent (MOY) to 86.7 percent (EOY); a difference of 50.1 percentage points from the BOY to MOY and 24.4 percentage points from the MOY to EOY, respectively. The overall increase of students ages 4.5 or above years old who achieved proficiency in Spanish mathematics was 74.5 percentage points.

What variables predict the likelihood that HISD prekindergarten students would achieve proficiency in language, literacy, and mathematics by the end of the 2015–2016 school year?

Logistic regression models were used to examine the relationship between predictor variables and the likelihood that HISD Pre-K students would achieve proficiency in language, literacy, and mathematics by the EOY. The models each contained eight predictor variables (BOY total score in language and literacy or mathematics; prekindergarten program type; race and ethnicity [i.e., Black and Hispanic]; gender; economically-disadvantaged status; LEP status; and special education status).

English Language and Literacy

Table 3 shows results for logistic regression models that predicted the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE English language and literacy subtests by the EOY for each age group. Each full model was statistically significant indicating that each model was able to distinguish between children who achieved proficiency in English language and literacy by the EOY from children who did not.

Table 3. Logistic regression models predicting the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE English language and literacy subtests by the End-of-Year based on age group, 2015–2016

Age groups		B	S.E.	Wald	df	Sig.	Odds ratio	95% C.I. for Odds ratio Lower	Upper
3.5 to < 4.0 year olds	ECC program	-0.58	0.33	3.11	1	0.078	0.56	0.29	1.07
	Black	-0.39	0.51	0.58	1	0.446	0.68	0.25	1.85
	Hispanic	-0.46	0.49	0.88	1	0.348	0.63	0.24	1.65
	Male	-0.32	0.23	2.02	1	0.155	0.72	0.46	1.13
	Econ_disadv	0.76	0.54	1.94	1	0.164	2.13	0.73	6.19
	Special Ed.	-0.69	0.87	0.63	1	0.429	0.50	0.09	2.76
	LEP	0.01	0.39	0.00	1	0.973	1.01	0.47	2.17
	Total_lit_English	0.07	0.01	101.86	1	0.000*	1.07	1.05	1.08
	Constant	-2.72	0.52	27.26	1	0.000*	0.07		
4.0 to < 4.5 year olds	ECC program	0.59	0.14	18.94	1	0.000*	1.81	1.38	2.36
	Black	0.03	0.19	0.03	1	0.858	1.03	0.71	1.50
	Hispanic	-0.17	0.18	0.90	1	0.342	0.84	0.60	1.20
	Male	-0.11	0.09	1.54	1	0.215	0.89	0.74	1.07
	Econ_disadv	0.17	0.21	0.66	1	0.418	1.18	0.79	1.78
	Special Ed.	-1.09	0.36	9.10	1	0.003**	0.34	0.17	0.68
	LEP	-0.31	0.13	5.45	1	0.020**	0.73	0.57	0.95
	Total_lit_English	0.04	0.00	375.10	1	0.000*	1.04	1.04	1.05
	Constant	-1.56	0.24	43.73	1	0.000*	0.21		
4.5 or above year olds	ECC program	0.66	0.14	21.72	1	0.000*	1.94	1.47	2.57
	Black	0.06	0.20	0.09	1	0.770	1.06	0.72	1.56
	Hispanic	0.10	0.19	0.25	1	0.616	1.10	0.76	1.60
	Male	-0.20	0.09	4.88	1	0.027**	0.82	0.68	0.98
	Econ_disadv	-0.53	0.23	5.03	1	0.025**	0.59	0.37	0.94
	Special Ed.	-0.66	0.28	5.39	1	0.020**	0.52	0.30	0.90
	LEP	-0.67	0.13	27.06	1	0.000*	0.51	0.39	0.66
	Total_lit_English	0.04	0.00	402.36	1	0.000*	1.04	1.04	1.05
	Constant	-0.77	0.26	8.65	1	0.003**	0.46		

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database..
Note. *p < .001, **p < .05

- The full model for students ages 3.5 to < 4.0 years old containing all predictors was statistically significant at χ^2 (8, N = 541) = 188.0, p < 0.001. The model explained between 29.4% (Cox and Snell R square) and 40.5% (Nagelkerke R squared) of the variance in English language and literacy proficiency status, and correctly classified 78.4% of the cases. Only one independent variable made a unique statistically significant contribution to the model, i.e., BOY total score in language and literacy. This indicated that for every one unit increase on the BOY total English language and literacy score, the odds of 3.5 to < 4.0 year old students achieving proficiency by the EOY increased by a factor of 1.07, holding all other variables constant.

- The full model for students ages 4.0 to < 4.5 years old containing all predictors was statistically significant at χ^2 (8, N = 2,544) = 660.9, p < 0.001. The model explained between 22.9% (Cox and Snell R square) and 30.8% (Nagelkerke R squared) of the variance in English language and literacy proficiency status, and correctly classified 72.3% of the cases. Four independent variables made statistically significant contributions to the model: BOY total score in language and literacy, prekindergarten program type, special education status, and LEP status. The strongest predictor was prekindergarten program type, indicating that the odds of students who attended an early childhood center (ECC) achieving proficiency by the EOY increased by a factor of 1.81, holding all other variables constant.

- The full model for 4.5 or above year olds containing all predictors was statistically significant, χ^2 (8, N = 2,896) = 721.0, p < 0.001. The model explained 22.0% (Cox and Snell R square) and 30.7% (Nagelkerke R squared) of the variance in English language and literacy proficiency status, and correctly classified 74.9% of the cases. Six independent variables made statistically significant contributions to the model: BOY total score in language and literacy, prekindergarten program type, gender, economically-disadvantaged status, special education status, and LEP status. The strongest predictor was prekindergarten program type, indicating that the odds of students who attended an early childhood center (ECC) achieving proficiency by the EOY increased by a factor of 1.94, holding all other variables constant.

- Additionally, BOY total score in English language and literacy was observed to predict students' proficiency by the EOY regardless of age group, followed by prekindergarten program type for 4.0 to < 4.5 year olds and 4.5 or above year olds. Students ages 4.0 or older identified as not eligible for special education services and/or non-LEP were also more likely to achieve proficiency by the EOY in English language and literacy, in contrast to students who were eligible for special education services and/or LEP, respectively. Similar observations were also noted for students age 4.5 or above years old in favor of female and/or non-economically-disadvantaged students, holding all other variables constant.

