

# Study of Early Education in Texas

## The Relationship of Pre-K Attendance to 3<sup>rd</sup> Grade Test Results

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## Acronyms

AEIS.....	Academic Excellence Indicator System
CDA .....	Child Development Associate
ERC.....	Education Research Center
ESL .....	English as Second Language
LEP .....	Limited English Proficiency
NIEER.....	National Institute for Early Education Research
PEIMS.....	Public Education Information Management System
PIDREP.....	PEIMS ID replacement
PRE-K.....	Pre-Kindergarten
TAAS .....	Texas Assessment of Academic Skills
TAKS .....	Texas Assessment of Knowledge and Skills

## **Executive Summary**

The major purpose of the project is to determine whether attending school-based Pre-Kindergarten predicted children's performance on the third-grade TAKS scores in reading and math. Kindergarten was used as the sampling frame to compare children attending Pre-K with those who did not attend. All children attending kindergarten in the state were selected and classified based on three criteria: whether their school district offered Pre-K or not, whether they were eligible for Pre-K (on the basis of Pre-K eligibility criteria measured in students' kindergarten year), and whether they attended Pre-K ("took it up"). The most important comparison was between eligible children in districts offering Pre-K who did and did not attend. The results show small, but significant differences with eligible children who attended Pre-K performing better on both reading and math third-grade standardized tests. The performance differential associated with Pre-K is greatest for the most disadvantaged children – those from very poor families and those who qualified by virtue of both family income and limited English proficiency.

In addition to the analytical goals of this project, another purpose of this exploratory analysis is to analyze the types of data available within the Texas Education Research Center (ERC) longitudinal database and to assess the degree to which additional datasets and/or variables could be linked with ERC data to improve upon these initial findings. Those recommendations are included in the final chapter of the report.

## **Introduction**

### **Background and Project Overview**

Pre-kindergarten programs were first introduced in Texas public schools in the 1985-86 school year to provide early education to at-risk 4-year-olds. Initially, the major “risk” categories were low family income and limited English proficiency, though others have been added over the years. Any district that serves 15 or more eligible 4-year-old children is required to offer a half-day Texas Public School Pre-Kindergarten program (Pre-K). If funds permit, districts can also enroll 3-year-olds and/or can expand the program from half-day to full-day.

Although the program has been in place for 25 years, there is relatively little information about its long-term effectiveness. The purpose of this report is to provide preliminary data on the relationship between attending Pre-K and school performance in third grade. An earlier study (Kuhne, 2008) examined the relationship of Pre-K attendance to performance on the Texas Assessment of Academic Skills (TAAS) for children attending public schools in the years from 1998 – 2002, finding a lasting advantage for children who had attended Pre-K. In 2003, the state adopted the Texas Assessment of Knowledge and Skills (TAKS), which was intended to be a more demanding and valid test of children’s academic competencies than the TAAS. The study presented here extends Kuhne’s analysis by examining the relationship of Pre-K attendance in the 1999-2000 school year (referred to as 2000 throughout the report) to performance on the TAKS in either the 2003 or 2004 school years.

### **Quality and Accessibility of Texas Pre-K**

The National Institute for Early Education Research (NIEER) rates state Pre-K programs on both access and quality. For the 2009-2010 school year, they rate Texas 7th in the nation on the number of children with access to the program. According to their information, 47 percent of the 4-year-olds in the state attend state Pre-K and another 9 percent attend Head Start. Their ratings of quality are less positive. Of their ten benchmarks for quality, the state requirements for programs meet only four. Specifically, Texas requirements meet the benchmarks for having comprehensive early learning standards, requiring a bachelor’s degree for teachers, requiring specialized training in Pre-K, and



requiring at least 15 hours/year of in-service training. The state requirements do not meet the following benchmarks: requiring a Child Development Associate (CDA) credential or equivalent for assistant teachers; maximum class size of 20; maximum staff-child ratio of 1:10; providing screening for vision, hearing, health and at least one support service; offering at least one meal; monitoring with site visits (Barnett et al., 2010). These ratings are based on the state requirements, not necessarily on actual practice. It is possible, and indeed likely, that some programs meet more benchmarks than those required, but it is of particular concern that there are no requirements for class size or teacher-child ratio. In the 1999 school year, the average number of children per staff member in Texas Pre-K classrooms was 11.78, but the numbers increased during the years from 2005-2011, with the most recent average being 18.05 (Lifeng Yang, e-mail message to author, August 31, 2011). The program has changed over the ten years since the children in this report attended Pre-K, but it appears that the overall quality of the program statewide is variable.

## **Review of Background Literature**

A number of evaluations of Pre-Kindergarten experiences indicate that children who have attended Pre-Kindergarten enter school with better academic skills than those with no such experience. For example, in a large nationally-representative sample of kindergarten children, those who had attended public school Pre-K programs performed better on reading and mathematics skills in kindergarten than children without formal preschool experience, but many of the gains had dissipated by the end of first grade. More lasting effects were found for children from economically disadvantaged families (Magnuson, Ruhm, et al., 2007).

The immediate effects of Pre-K appear to depend on the quality of the programs. Broad indicators of quality, such as teachers' education, credentials, and major are not consistent predictors of children's academic gains (Early et al., 2008). Not surprisingly, it is the process of teacher-child interactions and activities within the classroom that defines quality and predicts children's learning. In an analysis of 671 classrooms across 11 states, observed instructional interactions between teachers and children predicted children's academic skill gains; teachers' supportive emotional interaction with children predicted children's social skills (Mashburn et al., 2008). Further analyses of these classrooms indicated relatively little difference in children's skills between classrooms with low quality

and those with average quality, but when quality increased beyond average, children's gains in language, pre-academic skills, and social skills increased correspondingly (Burchinal, Vandergrift, et al., 2010). Little information exists, however, about the durability of the gains achieved in these Pre-K programs.