Spanish Language and Literacy

Table 4 shows results for logistic regression models predicting the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE Spanish language and literacy subtests by the EOY for each age group. Each full model was statistically significant indicating that each model was able to distinguish between children who achieved proficiency in Spanish language and literacy by the EOY from children who did not.

Table 4. Logistic regression models predicting the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE Spanish language and literacy subtests by the End-of-Year based on age group, 2015–2016

Age groups		B	S.E.	Wald	df	Sig.	Odds ratio	95% C.I. for Odds ratio Lower	Upper
3.5 to < 4.0 year olds	Pre-K program	-0.27	0.22	1.49	1	0.223	0.76	0.49	1.18
	Black	-1.54	1.67	0.86	1	0.354	0.21	0.01	5.60
	Hispanic	-1.08	1.13	0.90	1	0.342	0.34	0.04	3.13
	Male	-0.01	0.21	0.00	1	0.947	0.99	0.65	1.50
	Econ_disadv	-0.51	0.43	1.37	1	0.241	0.60	0.26	1.41
	Special Ed.	-1.94	1.32	2.17	1	0.141	0.14	0.01	1.90
	LEP	0.67	0.42	2.48	1	0.116	1.94	0.85	4.45
	Total_lit_Spanish	0.08	0.01	56.06	1	0.000*	1.09	1.06	1.11
	Constant	-0.58	1.24	0.22	1	0.637	0.56		
4.0 to < 4.5 year olds	Pre-K program	0.65	0.13	23.63	1	0.000*	1.91	1.47	2.48
	Black	-0.32	0.54	0.35	1	0.554	0.72	0.25	2.10
	Hispanic	0.41	0.39	1.09	1	0.297	1.51	0.70	3.27
	Male	-0.28	0.10	7.95	1	0.005**	0.76	0.63	0.92
	Econ_disadv	0.60	0.22	7.19	1	0.007**	1.82	1.18	2.83
	Special Ed.	-0.99	0.46	4.63	1	0.031**	0.37	0.15	0.92
	LEP	0.72	0.24	8.94	1	0.003**	2.05	1.28	3.29
	Total_lit_Spanish	0.06	0.00	182.88	1	0.000*	1.06	1.05	1.07
	Constant	-1.93	0.45	18.62	1	0.000	0.15		
4.5 or above year olds	Pre-K program	0.51	0.13	15.65	1	0.000*	1.66	1.29	2.14
	Black	-0.18	0.55	0.11	1	0.739	0.83	0.28	2.46
	Hispanic	0.54	0.43	1.58	1	0.209	1.71	0.74	3.98
	Male	-0.05	0.09	0.28	1	0.600	0.95	0.79	1.15
	Econ_disadv	0.88	0.21	17.99	1	0.000*	2.41	1.61	3.62
	Special Ed.	-1.27	0.40	9.92	1	0.002**	0.28	0.13	0.62
	LEP	0.86	0.22	15.17	1	0.000*	2.37	1.53	3.65
	Total_lit_Spanish	0.05	0.00	212.06	1	0.000*	1.05	1.04	1.05
	Constant	-2.48	0.47	27.61	1	0.000	0.08		

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. *$p < .001$, **$p < .05$

- The full model for students ages 3.5 to < 4.0 years old containing all predictors was statistically significant at χ^2 (8, N = 451) = 90.4, p < 0.001. The model explained between 18.2% (Cox and Snell R square) and 24.4% (Nagelkerke R squared) of the variance in Spanish language and literacy proficiency status, and correctly classified 71.2% of the cases. Only one independent variable made a unique

statistically significant contribution to the model, i.e., BOY total score in language and literacy. This indicated that for every one unit increase on the BOY total Spanish language and literacy score, the odds of 3.5 to < 4.0 year old students achieving proficiency by the EOY increased by a factor of 1.09, holding all other variables constant.

- The full model for students ages 4.0 to < 4.5 years old containing all predictors was statistically significant at χ^2 (8, N = 2,324) = 343.3, p < 0.001. The model explained between 13.7% (Cox and Snell R square) and 19.5% (Nagelkerke R squared) of the variance in Spanish language and literacy proficiency status, and correctly classified 72.5% of the cases. Six independent variables made statistically significant contributions to the model: BOY total score in language and literacy, prekindergarten program type, gender, economically-disadvantaged status, special education status, and LEP status. The strongest predictor was LEP status, indicating that the odds of students identified as LEP achieving proficiency by the EOY increased by a factor of 2.05, holding all other variables constant.

- The full model for 4.5 or above year olds containing all predictors was statistically significant, χ^2 (8, N = 2,704) = 413.1, p < 0.001. The model explained 14.2% (Cox and Snell R square) and 20.6% (Nagelkerke R squared) of the variance in Spanish language and literacy proficiency status, and correctly classified 75.5% of the cases. Five independent variables made statistically significant contributions to the model: BOY total score in language and literacy, prekindergarten program type, economically-disadvantaged status, special education status, and LEP status. The strongest predictors were economic status and LEP status, indicating that the odds of students identified as economically disadvantaged and/or limited English proficient achieving proficiency by the EOY increased by a factor of 2.41 and 2.37, respectively, holding all other variables constant.

- BOY total score in Spanish language and literacy was observed to predict students proficiency by the EOY regardless of age group, followed by prekindergarten program type, economic status, and LEP status for 4.0 to < 4.5 year olds and 4.5 or above year olds. Students age 4.0 to < 4.5 years old were also more likely to achieve proficiency in Spanish language and literacy if they were identified as female. A similar observation in favor of students not eligible to receive special education services in the district was observed among 4.5 or above year old students.

English Mathematics

Table 5 (p. 23) shows results for logistic regression models that predicted the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE English mathematics subtest by the EOY for each age group. Each full model was statistically significant indicating that each model was able to distinguish between children who achieved proficiency in English mathematics by the EOY from children who did not.

- The full model for students ages 3.5 to < 4.0 years old containing all predictors was statistically significant at χ^2 (8, N = 541) = 184.6, p < 0.001. The model explained between 28.9% (Cox and Snell R square) and 38.5% (Nagelkerke R squared) of the variance in English mathematics proficiency status, and correctly classified 72.6% of the cases. Only two independent variables made statistically significant contributions to the model, i.e., BOY total score in mathematics and economically-disadvantaged status. The strongest predictor was economically-disadvantaged status, indicating that the odds of 3.5 to < 4.0 years old, economically-disadvantaged students achieving proficiency by the EOY increased by a factor of 2.72, holding all other variables constant.