Evaluating effects of Pre-K programs is complicated by parents' self-selection into programs. Although a few states offer universal access to Pre-K, enrollment is voluntary. Similarly, in Texas, eligible families are not required to enroll their children. It is possible, and indeed likely, that the families who place their children in a Pre-K program might differ from those who do not—a process usually called selection. Most of the longitudinal research includes statistical controls for family and school characteristics, but they leave open the possibility that unmeasured family characteristics might determine the choice to enroll and also affect children's academic or social skills. One way of overcoming this problem is to take advantage of strict age cut-offs for admission—that is, to compare a control group (those born just after the cutoff date) and treatment group (those born just before the cutoff date) using the regression-discontinuity approach. In this way the treatment and control group are very close to the same chronological age yet only the treatment group experienced the Pre-K program. Using this method, and correcting for overall age differences in skills at entry, Gormley and his associates (Gormley & Gaier, 2005) found that the universal Pre-K program in Tulsa, Oklahoma, produced large gains in language and cognitive skills. Gains were greatest for children who qualified for a free lunch and for Hispanics. Black children showed some benefit, but there was little impact for White children. It is noteworthy that this program is rated as very high quality. Using a similar method on statewide data from five states (Michigan, New Jersey, Oklahoma, South Carolina, and West Virginia), there were impacts on print awareness in all states, but inconsistent impacts on vocabulary and math skills (Wong, Cook et al., 2008). The authors state that the states were chosen because they had relatively high quality programs; hence, the results raise questions about the effects of programs in other locales.

Overall, the large national studies suggest that Pre-K programs yield benefits that last into kindergarten and possibly first grade, but that the impacts vary with the quality of instruction and teacher-child interaction in the classroom. There is also fairly consistent evidence that benefits are greatest for children who are at risk of academic failure because their families are poor or because they are part of an ethnic and/or language minority group.

As these groups of children are those targeted by the Texas eligibility requirements, benefits from the state program might be expected. The quality of programs in Texas is, however, relatively unknown.

### **Duration of Effects**

One important question for education policy is: Does Pre-K make a long-term difference in children's school progress? Do the immediate gains from Pre-K translate into better academic skills and performance over time? Research on small, high quality early education programs demonstrates that gains from such programs can last into adulthood. The Perry Preschool in Michigan was an intensive intervention serving 4-year-olds from very low-income families, most of whom were Black. It was evaluated by randomly assigning children to the program or to a control group. Children in the program showed consistently better school performance that ultimately translated into better employment, earnings, and other advantages in adulthood (Barnett et al., 2005). Nobel-prize economist, James Heckman, has argued widely that the return on investment in interventions is greater the earlier in life they begin (Heckman, 2006).

Programs such as the Perry Preschool are not typical and are difficult to replicate on a large scale. There is evidence, however, that quality variations across more typical child care and early education programs have effects that last into adolescence. In a longitudinal investigation of approximately 1000 children from ten locations in the United States, the quality of their early education and care experiences predicted academic skills at age 15, even with extensive controls for family and subsequent school experiences (Vandell et al., 2010).

Information about durability of effects of Texas programs indicates that Pre-K provides a small but significant advantage. One approach to evaluating Texas programs is an analysis of first-grade retention rates for schools offering Pre-K and/or early childhood programs compared to those not offering such programs. Not surprisingly, retention rates were lower in schools without early childhood programs, largely because they served more advantaged students. Once the multiple campus, student, demographic, and operational predictors, as well as access to community-based early childhood programs were controlled, however, "campuses that contained early childhood and Pre-Kindergarten programs, or a combination of both, had retention rates that were no longer statistically different from the

campus configurations that, on average, contained fewer economically disadvantaged and at-risk students” (Gasko, 2008, p. viii).

A second evaluation produced evidence that children retained modest gains by the time they reached third grade. Using the complete database of all children attending Texas public schools, kindergarten children who had and had not been enrolled in state Pre-K in the previous year were identified. For those who were still in public school in third grade, the TAAS scores of those with and without public Pre-K experience were compared, using a range of controls for selection. There were small but important effects of participating on both reading and math scores, as well as on being placed in special education and being retained. Effects were larger for students who qualified for Pre-K on both income and Limited English Proficiency (LEP) criteria. For children who took the Spanish language TAAS, there were effects of Pre-K on math but not reading (Kuhne, 2008).

### **Purpose of This Report**

The investigation reported here extends the work of Kuhne to investigate the relationship of Pre-K experience to third-grade academic performance as measured by the TAKS, a test that was intended to improve on the measurement quality of the TAAS. Using the entire TEA database for the 2000 school year, children in kindergarten were classified according to three criteria: whether their school district offered Pre-K, whether they were eligible, and whether they had attended a public school Pre-K in the prior year. The major research question addressed is whether eligible children who attended Pre-K performed better on the third-grade TAKS than did those who did not attend. The results are examined for the total sample as well as for different ethnic groups (Hispanic, Black, White Non-Hispanic), for different levels of disadvantage, and for children with different bases for eligibility (low income and LEP). A second goal is to compare schools and children in districts that did and did not offer Pre-K.

Another purpose of this analysis is to identify the extent to which the longitudinal database housed in the Texas Education Research Center (ERC) contains sufficient key variables of interest for conducting an analysis of this nature and to recommend future database enhancements that would better support future research on this topic.

## Overview of Method

The major purpose of the project is to determine whether attending school-based Pre-Kindergarten predicts children's performance on the third-grade TAKS scores in reading and math. Kindergarten was used as the sampling frame to compare children attending Pre-K with those who did not attend.<sup>1</sup> All children attending kindergarten in the state were selected. Each child was classified on three criteria: (a) whether their school district offered Pre-K in 1999, (b) whether they were eligible for Pre-K, and (c) whether they had been enrolled in Pre-K.

The outcomes of interest are third-grade TAKS scores in reading and math. In one set of analyses, districts that offered Pre-K were selected and compared to the performance of eligible students who attended with those who did not. Because students who attend Pre-K might differ on family or other characteristics from those who do not, a set of controls was selected to reduce bias, including ethnic group basis for eligibility (e.g., LEP, economic disadvantage; see appendix for full listing). Differences in performance between attenders and non-attenders may reflect the effects of attending Pre-K.

A second method, based on Kuhne's "intent-to-treat" is a comparison of districts offering Pre-K with those not offering Pre-K. In these analyses, examination was made of how eligible children compared with "not eligible" children, by districts where Pre-K was offered and in those where it was not. This analysis omits some of the individual-level selection biases that may affect participation but introduces errors of underestimating effects, because not all eligible children take the opportunity to attend Pre-K in districts where it is offered. Because districts offering Pre-K differ in many respects from those not offering it, examination was made of the relative performance of eligible and ineligible children (i.e., the gap between them) in "offering" districts and in districts with no available school-based Pre-K programs.

### Sample

The analysis sample consists of the population of students enrolled in kindergarten in the 2000 school year who were also enrolled in third grade in any public school in Texas in

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<sup>1</sup> Ideally, it would be best to identify Pre-K participants from a larger population that includes both participants and non-participants at the point of entry in the program instead of the year following program exit but that was not possible within the constraints of the ERC database.

either the 2003 or 2004 school years. Kindergarten was used as the basis for sample selection in order to identify both participants and nonparticipants in Pre-K.

The initial sample was obtained by selecting all unduplicated students with grade=kindergarten (n=290,926). Almost all of the kindergarteners (95.3%) were age 5 when starting school in 2000; another 4.5 percent were age 6<sup>2</sup>. The demographic and program participation characteristics of the initial sample are shown in Table 1, and definitions for eligibility for each program are included in the appendix. The majority of the sample is Hispanic (44.1%) and Anglo (39.3%). The most common home languages are English (74.5%) and Spanish (23.4%).

**Table 1. Third-grade Campus and Kindergarten Individual Level Demographics**

Source/Level of Analysis	Measure	Percent
<b>Campus 2003</b> N = 237,147	Limited English Proficiency (LEP)	21.4
	Economically Disadvantaged	58.4
	Ethnic Group	
	Black	13.6
	Hispanic	45.7
	Anglo/Other	40.7
	Special Education	10.4
	Student Mobility	19.0
<b>Kindergarten 1999</b> N=290,926	Male	51.4
	Age on September 1	5.1
	Economically Disadvantaged	
	Free lunch	40.1
	Reduced lunch	8.5
	Other	7.1
	Ethnic Group	
	Black	13.9
	Hispanic	44.1
	Anglo/Other	42.0
	Home Language	
	English	74.5
	Spanish	23.4
	Other	2.1
	At Risk of Dropping Out	32.6
	English as Second Language (ESL) Program Participant	5.2
	Identified Immigrant	2.6
	Enrolled and Served Through the Special Education Program	6.2
Retained Indicator - TAKS Taken in 2004	9.6 <sup>a</sup>	

<sup>a</sup>Note: N=237,279

<sup>2</sup> Age is only available in years, not months, in the ERC database.

### **Third-grade Sample**

To select the third-grade sample, all of the children from the kindergarten sample who were in Texas public schools in either 2003 or 2004 were identified. In the first step, the 2000 kindergarteners with enrollment or attendance records in the PEIMS 2003 or 2004 were identified (n = 268,282).

As children leaving the public schools might differ from those with continuous attendance, the identified sample was compared to the 2000 kindergarteners not found in PEIMS. The results are shown in Appendix Table A1. As compared to those not found in the PEIMS system by 2003 or 2004, those in the sample are more likely, in the 2000 school year, to be Hispanic, to be LEP, to have Spanish as a home language, to be “at risk,” and to be eligible for free school lunches. Those *not* found in the sample are more likely than those remaining to be Anglo, to be an immigrant, and not to be economically disadvantaged. On the whole, the third-grade sample has higher percentages of children with some risk characteristics than the kindergarten sample. The differences could be due to children moving out of the state as well as to children moving out of the public school system into private schools within the state.

### **Third-grade TAKS Test Scores**

The second step was to match the third-grade TAKS scores to the child records. This process was done separately for reading and math scores because some students had one, but not the other. To include students who were retained for one year and/or took the Spanish language version of the exam, the initial sample was matched against both the 2003 and 2004 files for English and Spanish.

**Reading.** The sample was matched to third-grade reading TAKS scores. A student had three opportunities to pass the reading test. For this analysis, only the first legitimate Reading score was retained and if found, the student record was deemed matched and put aside. From this procedure, 237,279 legitimate scores were identified leaving 31,003 missing. The principal reason for missing data was that the student did not take the test. A breakdown of the reasons is shown in Appendix Table A2.

**Math scores.** The sample was matched to third-grade math TAKS scores. Unlike the reading test, children who missed or failed the math test did not have another opportunity to

take it. There were 236,073 legitimate scores and 32,209 cases without legitimate scores. The distribution of reasons for missing scores is shown in Appendix Table A3.

From 1994 to 2002, a criterion-referenced test, the Texas Assessment of Academic Skills (TAAS) was administered every spring to students in grades 3–8 and 10 in reading and mathematics. In the 2002–2003 school year, the Texas Assessment of Knowledge and Skills (TAKS) replaced the TAAS as the primary state assessment program administered in the spring of third grade. A criterion-referenced assessment, the TAKS is designed to be more comprehensive than any of its predecessors and to encompass more of the state mandated curriculum (Texas Education Agency, 2004).