- The full model for students ages 4.0 to < 4.5 years old containing all predictors was statistically significant at χ^2 (8, N = 2,544) = 596.0, p < 0.001. The model explained between 20.9% (Cox and Snell R square) and 33.8% (Nagelkerke R squared) of the variance in English mathematics proficiency status, and correctly classified 81.5% of the cases. Four independent variables made statistically significant contributions to the model: BOY total score in mathematics, prekindergarten program type, gender, and special education status. The strongest predictor was prekindergarten program type, indicating that the odds of students who attended an early childhood center (ECC) achieving proficiency by the EOY increased by a factor of 1.99, holding all other variables constant.

Table 5. Logistic regression models predicting the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE English mathematics subtest by the End-of-Year based on age group, 2015–2016

Age groups		B	S.E.	Wald	df	Sig.	Odds ratio	95% C.I. for Odds ratio Lower	Upper
3.5 to < 4.0 year olds	Pre-K program	-0.01	0.29	0.00	1	0.963	0.99	0.56	1.74
	Black	-0.03	0.49	0.00	1	0.953	0.97	0.37	2.53
	Hispanic	0.15	0.46	0.11	1	0.743	1.16	0.47	2.89
	Male	-0.27	0.21	1.65	1	0.199	0.76	0.51	1.15
	Econ_disadv	1.00	0.50	3.96	1	0.047**	2.72	1.01	7.28
	Special Ed.	-0.52	0.83	0.39	1	0.531	0.59	0.12	3.04
	LEP	0.23	0.34	0.47	1	0.495	1.26	0.65	2.46
	Total_math_English	0.25	0.02	114.52	1	0.000*	1.29	1.23	1.35
	Constant	-3.52	0.56	38.92	1	0.000	0.03		
4.0 to < 4.5 year olds	Pre-K program	0.69	0.19	12.63	1	0.000*	1.99	1.36	2.91
	Black	-0.40	0.26	2.24	1	0.134	0.67	0.40	1.13
	Hispanic	-0.34	0.25	1.86	1	0.172	0.71	0.44	1.16
	Male	-0.29	0.12	5.83	1	0.016**	0.75	0.60	0.95
	Econ_disadv	0.17	0.31	0.31	1	0.580	1.19	0.65	2.17
	Special Ed.	-1.07	0.36	8.86	1	0.003**	0.34	0.17	0.70
	LEP	-0.21	0.16	1.65	1	0.199	0.81	0.59	1.11
	Total_math_English	0.24	0.01	373.76	1	0.000*	1.28	1.24	1.31
	Constant	-1.21	0.35	12.18	1	0.000	0.30		
4.5 or above year olds	Pre-K program	1.25	0.29	18.00	1	0.000*	3.48	1.96	6.19
	Black	-0.55	0.32	2.89	1	0.089	0.58	0.30	1.09
	Hispanic	-0.23	0.31	0.55	1	0.460	0.80	0.44	1.45
	Male	-0.14	0.14	1.06	1	0.303	0.87	0.66	1.14
	Econ_disadv	-0.42	0.42	0.97	1	0.324	0.66	0.29	1.51
	Special Ed.	-1.63	0.36	20.94	1	0.000*	0.20	0.10	0.39
	LEP	-0.48	0.18	6.80	1	0.009**	0.62	0.43	0.89
	Total_math_English	0.25	0.01	324.23	1	0.000*	1.28	1.25	1.32
	Constant	-0.48	0.48	1.00	1	0.317	0.62		

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. *p < .001, **p < .05

- The full model for 4.5 or above year olds containing all predictors was statistically significant, χ^2 (8, N = 2,896) = 531.7, p < 0.001. The model explained 16.8% (Cox and Snell R square) and 34.0% (Nagelkerke R squared) of the variance in English mathematics proficiency status, and correctly classified 89.7% of the cases. Four independent variables were also noted to make statistically significant contributions to the model: BOY total score in mathematics, prekindergarten program type, special education status, and LEP status. The strongest predictor was prekindergarten program type, indicating that the odds of students who attended an early childhood center (ECC) achieving proficiency by the EOY increased by a factor of 3.84, holding all other variables constant.

- BOY total score in English mathematics was observed to predict students proficiency by the EOY regardless of age group, followed by prekindergarten program type and special education status for 4.0

to < 4.5 year olds and 4.5 or above year olds. Students age 4.0 to < 4.5 years old were also more likely to achieve proficiency in English mathematics if they were identified as female. A similar observation in favor of non-LEP students was observed to occur among 4.5 or above year olds.

Spanish Mathematics

Table 6 shows results for logistic regression models that predicted the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE Spanish mathematics subtest by the EOY for each age group. Each full model was statistically significant indicating that each model was able to distinguish between children who achieved proficiency in Spanish mathematics by the EOY from children who did not.

Table 6. Logistic regression models predicting the likelihood of prekindergarten students achieving proficiency on the HISD CIRCLE Spanish mathematics subtests by the End-of-Year based on age group, 2015-2016

Age groups		B	S.E.	Wald	df	Sig.	Odds ratio	95% C.I. for Odds ratio Lower	Upper
3.5 to < 4.0 year olds	Pre-K program	-0.18	0.22	0.65	1	0.422	0.84	0.54	1.29
	Black	-2.33	1.80	1.69	1	0.194	0.10	0.00	3.27
	Hispanic	-1.16	1.26	0.85	1	0.355	0.31	0.03	3.69
	Male	0.05	0.22	0.05	1	0.831	1.05	0.69	1.60
	Econ_disadv	-0.41	0.45	0.81	1	0.368	0.66	0.27	1.62
	Special Ed.	-1.34	0.89	2.28	1	0.131	0.26	0.05	1.49
	LEP	0.08	0.39	0.04	1	0.835	1.08	0.50	2.33
	Total_math_Spanish	0.24	0.03	65.85	1	0.000*	1.27	1.20	1.35
	Constant	-0.34	1.40	0.06	1	0.808	0.71		
4.0 to < 4.5 year olds	Pre-K program	0.59	0.17	12.68	1	0.000*	1.81	1.30	2.50
	Black	-1.04	0.62	2.85	1	0.092	0.35	0.11	1.18
	Hispanic	-0.60	0.51	1.38	1	0.241	0.55	0.20	1.50
	Male	-0.13	0.12	1.31	1	0.253	0.88	0.70	1.10
	Econ_disadv	0.34	0.27	1.58	1	0.209	1.40	0.83	2.36
	Special Ed.	-0.48	0.52	0.85	1	0.355	0.62	0.22	1.72
	LEP	0.92	0.26	12.78	1	0.000*	2.52	1.52	4.19
	Total_math_Spanish	0.22	0.01	235.13	1	0.000*	1.25	1.22	1.29
	Constant	-1.17	0.55	4.49	1	0.034	0.31		
4.5 or above year olds	Pre-K program	0.46	0.19	6.07	1	0.014**	1.58	1.10	2.27
	Black	-0.47	0.66	0.52	1	0.470	0.62	0.17	2.25
	Hispanic	0.13	0.57	0.06	1	0.811	1.14	0.38	3.47
	Male	0.17	0.13	1.68	1	0.195	1.18	0.92	1.53
	Econ_disadv	0.40	0.28	1.97	1	0.160	1.49	0.85	2.60
	Special Ed.	-0.83	0.48	2.94	1	0.086	0.44	0.17	1.12
	LEP	0.35	0.29	1.44	1	0.230	1.41	0.80	2.48
	Total_math_Spanish	0.21	0.01	216.67	1	0.000*	1.23	1.20	1.27
	Constant	-1.13	0.59	3.65	1	0.056	0.32		