The scores on the TAKS are “scale scores.” The basic score on any test is the raw score, which is simply the number of questions correct. A raw score can be interpreted only in terms of a particular set of test questions. Unlike raw scores, scale scores can be interpreted across different sets of test questions. Scale scores allow direct comparisons of student performance between specific sets of test questions from different test administrations. A scale score is a conversion of the raw score onto a scale that is common to all test forms for that assessment. The scale score takes into account the difficulty level of the specific set of questions on which it is based. It quantifies a student’s performance relative to the passing standards or proficiency levels. The scale for TAKS reading and mathematics for grades 3–8 ranges from 0 to 1000. The score necessary to achieve the status “Met Standard” in reading is 483 (Texas Education Agency, 2006a) and in mathematics is 500 (Texas Education Agency, 2006b) in grade 3.

**Attrition.** To assess possible biases in the sample of children with third-grade TAKS scores, a sample attrition was examined by comparing those with a legitimate third-grade Reading TAKS score, in the PEIMS system in either 2003 or 2004, with those who did not. Similar comparisons were done for Math scores. The results are virtually identical (see Appendix Tables A4 for reading and A5 for math). Compared to those with legitimate TAKS scores in either 2003 or 2004, those without TAKS scores were, as of the 2000 school year, more likely to be male, to be African-American, to be older at kindergarten entry, to be at-risk, and to be eligible for free lunches. Students missing TAKS scores, compared to those with legitimate scores, were less likely to be economically advantaged, to be Hispanic, to have Spanish as a home language, and to be LEP.



## Predictor Variables

**District Offer of Pre-K.** The availability of school-based Pre-K in each district in the 1999 school year was inferred from the unduplicated 2000 school year enrollment records of the kindergarten sample. A district was identified as offering Pre-K in 1999 if at least one kindergarten student in that district, in 2000, was labeled as being in grade = -1 (Pre-K) in the 1999 school year. In 2000, 1,183 districts existed in the TEA system; our K sample is derived from the 1,101 (of the 1,183 total) districts that, in 2000, reported having a kindergarten student.

The 1999 district-level indicator of Pre-K offer was joined to the 2000 K population by merging on the district variable. Thus, this analysis uses the assumption that the 2000 kindergarten students lived in the same school district in the prior year. This assumption is supported by the fact that most Pre-K students were reported being in the same district at the beginning of kindergarten (89.1%); 11% moved or attended a new charter school in 2000. Students who changed schools between the Pre-K and K years probably account for another anomaly – children who enrolled in Pre-K in districts that did not offer it. The number of children in this group was negligible (.28%).

Using this method, districts were labeled in the 2000 school year as follows: 813 (74%) districts offered Pre-K, 254 (23%) did not, and data was missing for 34 (3%) of the districts. As shown in Table 2, the missing districts are due to an increase in charter schools (which are classified as separate “districts”) between 1999 and 2000. As many of the school districts in the 2000 school year database did not exist in 1999, their Pre-K offer status could not be determined. That is, K students in newly created districts in 2000 could not have their Pre-K and K districts match as the K district did not exist one year earlier.

**Table 2. School District Comparison in 1999 and 2000 School Years**

	1999	2000
Total Districts	1,103	1,183
Regular Districts	1,042	1,041
Charter Districts	61	142
Offered PreK in 1999		813
Did not offer PreK in 1999		254
Unknown offer of PreK in 1999		34

The characteristics of the districts that offered and did not offer Pre-K in 1999 are shown in Table 3. On the whole, districts offering Pre-K were much larger and served more students classified as economically-disadvantaged, Hispanic, Black, and LEP.

**Table 3. 1999 Student Demographics for Texas School Districts by Presence of Pre-Kindergarten Programs**

Measure	Percent No Pre-K	Percent Pre-K	Total
Count of Districts	294	809	1,103
Economically Disadvantaged (%)	41.2	49.6	47.4
Ethnic Group (%)			
Black	6.7	10.4	9.4
Hispanic	19.9	31.1	28.1
Anglo	72.5	57.4	61.4
Native American	0.4	0.3	0.4
Asian/Pacific Islands	0.5	0.8	0.7
Enrolled in Bilingual Education (%)	2.3	6.9	5.7
Limited English Proficiency (LEP) Status (%)	2.6	7.8	6.4
Enrolled in Special Education (%)	15.5	13.9	14.3

### Student Eligibility

As discussed earlier, districts having at least 15 4-year-olds who were eligible for Pre-K were required to offer such services. In 1999, children who were either 3 or 4 years old by September 1 were eligible to participate in Texas Pre-K programs if they were 3 on September 1, 1998 and were educationally disadvantaged, had limited English language proficiency, or were homeless. (Tex Education Code Ann. § 29.153. (Vernon 1996) *Educational disadvantage* (referred to as economic disadvantage in this report) is evidenced by eligibility for free lunch (family income less than 133 percent of federal poverty level), reduced lunch (family income less than 185 percent of federal poverty level), or other evidence of disadvantage, including family income below the federal poverty threshold of family eligibility for Temporary Assistance to Needy Families or food stamps. *Limited English language proficiency* (LEP) is evidenced by living in a home in which the primary language was not English, speaking a language other than English most of the time, or a qualifying score on an oral proficiency test.

Few 3-year-olds in our sample were enrolled (n = 3974). If a child was age 5 or older, that child could attend Pre-K only if a waiver of the attendance accounting rules

authorized such an action. In order to classify all students, eligibility in the kindergarten year was used to infer whether a student would have been eligible in the previous year. Although Pre-K-specific information exists for those students who did take up Pre-K in 1999, the eligibility status for those students who did not take up Pre-K in the Texas public school system is unknown. To determine the accuracy of using kindergarten year data to infer eligibility during the previous year, children who did participate in Pre-K (N= 108,056) were classified according to their eligibility in both years (see Table 4). The great majority (85.5%) were eligible in both years. Another 10.8% were eligible in the Pre-K year but not in kindergarten, indicating that most of the children who had participated in Pre-K but were classified as ineligible in kindergarten were in fact eligible in the Pre-K year. Of the remaining children, 2.5% were ineligible in both years, and 1.2% were classified as eligible in kindergarten but had not been eligible in Pre-K. Most of the children who changed eligibility between the Pre-K and kindergarten year were eligible due to economic disadvantage (77.25%). It is likely their economic situation improved between Pre-K and K.

**Table 4. Kindergarten Eligibility of Students Who Had Enrolled in Pre-K in the Previous Year**

<b>Kindergarten Eligible</b>	<b>Pre-K Eligible</b>	<b>Frequency</b>	<b>Percent</b>
No	No	2,747	2.5
No	Yes	11,635	10.8
Yes	No	1,249	1.2
Yes	Yes	92,425	85.5

Eligibility for all kindergarten students by reasons for eligibility is shown in Table 5. Almost 60% of the kindergarten enrollees met one or more the eligibility criteria. Of these, the great majority were economically disadvantaged (55.67%), often in combination with limited English proficiency (19.87%). Slightly over 3% of the population qualified only by LEP.

**Table 5. Number of Eligible Children by Reasons of Economic Disadvantage and Limited English Proficiency, as Measured in Kindergarten Year**

<b>Kindergarten Eligible</b>	<b>Kindergarten Economic Disadvantage</b>	<b>Kindergarten Limited English Proficiency</b>	<b>Frequency</b>	<b>Percent</b>
No	No	No	1,195,757	41.1
Yes	No	Yes	9,398	3.2
Yes	Yes	No	104,158	35.8
Yes	Yes	Yes	57,795	19.9

**Campus Characteristics of Eligible and Noneligible Children**

Students who were eligible for Pre-K attended schools that differed in several respects from the schools attended by non-eligible students. The student-level campus characteristics from the year 2000 for children who were and were not eligible for Pre-K are shown in Table 6. The campuses of the Pre-K-eligible students had higher percentages of LEP, economically disadvantaged, African-American, Hispanic, and bilingual program students as compared to the campuses housing non-eligible students.

**Table 6. Student-Level Campus Characteristics, 2000, by Pre-K Eligibility**

Measure	Percent Not Kindergarten Eligible	Percent Kindergarten Eligible
	<b>N=119,530</b>	<b>N=171,347</b>
Average Total Student Count	606.7	621.6
Economically Disadvantaged (%)	38.1	72.6
Ethnic Group (%)		
Black	11.8	16.6
Hispanic	25.5	55.8
Anglo	59.0	25.6
Native American	0.4	0.3
Asian/Pacific Islands	3.4	1.8
Enrolled in Bilingual Education Program (%)	9.3	26.7
Mobility (%)	18.2	23.0
Limited English Proficiency (LEP) Status (%)	10.2	28.6
Enrolled in Special Education Program (%)	11.2	10.1
Grade Kindergarten Regular Ed, Retention (%)	2.3 <sup>a</sup>	1.9 <sup>b</sup>

Notes: <sup>a</sup> N=116,530<sup>b</sup> N=165,744

### Participation in Pre-K

To identify children who enrolled in Pre-K, the 1999 Enrollment file was processed, and records with grade = -1 (Pre-K) were retained. These records were merged with the kindergarten population. If the identification information matched across the files, the 2000 K student was identified as having been enrolled in Pre-K in 1999. Of the 171,351 children who were eligible for Pre-K, 93,674 (54.7 %) were enrolled.

The demographic comparisons of eligible children who did and did not enroll in Pre-K are shown in Table 7. Hispanic children were slightly more likely to enroll; Black and White children were slightly less likely to enroll when compared to their counterparts who did not take up Pre-K.

**Table 7. Demographics of Year 2000 Kindergarten Students by Year 1999 Pre-K Enrollment, Applying Pre-K Eligibility Criteria to Year 2000 Kindergarten Students**

Measure	Percent Not Enrolled	Percent Enrolled
	N=77,677	N=93,674
Male	52.2	50.5
Age on September 1	5.1	5.0
Economically Disadvantaged		
Free lunch	69.6	66.8
Reduced lunch	14.7	14.1
Other	10.5	13.3
Ethnic Group		
Black	18.0	15.9
Hispanic	59.2	66.6
Anglo	20.3	14.4
Native American	0.3	0.2
Asian/Pacific Islands	2.2	2.9
Home Language		
English	64.0	53.1
Spanish	33.2	43.7
Other	2.8	3.2
At Risk of Dropping Out	45.5	54.4
Enrolled in ESL Program	7.6	9.9
Identified Immigrant	5.2	3.5
Limited English Proficiency (LEP)	32.7	44.6
Enrolled in Special Education Program	7.0	5.5
Retained Indicator - TAKS Taken in 2004	14.1 <sup>a</sup>	10.8 <sup>b</sup>

Notes: <sup>a</sup> N=57,537

<sup>b</sup> N=80,819

## Results

The first question addressed in the analyses was whether eligible children who attended Pre-K had higher third-grade TAKS scores than eligible children who did not attend. Children were classified on three criteria – whether their district offered Pre-K, whether they were eligible, and whether they were enrolled. Children were classified into the four cells shown in Table 8.<sup>3</sup> As noted earlier, the small number of not-eligible children who took up Pre-K consisted primarily of children who were eligible in the Pre-K year but not in kindergarten. It may be reasonable to assume that a similar proportion of the not-eligible children who did not take up Pre-K were eligible in the prior year. In any case, there are some children who were misclassified, with the consequence that the differences between groups may be slightly underestimated.