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.
Note. *$p < .001$, **$p < .05$

- The full model for students ages 3.5 to < 4.0 years old containing all predictors was statistically significant at χ^2 (8, N = 541) = 184.6, p < 0.001. The model explained between 28.9% (Cox and Snell R square) and 38.5% (Nagelkerke R squared) of the variance in Spanish mathematics proficiency status, and correctly classified 72.6% of the cases. Only one independent variable made a unique statistically significant contribution to the model, i.e., BOY total score in mathematics. This indicated that for every one unit increase on the BOY total Spanish mathematics score, the odds of 3.5 to < 4.0 year old students achieving proficiency by the EOY increased by a factor of 1.27, holding all other variables constant.

- The full model for students ages 4.0 to < 4.5 years old containing all predictors was statistically significant at χ^2 (8, N = 2,544) = 596.0, p < 0.001. The model explained between 20.9% (Cox and Snell R square) and 33.8% (Nagelkerke R squared) of the variance in Spanish mathematics proficiency status, and correctly classified 81.5% of the cases. Only three independent variables made statistically significant contributions to the model: BOY total score in mathematics, prekindergarten program type, and LEP status. The strongest predictor was LEP status, indicating that the odds of students identified as limited English proficient achieving proficiency by the EOY increased by a factor of 2.52, holding all other variables constant.

- The full model for 4.5 or above year olds containing all predictors was statistically significant, χ^2 (8, N = 2,896) = 531.7, p < 0.001. The model explained 16.8% (Cox and Snell R square) and 34.0% (Nagelkerke R squared) of the variance in Spanish mathematics proficiency status, and correctly classified 89.7% of the cases. Only two independent variables were also noted to make statistically significant contributions to the model: BOY total score in mathematics and prekindergarten program type. The strongest predictor was prekindergarten program type, indicating that the odds of students who attended an early childhood center (ECC) achieving proficiency by the EOY increased by a factor of 1.58, holding all other variables constant.

- BOY total score in Spanish mathematics was observed to predict students' proficiency by the EOY regardless of age group, followed by prekindergarten program type for 4.0 to < 4.5 year olds and 4.5 or above year olds. Students age 4.0 to < 4.5 years old were also more likely to achieve proficiency in Spanish mathematics if they were identified as LEP.

Discussion

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, effect size computations, and inferential statistical models were used to examine relationships among HISD early childhood centers (ECC) and school-based programs (SPB) where HISD Pre-K students were enrolled to their academic achievement in language, literacy, and mathematics during the 2015–2016 school year. HISD early childhood centers include Bellfort; Farias; Fonwood; Halpin; Martin Luther King, Jr.; Laurenzo; Mistral; and Neff. Proficiency levels in the specified academic areas were measured at the beginning-of-year (BOY), middle-of-year (MOY), and end-of-year (EOY). Students' age was also taken into consideration during the course of this evaluation in order to determine appropriate proficiency level expectations as indicated in the *CIRCLE Progress Monitoring Cut Points* document (Children's Learning Institute [CLI], 2016).

Results from descriptive analyses indicated that increases in the percent of students attaining proficiency in language, literacy, and mathematics were experienced by HISD Pre-K students from the BOY, MOY and EOY regardless of prekindergarten program and language version of assessment. Percent increases in proficiency among 3.5 to < 4.0 year olds was typically higher during the second half of the year (MOY to EOY; see Figures 1 to 8). Some explanations for this phenomenon may in part be due to the development

of children as they progress in age and instructional priorities for this age group. In contrast, increases in the percent of students ages 4.0 to < 4.5 and 4.5 or above years old attaining proficiency were usually higher during the first half of the school year (BOY to MOY), regardless of prekindergarten program attended. The only notable exceptions occurred among students ages 4.0 to < 4.5 and 4.5 or above years who attended a school-based program and who took the English language and literacy subtests and Spanish language and literacy subtest (4.0 to < 4.5 year olds only).

Further, proficiency levels in language, literacy, and mathematics described in this report also indicated that, with the exception of 3.5 to < 4.0 year olds, students ages 4.0 to < 4.5 years old and 4.5 or above years old who attended an ECC were more likely to achieve proficiency than their peers who attended an SBP at the BOY, MOY and EOY. In contrast, 3.5 to < 4.0 year-old students who attended an SBP were more likely to achieve proficiency than their peers who attended an ECC. This was particularly noted among proficiency levels observed for the English language, literacy, and mathematics subtests.

Logistic regression models were also used to examine the relationship between predictor variables and the likelihood of students achieving proficiency in language, literacy, and mathematics by the end-of-year (EOY). Results indicated positive, significant relationships between the BOY total score and students' proficiency in language, literacy, and mathematics by the EOY regardless of age group, subject, and language version of subtests. This finding indicates HISD early childhood educators should consider the implications of students' pre-existing knowledge as they enter Pre-K for their first or second year. Results also implicates the presence of an achievement gap. Pre-K students who have lower achievement at the BOY were less likelihood to achieve proficiency than their higher performing peers.

Prekindergarten program type was also observed to predict students' proficiency in language, literacy, and mathematics of 4.0 to < 4.5 year olds and 4.5 or above year olds, regardless of subject and language version of assessment. Specifically, students who were at least four-years old were more likely to achieve proficiency by the EOY if they had attended an ECC instead of an SBP. Results generated from statistical models were supported by descriptive statistics presented in Figures 1 to 8.

With respect to demographic characteristics, varied relationships were observed among variables to include economically-disadvantaged status, special education status, LEP status, age group and proficiency on the HISD CIRCLE English and Spanish language, literacy, and mathematics subtests. No significant relationships were observed during this evaluation when race and ethnicity was taken into account (i.e., Black and Hispanic), regardless of prekindergarten program type and age group. One explanation for this finding may be due to homogeneity of race and ethnic characteristics among HISD Pre-K students who attend ECCs and SBPs. This explanation is substantiated by data presented in the *District and School Profiles 2014–2015* report which concurs that 87 percent of the student population is identified as Black (24.9%) and/or Hispanic (62.1%).

Recommendations

- The Early Childhood Department may want to identify and monitor factors that impact the educational experiences of students once they enroll in HISD Pre-K programs to provide further insight as to why 3.5 to < 4.0 year-old students were more likely to achieve higher proficiency in language, literacy, and mathematics at a school-based program (SBP), in contrast to 4.0 to < 4.5 year-old and 4.5 or above year-old students were more likely to achieve higher proficiency if they attended an early childhood center (ECC).

- The Early Childhood and Research and Accountability departments may want to monitor the academic growth and achievement gaps of students in the context of demographic characteristics and content area.

- The Early Childhood Department may consider working with the Student Assessment Department, Special Education Department and/or Research and Accountability Department to identify and implement with fidelity an inclusive, monitored assessment to measure all children's strengths, progress, and needs upon entering and exiting HISD prekindergarten programs.

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Appendix A

HISD CIRCLE Subtests Administered to Students the 2015–2016 School Year

HOUSTON INDEPENDENT SCHOOL DISTRICT

CIRCLE ASSESSMENT REQUIRED SUBTESTS

Wave 1 (BOY): September 28- October 16, 2015
Wave 2 (MOY): January 11- January 29, 2016
Wave 3 (EOY): April 18- May 6, 2016

Subtest Outside of CIRCLE Progress Monitoring PreK	Wave 1 (BOY)	Wave 2 (MOY)	Wave 3 (EOY)
ABC Names (untimed)	X	X	X
ABC Sounds		X	X
Subtest Inside of CIRCLE Progress Monitoring PreK	**Wave 1 (BOY)**	**Wave 2 (MOY)**	**Wave 3 (EOY)**
Rapid Vocabulary	X	X	X
Listening	X		
Rhyming I	X	X	X
Alliteration	X	X	X
Words in a Sentence	X	X	X
Syllabication	X	X	X
Onset-Rime *Only in English*	X	X	X
Rote Counting	X	X	X
Shape Naming	X	X	X
Number Naming	X	X	X
Counting Sets	X	X	X
Patterns	X	X	X
Operations		X	X
Positive Social Behaviors	X	X	X
Early Writing Checklist	X	X	X
Book and Print Awareness	X		

HOUSTON INDEPENDENT SCHOOL DISTRICT
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9/9/2016

Adapted from the *Houston Independent School District CIRCLE Assessment Required Subtests. 2015–2016*

Appendix B

AT-RISK-INDICATOR CODE: Definition

Definition
AT-RISK-INDICATOR-CODE indicates whether a student is currently identified as at-risk of dropping out of school using state-defined criteria only (TEC §29.081, Compensatory and Accelerated Instruction). A student at-risk of dropping out of school includes each student who is under 26 years of age and who: 1. is in prekindergarten, kindergarten or grade 1, 2, or 3 and did not perform satisfactorily on a readiness test or assessment instrument administered during the current school year; 2. is in grade 7, 8, 9, 10, 11, or 12 and did not maintain an average equivalent to 70 on a scale of 100 in two or more subjects in the foundation curriculum during a semester in the preceding or current school year or is not maintaining such an average in two or more subjects in the foundation curriculum in the current semester; 3. was not advanced from one grade level to the next for one or more school years; (Note: From 2010-2011 forward, TEC 29.081 (d-1) excludes from this criteria prekindergarten or kindergarten students who were not advanced to the next grade level as a result of a documented request by the student's parent.) 4. did not perform satisfactorily on an assessment instrument administered to the student under TEC Subchapter B, Chapter 39, and who has not in the previous or current school year subsequently performed on that instrument or another appropriate instrument at a level equal to at least 110 percent of the level of satisfactory performance on that instrument; 5. is pregnant or is a parent; 6. has been placed in an alternative education program in accordance with TEC §37.006 during the preceding or current school year; 7. has been expelled in accordance with TEC §37.007 during the preceding or current school year; 8. is currently on parole, probation, deferred prosecution, or other conditional release; 9. was previously reported through the Public Education Information Management System (PEIMS) to have dropped out of school; 10. is a student of limited English proficiency, as defined by TEC §29.052; 11. is in the custody or care of the Department of Protective and Regulatory Services or has, during the current school year, been referred to the department by a school official, officer of the juvenile court, or law enforcement official; 12. is homeless, as defined NCLB, Title X, Part C, Section 725(2), the term "homeless children and youths", and its subsequent amendments; or 13. resided in the preceding school year or resides in the current school year in a residential placement facility in the district, including a detention facility, substance abuse treatment facility, emergency shelter, psychiatric hospital, halfway house, or foster group home.

Special Instructions
Please note that a student with a disability may be considered to be at-risk of dropping out of school if the student meets one or more of the statutory criteria for being in an at-risk situation that is not considered to be part of the student's disability. A student with a disability is not automatically coded as being in an at-risk situation. Districts should use the student's individualized education program (IEP) and other appropriate information to make the determination.