**Table 8. Number of Year 2000 Kindergarteners Enrolled and Not Enrolled in Pre-K by Eligibility Classification**

	Not Enrolled	Enrolled
Not eligible at Kindergarten	104,819	14,294
Eligible	77,404	93,542

### Pre-K Attenders Versus Non-attenders

To answer the question of whether attendance predicted TAKS performance, the analyses to districts offering Pre-K were restricted. The two TAKS scores (reading scale score, math scale score) were regressed on eligibility, enrollment, and the interaction of eligibility by enrollment using OLS regression. Model 1 tested the predictor variables without covariates. To control for demographic and other differences between schools and between individuals, Model 2 included the following covariates:

*Campus-level:* percent of LEP students, percent of economically-disadvantaged students, percent of Black students, percent of Hispanic students, percent of Native American

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<sup>3</sup> Children in districts that could not be classified as offering or not offering Pre-K were omitted (offer status was missing for 867 students).

students, percent of Asian/Pacific Islander students, percent of special education students, and percent mobility (students not in school for more than 83 percent of the year)

*Student-level:* gender, age on Sept. 1, 1999, limited English proficiency, special education in 1999, retained by third grade (i.e., completed third-grade TAKS in 2004), eligible for free lunch, eligible for reduced-price lunch, economic disadvantage by other criteria, Black, Hispanic, other non-White, home language Spanish, home language not English or Spanish.

Results from both models for reading and math are presented in Tables 9 through 12. Because the number of cases is so large, an alpha level of  $p < .0001$  was used. The means and the effect sizes in the TAKS scale score units are reported.

For the entire sample, there were small but statistically significant differences in reading (Tables 9 and 10) and math scores (Tables 11 and 12). The differences were maintained with controls for demographics of schools and individual children (Model 2). The advantages associated with Pre-K, though statistically reliable, were small (in the range of 6 to 11 points). For example, a difference of 10 scale score points represents approximately one-half of a raw score point on the reading test.

**Table 9. Results of Regressions Testing Pre-K Attendance Effects on Reading Scaled Scores - Interaction Included**

Variable	Model 1		Model 2	
	Estimate	StdErr	Estimate	StdErr
Intercept	2323.76*	0.61	2441.00*	9.56
Enrolled in Pre-K	-57.42*	1.68	-29.41*	1.69
Kindergarten Eligible	-128.12*	0.96	-52.80*	2.47
Interaction of Eligible and Enrolled	64.15*	1.93	38.31*	1.93

NOTE: Statistical significance level is \* =  $p < .0001$



Table 10 illustrates the results of testing Pre-K attendance effects on reading scaled scores as predicted values to simplify the interpretation of the interactions.

**Table 10. Predicted Values of Pre-K Attendance Effects on Reading Scaled Scores - Interaction Included**

<b>Model 1</b>	<b>Enrolled</b>	<b>Not Enrolled</b>	<b>Model 2</b>	<b>Enrolled</b>	<b>Not Enrolled</b>
<b>Eligible</b>	2202.37	2,195.6	<b>Eligible</b>	2397.10	2388.20
<b>Not Eligible</b>	2266.34	2,323.8	<b>Not Eligible</b>	2,411.6	2,441.0

**Table 11. Results of Regressions Testing Pre-K Attendance Effects on Math Scaled Scores - Interaction Included**

<b>Variable</b>	<b>Model 1</b>		<b>Model 2</b>	
	<b>Estimate</b>	<b>StdErr</b>	<b>Estimate</b>	<b>StdErr</b>
Intercept	2,274.7*	0.6	2,419.4*	9.7
Enrolled in Pre-K	-61.3*	1.7	-31.1*	1.7
Kindergarten Eligible	-116.5*	1.0	-48.8*	2.5
Interaction of Eligible and Enrolled	71.9*	2.0	40.7*	2.0

NOTE: Statistical significance level is \* =  $p < .0001$

Table 12 illustrates the results of testing Pre-K attendance effects on math scaled scores as predicted values to simplify the interpretation of the interactions.

**Table 12. Predicted Values of Pre-K Attendance Effects on Math Scaled Scores - Interaction Included**

Model 1	Enrolled	Not Enrolled	Model 2	Enrolled	Not Enrolled
Eligible	2,168.82	2,158.2	Eligible	2,380.3	2,370.6
Not Eligible	2,213.76	2,274.7	Not Eligible	2,388.4	2,419.4

**Gain from Pre-K.** These analyses were followed up with identical analyses performed only on eligible children, comparing those who took up Pre-K with those who did not. In Tables 13 and 14, the results comparing eligible children who did and did not participate in Pre-K were shown grouped by demographic and eligibility characteristics. Only the children who attended school in districts offering Pre-K were included. The scores listed for the “no Pre-K” group are the estimated average scores; the columns headed “Pre-K dif” show the amount by which children who attended Pre-K differed from those who did not.

**Results by Ethnic Group.** The analyses for the three largest ethnic groups – Black, Hispanic, and White were repeated. The numbers of Asian and Native American children were too small for reliable analyses. Within the Hispanic group, children who took the tests in Spanish and English separately were examined. The results in Tables 13 and 14 show the strongest and most consistent differences associated with attending Pre-K for Hispanic children and no effects for White children. For reading, scores of Hispanic children who attended Pre-K exceeded those who did not by 11.6 points; the difference was slightly larger (12.3) with the additional controls. Similarly, for math, the difference was 11.5 points with controls for covariates. The advantages associated with Pre-K were especially marked for Hispanic children who took the test in Spanish.