Retrieved from the Texas Education Agency at http://tea.texas.gov/Reports_and_Data/Data_Submission/PEIMS/PEIMS_Data_Standards/2015-2016

Appendix C

Academic achievement on HISD CIRCLE English language and literacy subtests

Table 1. Academic achievement of HISD prekindergarten students ages 3.5 to < 4.0 years old on the End-of-Year HISD CIRCLE English language and literacy subtests based on prekindergarten program and age group, 2015–2016

		Early Childhood Center			School-based Program				
Demographic characteristics		**n**	**Mean**	**SD**	**n**	**Mean**	**SD**	**Mean difference**	**Effect size**
Overall Sample		89	64.4	33.4	452	72.9	34.5	-8.5	-0.25
Gender	Female	43	65.0	37.9	263	76.4	34.3	-11.5	-0.33
	Male	46	63.9	29.0	189	68.0	34.3	-4.1	-0.12
Ethnicity	Asian	2	*	*	10	64.7	45.0	–	–
	Black	37	59.2	41.1	195	77.0	36.7	-17.8	-0.47
	Hispanic	49	66.2	25.8	217	69.3	31.9	-3.1	-0.10
	Other	0	–	–	6	95.5	21.7	–	–
	White	1	*	*	24	70.6	33.2	–	–
Economically disadvantaged	No	0	–	–	35	70.7	35.6	–	–
	Yes	89	64.4	33.4	417	73.1	34.4	-8.7	-0.25
Special Education eligible	No	85	63.5	33.8	446	72.9	34.7	-9.4	-0.27
	Yes	4	*	*	6	76.0	16.8	–	–
Limited English Proficient (LEP)	No	83	62.4	32.9	397	75.1	34.3	-12.7	-0.37
	Yes	6	91.5	31.0	55	57.2	32.4	34.3	1.06
At risk	No	0	–	–	29	58.1	24.1	–	–
	Yes	89	64.4	33.4	423	73.9	34.9	-9.5	-0.28

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure score was not include in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Table 2. Academic achievement of HISD prekindergarten students ages 4.0 to < 4.5 years old on the End-of-Year HISD CIRCLE English language and literacy subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		382	106.7	20.4	2,162	98.0	24.4	8.7	0.37
Gender	Female	197	109.6	18.9	1,110	98.8	23.9	10.7	0.46
	Male	185	103.7	21.6	1,052	97.1	24.8	6.6	0.27
Ethnicity	Asian	13	100.4	19.6	140	100.6	22.0	-0.2	-0.01
	Black	237	110.2	19.1	806	101.6	24.1	8.6	0.37
	Hispanic	122	101.2	21.1	1,039	94.0	24.5	7.2	0.30
	Other	2	*	*	35	113.2	18.1	–	–
	White	8	93.5	27.4	142	101.6	23.2	-8.1	-0.35
Economically disadvantaged	No	3	*	*	223	103.3	21.8	–	–
	Yes	379	106.7	20.5	1,939	97.4	24.6	9.3	0.39
Special Education eligible	No	378	106.9	20.5	2,116	98.2	24.3	8.6	0.36
	Yes	4	*	*	46	88.0	24.2	–	–
Limited English Proficient (LEP)	No	346	107.8	20.1	1,761	99.6	23.5	8.1	0.35
	Yes	36	96.5	21.0	401	90.8	26.8	5.7	0.22
At risk	No	1	*	*	17	93.1	15.1	–	–
	Yes	381	106.8	20.4	2,145	98.0	24.4	8.8	0.37

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure score was not include in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Table 3. Academic achievement of HISD prekindergarten students ages 4.5 or above years old on the End-of-Year HISD CIRCLE English language and literacy subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		432	114.4	17.6	2,464	103.8	22.5	10.6	0.48
Gender	Female	197	115.7	16.8	1,242	105.1	22.0	10.6	0.50
	Male	235	113.3	18.1	1,222	102.5	23.0	10.8	0.48
Ethnicity	Asian	15	109.7	14.9	141	109.9	18.5	-0.2	-0.01
	Black	277	117.8	16.8	985	105.2	23.0	12.6	0.58
	Hispanic	130	107.4	17.9	1,173	101.3	22.6	6.2	0.28
	Other	5	123.2	15.3	27	109.0	9.6	14.2	1.35
	White	5	114.8	4.1	138	108.6	20.3	6.2	0.31
Economically disadvantaged	No	1	*	*	217	110.4	16.3	–	–
	Yes	431	114.3	17.5	2,247	103.2	22.9	11.1	0.50
Special Education eligible	No	422	114.8	17.4	2,404	104.2	22.1	10.5	0.49
	Yes	10	99.9	17.9	60	88.7	31.9	11.2	0.37
Limited English Proficient (LEP)	No	393	115.1	17.4	2,040	105.4	21.5	9.7	0.46
	Yes	39	107.6	18.4	424	96.3	25.4	11.3	0.45
At risk	No	0	–	–	15	88.7	27.4	–	–
	Yes	432	114.4	17.6	2,449	103.9	22.4	10.5	0.48

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure score was not include in the overall cut-point total score for English language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Appendix D

Academic achievement on HISD CIRCLE Spanish language and literacy subtests

Table 1. Academic achievement of HISD prekindergarten students ages 3.5 to < 4.0 years old on the End-of-Year HISD CIRCLE Spanish language and literacy subtests based on prekindergarten program and age group, 2015–2016

		Early Childhood Center			School-based Program				
Demographic characteristics		**n**	**Mean**	**SD**	**n**	**Mean**	**SD**	**Mean difference**	**Effect size**
Overall Sample		166	70.3	28.6	285	69.1	28.0	1.2	0.04
Gender	Female	88	71.7	27.3	161	69.7	27.2	2.1	0.08
	Male	78	68.6	30.0	124	68.3	29.2	0.3	0.01
Ethnicity	Asian	0	–	–	0	–	–	–	–
	Black	0	–	–	4	*	*	–	–
	Hispanic	163	70.1	28.7	279	69.2	28.1	0.9	0.03
	Other	0	–	–	1	*	*	–	–
	White	3	*	*	1	*	*	–	–
Economically disadvantaged	No	10	76.7	31.4	19	79.1	27.7	-2.4	-0.08
	Yes	156	69.9	28.5	266	68.4	28.0	1.5	0.05
Special Education eligible	No	165	70.3	28.7	278	69.5	28.0	0.7	0.03
	Yes	1	*	*	7	50.6	25.4	–	–
Limited English Proficient (LEP)	No	6	59.7	32.1	36	60.9	24.1	-1.3	-0.05
	Yes	160	70.7	28.5	249	70.3	28.4	0.4	0.01
At risk	No	0	–	–	9	62.7	21.7	–	–
	Yes	166	70.3	28.6	276	69.3	28.2	1.0	0.03

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure score was not include in the overall cut-point total score for Spanish language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Table 2. Academic achievement of HISD prekindergarten students ages 4.0 to < 4.5 years old on the End-of-Year HISD CIRCLE Spanish language and literacy subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		477	99.2	20.6	1,847	92.6	25.2	6.7	0.27
Gender	Female	231	102.5	18.7	949	93.4	24.7	9.1	0.39
	Male	246	96.1	21.8	898	91.7	25.8	4.5	0.18
Ethnicity	Asian	0	–	–	7	76.3	24.6	–	–
	Black	1	*	*	38	65.4	31.6	–	–
	Hispanic	472	99.4	20.4	1,778	93.2	24.9	6.2	0.26
	Other	0	–	–	4	*	*	–	–
	White	4	*	*	20	91.0	17.8	–	–
Economically disadvantaged	No	9	83.7	19.0	105	88.8	21.7	-5.1	-0.24
	Yes	468	99.5	20.5	1,742	92.8	25.4	6.8	0.28
Special Education eligible	No	473	99.4	20.4	1,829	92.6	25.2	6.8	0.28
	Yes	4	*	*	18	83.8	26.1	–	–
Limited English Proficient (LEP)	No	9	96.4	20.7	106	73.3	32.2	23.1	0.73
	Yes	468	99.3	20.6	1,741	93.7	24.3	5.6	0.24
At risk	No	0	–	–	1	*	*	–	–
	Yes	477	99.2	20.6	1,846	92.6	25.2	6.7	0.27

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure was not include in the overall cut-point total score for Spanish language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Table 3. Academic achievement of HISD prekindergarten students ages 4.5 or above years old on the End-of-Year HISD CIRCLE Spanish language and literacy subtests based on prekindergarten program and age group, 2015–2016

Demographic Characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		549	104.9	18.2	2,155	99.4	23.2	5.5	0.25
Gender	Female	268	106.1	17.7	1,083	100.1	22.6	6.0	0.28
	Male	281	103.9	18.7	1,072	98.6	23.8	5.3	0.23
Ethnicity	Asian	0	–	–	6	64.2	29.3	–	–
	Black	0	–	–	49	76.8	28.8	–	–
	Hispanic	546	105.0	18.3	2,079	100.1	22.7	4.9	0.22
	Other	1	*	*	3	*	*	–	–
	White	2	*	*	18	88.8	29.0	–	–
Economically disadvantaged	No	12	89.8	22.4	120	91.7	25.7	-1.9	-0.07
	Yes	537	105.3	18.0	2,035	99.8	23.0	5.5	0.25
Special Education eligible	No	541	105.0	18.2	2,129	99.6	23.1	5.4	0.24
	Yes	8	97.0	22.2	26	82.8	29.1	14.2	0.51
Limited English Proficient (LEP)	No	10	96.8	15.6	132	78.2	30.6	18.6	0.62
	Yes	539	105.1	18.2	2,023	100.8	22.0	4.3	0.20
At risk	No	0	–	–	0	–	–	–	–
	Yes	549	104.9	18.2	2,155	99.4	23.2	5.5	0.25

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink. Because the 'ABC Sounds' sub-measure was not include in the overall cut-point total score for Spanish language and literacy, underestimates of students' proficiency levels may be present (HISD, 2016b).

Appendix E

Academic achievement on HISD CIRCLE English mathematics subtests

Table 1. Academic achievement of HISD prekindergarten students ages 3.5 to < 4.0 years old on the End-of-Year HISD CIRCLE English mathematics subtests based on prekindergarten program and age group, 2015–2016

		Early Childhood Center			School-based Program				
Demographic characteristics		**n**	**Mean**	**SD**	**n**	**Mean**	**SD**	**Mean difference**	**Effect size**
Overall Sample		89	20.1	5.7	452	21.4	5.7	-1.3	-0.22
Gender	Female	43	20.2	6.1	263	21.9	5.5	-1.7	-0.31
	Male	46	20.0	5.4	189	20.6	6.0	-0.6	-0.11
Ethnicity	Asian	2	*	*	10	22.6	5.8	–	–
	Black	37	19.6	6.4	195	21.8	5.7	-2.2	-0.38
	Hispanic	49	20.1	5.3	217	20.9	5.8	-0.8	-0.15
	Other	0	–	–	6	23.5	5.8	–	–
	White	1	*	*	24	20.5	5.1	–	–
Economically disadvantaged	No	0	–	–	35	20.8	5.8	–	–
	Yes	89	20.1	5.7	417	21.4	5.7	-1.3	-0.23
Special Education eligible	No	85	20.0	5.8	446	21.4	5.7	-1.4	-0.24
	Yes	4	*	*	6	20.0	5.4	–	–
Limited English Proficient (LEP)	No	83	19.9	5.7	397	21.5	5.7	-1.6	-0.28
	Yes	6	23.0	6.1	55	20.5	5.9	2.5	0.42
At risk	No	0	–	–	29	19.1	6.2	–	–
	Yes	89	20.1	5.7	423	21.5	5.7	-1.4	-0.25

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink.

Table 2. Academic achievement of HISD prekindergarten students ages 4.0 to < 4.5 years old on the End-of-Year HISD CIRCLE English mathematics subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		382	25.9	3.0	2,162	24.8	3.9	1.1	0.30
Gender	Female	197	26.2	2.5	1,110	24.9	3.7	1.3	0.36
	Male	185	25.6	3.3	1,052	24.7	4.1	1.0	0.25
Ethnicity	Asian	13	26.1	2.7	140	26.1	3.4	-0.1	-0.02
	Black	237	26.1	3.0	806	25.0	3.9	1.0	0.28
	Hispanic	122	25.7	3.0	1,039	24.3	4.0	1.5	0.38
	Other	2	*	*	35	25.5	2.8	–	–
	White	8	25.4	2.9	142	25.8	3.4	-0.5	-0.14
Economically disadvantaged	No	3	*	*	223	26.1	3.4	–	–
	Yes	379	25.9	3.0	1,939	24.7	3.9	1.3	0.34
Special Education eligible	No	378	25.9	3.0	2,116	24.8	3.9	1.1	0.30
	Yes	4	*	*	46	23.2	4.5	–	–
Limited English Proficient (LEP)	No	346	26.0	2.9	1,761	24.8	3.9	1.2	0.31
	Yes	36	25.3	3.2	401	24.7	4.1	0.7	0.17
At risk	No	1	*	*	17	24.8	2.5	–	–
	Yes	381	25.9	3.0	2,145	24.8	3.9	1.1	0.30

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink.