Black children who attended Pre-K performed better on the reading test than non-attenders, but the difference was reduced to a level failing to meet our criteria for statistical significance when the controls were added (Model 2). In math, however, Black children who attended Pre-K had significantly higher scores than non-attenders, with and without controls. White children, on the other hand, evidenced no benefit from Pre-K. The differences

between White children who attended Pre-K and White children who did not are not statistically significant.

**Table 13. Results of Regressions Testing Pre-K Attendance Effects on Reading Scaled Scores - Eligible Only**

Sample	Model 1				Model 2			
	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>
All	2196.5*	2203.2*	6.7*	0.04	2459.7*	2467.8*	8.1*	0.05
Black	2168.9*	2177.0*	8.1*	0.05	2414.3*	2420.0*	5.7	0.03
Hispanic	2184.9*	2196.5*	11.6*	0.07	2397.6*	2409.8*	12.3*	0.07
White	2252.3*	2247.9*	-4.4	-0.03	253*	2524.4*	-6.6	-0.04
Hispanic/Spanish Test	2170.3*	2186.0*	15.7*	0.09	2377.5*	2391.5*	14.0*	0.08
Hispanic/English Test	2203.1*	2216.5*	13.4*	0.08	2437.9*	2447.5*	9.6*	0.05

NOTE: Statistical significance level is \* = p < .0001

NOTE: The effect size is the Pre-K Difference as a proportion of the standard deviation of the non-enrolled group. This standard deviation is always obtained from the full research sample, even if the table shows impacts for subgroups.

**Table 14. Results of Regressions Testing Pre-K Attendance Effects on Math Scaled Scores – Eligible Only**

Sample	Model 1				Model 2			
	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>
All	2158.2*	2168.8*	10.6*	0.06	2446.0*	2454.7*	8.7*	0.05
Black	2116.6*	2129.8*	13.3*	0.08	2310.1*	2321.1*	11.0*	0.06
Hispanic	2151.8*	2165.5*	13.7*	0.08	2397.8*	2409.3*	11.5*	0.07
White	2208.2*	2205.9*	-2.3	-0.01	2539.7*	2534.6*	-5.1	-0.03
Hispanic/Spanish Test	2147.3*	2163.5*	16.2*	0.09	2393.1*	2406.6*	13.6*	0.08
Hispanic/English Test	2157.1*	2169.3*	12.2*	0.07	2427.3*	2435.9*	8.5*	0.05

NOTE: Statistical significance level is \* =  $p < .0001$

Note: The effect size is the Pre-K Difference as a proportion of the standard deviation of the non-enrolled group. This standard deviation is always obtained from the full research sample, even if the table shows impacts for subgroups.

### Results by Reason for Eligibility

Tables 15 through 16 show the results for subgroups with differing levels of economic disadvantage (i.e., not economically disadvantaged, eligible for reduced price lunch, eligible for free lunch, eligible for other reasons). Results are then broken down for all combinations of LEP and economic disadvantage (LEP without economic disadvantage, disadvantage without LEP, and both).

On the whole, differences in both reading and math scores associated with Pre-K attendance were larger for more economically disadvantaged children (“other reasons” and free lunch) compared to those who were slightly less economically disadvantaged (reduced lunch) or not disadvantaged. The children classified as disadvantaged for “other” reasons came from families with very low incomes. With controls in the models, those who attended Pre-K scored 15.5 points higher on reading and 14.0 points higher on math than did similarly disadvantaged children who did not attend Pre-K. Children eligible for free lunch scored 7.3 points higher on reading and 8.5 points higher on math when they had attended Pre-K than when they had not. The differences for the reduced lunch group and for non-disadvantaged

children failed to reach our criteria for statistical significance once the controls for school and individual characteristics were introduced.

LEP children who were also disadvantaged had reliably higher reading and math scores when they attended Pre-K than when they did not. With controls in the model, those who had attended Pre-K scored 12.0 points higher on reading and 12.3 points higher on math than did LEP/economically disadvantaged children who had not attended Pre-K. Although LEP children who were not disadvantaged had much higher scores when they attended Pre-K than when they did not, the differences were reduced to non-significance with the addition of controls, suggesting that much of the superiority they demonstrated was a result of selection effects. That is, non-disadvantaged families of LEP children who enrolled their children in Pre-K also had other characteristics that contributed to children’s performance.

For economically disadvantaged children who were not LEP, those who had attended Pre-K scored 6.0 points higher on reading and 6.7 points higher on math TAKS scores as compared to those who had not.

**Table 15. Results of Regressions Testing Pre-K Attendance Effects on Reading Scaled Scores – Eligible Only**

Sample	Model 1				Model 2			
	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>
All	2196.5*	2203.2*	6.7*	0.04	2459.7*	2467.8*	8.1*	0.05
Not Economically Disadvantaged	2211.2*	2229.6*	18.4*	0.10	2423.7*	2431.1*	7.4	0.04
Reduced Price Lunch	2240.6*	2238.0*	-2.7	-0.01	2469.1*	2473.0*	3.9	0.02
Free Lunch	2186.9*	2193.3*	6.4*	0.04	2424.4*	2432.1*	7.7*	0.04
Other Economic Disadvantage	2182.7*	2197.5*	14.8*	0.08	2535.5*	2550.9*	15.5*	0.09
Limited English Proficiency (LEP), No Economic Disadvantage	2211.2*	2229.6*	18.4*	0.10	2423.7*	2431.1*	7.4	0.04
Economic Disadvantage, No LEP	2206.9*	2214.1*	7.2*	0.04	2453.2*	2459.2*	6.0*	0.03
LEP and Economic Disadvantage	2167.4*	2182.7*	15.3*	0.09	2330.4*	2342.4*	12.0*	0.07

NOTE: Statistical significance level is \* = p < .0001

Note: The effect size is the Pre-K Difference as a proportion of the standard deviation of the non-enrolled group. This standard deviation is always obtained from the full research sample, even if the table shows impacts for subgroups.