Table 3. Academic achievement of HISD prekindergarten students ages 4.5 or above years old on the End-of-Year HISD CIRCLE English mathematics subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		432	26.8	2.2	2,464	25.7	3.3	1.1	0.36
Gender	Female	197	27.0	1.8	1,242	25.8	3.2	1.2	0.4
	Male	235	26.7	2.4	1,222	25.6	3.5	1.1	0.34
Ethnicity	Asian	15	26.9	1.5	141	27.0	1.9	-0.1	-0.06
	Black	277	27.0	2.2	985	25.7	3.7	1.3	0.38
	Hispanic	130	26.5	2.2	1,173	25.4	3.2	1.1	0.34
	Other	5	28.0	0.0	27	26.1	1.9	1.9	1.10
	White	5	26.8	0.8	138	26.1	2.8	0.7	0.25
Economically disadvantaged	No	1	*	*	217	26.8	2.0	–	–
	Yes	431	26.8	2.2	2,247	25.6	3.4	1.2	0.38
Special Education eligible	No	422	26.8	2.2	2,404	25.7	3.2	1.1	0.36
	Yes	10	25.8	3.3	60	23.2	6.9	2.7	0.41
Limited English Proficient (LEP)	No	393	26.9	2.2	2,040	25.7	3.3	1.1	0.36
	Yes	39	26.4	2.4	424	25.4	3.5	0.9	0.28
At risk	No	0	–	–	15	25.1	3.4	–	–
	Yes	432	26.8	2.2	2,449	25.7	3.3	1.1	0.35

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink

Appendix F

Academic achievement on HISD CIRCLE Spanish mathematics subtests

Table 1. Academic achievement of HISD prekindergarten students ages 3.5 to < 4.0 years old on the End-of-Year HISD CIRCLE Spanish mathematics subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		166	20.9	5.5	285	21.4	5.4	-0.6	-0.10
Gender	Female	88	21.1	4.9	161	21.7	4.8	-0.7	-0.13
	Male	78	20.6	6.0	124	21.0	6.0	-0.4	-0.06
Ethnicity	Asian	0	–	–	0	–	–	–	–
	Black	0	–	–	4	*	*	–	–
	Hispanic	163	20.8	5.5	279	21.4	5.4	-0.6	-0.12
	Other	0	–	–	1	*	*	–	–
	White	3	*	*	1	*	*	–	–
Economically disadvantaged	No	10	21.6	5.68	19	23.2	5.6	-1.6	-0.28
	Yes	156	20.8	5.5	266	21.3	5.3	-0.5	-0.09
Special Education eligible	No	165	20.9	5.5	278	21.6	5.2	-0.7	-0.14
	Yes	1	*	*	7	14.4	6.8	–	–
Limited English Proficient (LEP)	No	6	20.7	5.4	36	20.6	5.8	0.1	0.01
	Yes	160	20.9	5.5	249	21.5	5.3	-0.7	-0.12
At risk	No	0	–	–	9	20.9	5.3	–	–
	Yes	166	20.9	5.5	276	21.4	5.4	-0.6	-0.11

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink.

Table 2. Academic achievement of HISD prekindergarten students ages 4.0 to < 4.5 years old on the End-of-Year HISD CIRCLE Spanish mathematics subtests based on prekindergarten program and age group, 2015–2016

Demographic characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		477	25.8	3.3	1,847	24.7	4.1	1.1	0.27
Gender	Female	231	25.9	3.0	949	24.8	3.9	1.1	0.29
	Male	246	25.6	3.5	898	24.6	4.3	1.0	0.25
Ethnicity	Asian	0	–	–	7	23.4	5.0	–	–
	Black	1	*	*	38	21.4	6.5	–	–
	Hispanic	472	25.8	3.3	1,778	24.8	4.0	1.0	0.26
	Other	0	–	–	4	*	*	–	–
	White	4	*	*	20	25.8	2.9	–	–
Economically disadvantaged	No	9	23.9	2.9	105	24.8	4.0	-0.9	-0.23
	Yes	468	25.8	3.3	1,742	24.7	4.1	1.1	0.28
Special Education eligible	No	473	25.8	3.3	1,829	24.7	4.0	1.1	0.28
	Yes	4	*	*	18	23.2	5.1	–	–
Limited English Proficient (LEP)	No	9	26.4	2.6	106	22.5	5.6	3.9	0.72
	Yes	468	25.8	3.3	1,741	24.9	3.9	0.9	0.24
At risk	No	0	–	–	1	*	*	–	–
	Yes	477	25.8	3.3	1,846	24.7	4.1	1.1	0.27

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older). Students who scored on average below the cut points are highlighted in pink.

Table 3. Academic achievement of HISD prekindergarten students ages 4.5 or above years old on the End-of-Year HISD CIRCLE Spanish mathematics subtests based on prekindergarten program and age group, 2015–2016

Demographic Characteristics		Early Childhood Center			School-based Program			Mean difference	Effect size
		n	Mean	SD	n	Mean	SD		
Overall Sample		549	26.5	5.5	2,155	25.8	3.3	0.7	0.18
Gender	Female	268	26.6	2.3	1,083	25.8	3.3	0.8	0.25
	Male	281	26.4	2.7	1,072	25.8	3.3	0.6	0.20
Ethnicity	Asian	0	–	–	6	23.0	6.2	–	–
	Black	0	–	–	49	23.1	5.3	–	–
	Hispanic	546	26.5	2.5	2,079	25.9	3.2	0.6	0.21
	Other	1	*	*	3	*	*	–	–
	White	2	*	*	18	25.2	4.6	–	–
Economically disadvantaged	No	12	25.1	2.7	120	25.4	3.8	-0.3	-0.07
	Yes	537	26.5	2.5	2,035	25.8	3.3	0.7	0.23
Special Education eligible	No	541	26.5	2.5	2,129	25.8	3.3	0.7	0.22
	Yes	8	25.1	3.5	26	23.4	5.7	1.8	0.33
Limited English Proficient (LEP)	No	10	26.4	1.9	132	23.6	5.2	2.8	0.55
	Yes	539	26.5	2.5	2,023	25.9	3.1	0.6	0.19
At risk	No	0	–	–	0	–	–	–	–
	Yes	549	26.5	2.5	2,155	25.8	3.3	0.7	0.22

Source. HISD CIRCLE 2015–2016 student database; PEIMS 2015–2016 HISD student database.

Note. If a student scores at or above cut points determined for a particular measure, she or he is considered proficient. If a student scored below the benchmark, she or he is considered 'developing' (refers to students younger than four years old) or 'emerging' (for students four years old and older).