**Table 16. Results of Regressions Testing Pre-K Attendance Effects on Math Scaled Scores – Eligible Only**

Sample	Model 1				Model 2			
	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>	No Pre-K	Pre-K	Pre-K Dif	Effect Size <sup>a</sup>
All	2,158.2*	2,168.8*	10.6*	0.06	2446.0*	2,454.7*	8.7*	0.05
Not Economically Disadvantaged	2,192.8*	2,214.6*	21.8*	0.13	2472.3*	2,482.4*	10.1	0.06
Reduced Price Lunch	2,194.5*	2,197.2*	2.7	0.02	2408.3*	2,414.1*	5.8	0.03
Free Lunch	2,149.0*	2,159.0*	10.0*	0.06	2424.3*	2,432.8*	8.5*	0.05
Other Economic Disadvantage	2,151.1*	2,167.1*	16.0*	0.09	2414.3*	2,428.4*	14.1*	0.08
Limited English Proficiency (LEP), No Economic Disadvantage	2,192.8*	2,214.6*	21.8*	0.13	2472.3*	2,482.4*	10.1	0.06
Economic Disadvantage, No LEP	2,160.8*	2,168.6*	7.7*	0.04	2427.2*	2,433.9*	6.7*	0.04
LEP and Economic Disadvantage	2,146.4*	2,162.5*	16.1*	0.09	2350.1*	2,362.4*	12.3*	0.07

NOTE: Statistical significance level is \* = p <.0001

The effect size is the Pre-K Difference as a proportion of the standard deviation of the non-enrolled group. This standard deviation is always obtained from the full research sample, even if the table shows impacts for subgroups.

### **Do Children in Districts Offering or Not Offering Pre-K Perform Differently?**

School districts in Texas are required to offer Pre-K if there are at least 15 eligible children who are at least four years of age in their population. As noted above, the districts that did not offer Pre-K in 1998-1999 were much smaller than those that did, and their populations of Hispanic and Black children were smaller as well. It appears that such districts are relatively affluent and might, therefore, provide better educational opportunities for their students, including their small populations of economically-disadvantaged and LEP students. It is also possible that the families with economically-disadvantaged and LEP who reside in these districts have other characteristics that might contribute to their children’s school competencies. In either case, one result might be that Pre-K eligible students in these districts might perform better than eligible students in less advantaged school districts.

To test this possibility, all children who had not attended Pre-K were selected and compared by eligible and not-eligible children in districts that did and did not offer Pre-K. TAKS scores were regressed on eligibility (1=yes; 0=no), offer (1=yes; 0=no), and

eligibility\*offer. Model 1 contained no covariates; Model 2 included the same covariates used in the analyses already reported. The results for the total population of children are shown in Tables 17 and 18. There are consistent and large differences between eligible and ineligible children on both reading and math that are not completely accounted for by the covariates. On both reading and math, children in districts that did not offer Pre-K scored higher than those in districts that offered Pre-K, but the difference was not statistically significant once the controls were in the models. There was no evidence of an interaction. That is, the gap between eligible and ineligible children who had not attended Pre-K was similar whether the districts offered Pre-K or not.

Our analyses also compared eligible children who did not attend Pre-K with those who were not eligible (see Tables 17 and 18). In districts that did not offer Pre-K, children who were not eligible scored 116 points higher on the reading test and 107 points higher on the math test than those who were eligible and did not attend Pre-K. With controls, these differences were smaller - 58 points on the reading test and 46 points on the math test. In districts that offered Pre-K, the differences between eligible and ineligible children, with controls, were 48 points for reading and 45 points for math. All of these differences were much larger in magnitude than the differences between eligible children who did and did not take up Pre-K.

**Table 17. Results of Regressions Testing District Offer of Pre-K and Child Eligibility on Scaled Scores – Non-Enrolled Only**

Predictor	Reading Model 1	Reading Model 2	Math Model 1	Math Model 2
Intercept	2,344.2*	2,461.0*	2,289.7*	2,441.1*
Offer	-20.4*	-5.6	-15.0*	-1.3
Eligibility	-116.1*	-57.7*	-107.0*	-53.9*
Offer *Eligibility	-12.0	9.3	-9.6	8.6

NOTE: Statistical significance level is \* =  $p < .0001$

Table 18 illustrates the results of district offer and eligibility for non-enrolled children as predicted values to simplify the interpretation of the interactions.

**Table 18. Predicted Values of District Offer of Pre-K and Child Eligibility on Scaled Scores – Non-Enrolled Only, Model 2**

<b>Reading Model 2</b>	<b>Offered</b>	<b>Not Offered</b>	<b>Math Model 2</b>	<b>Offered</b>	<b>Not Offered</b>
<b>Eligible</b>	2,407.1	2,403.4	<b>Eligible</b>	2,394.6	2,387.2
<b>Not Eligible</b>	2,455.4	2,461.0	<b>Not Eligible</b>	2,439.8	2,441.1



## **Conclusions and Recommendations**

### **Conclusions**

The results of this investigation are consistent with the earlier findings by Kuhne (2008) showing small but significant advantages on both reading and math scores in third grade for children who had attended public school Pre-K programs. Although these effects are small, it is notable that they appear four years after children completed Pre-K programs. Once children enter school, they have a wide range of school experiences that could overwhelm any advantage or disadvantage from a preschool program, but these findings suggest that the advantages were sustained. It is also noteworthy that controlling the demographic characteristics of schools and children had little effect on the difference between children with Pre-K experiences and those without. In fact, in some cases, the difference increased slightly, suggesting that children who were enrolled may have been more disadvantaged than those who were eligible but did not enroll.

Our findings are consistent with many others showing the greatest gains from Pre-K among the most disadvantaged students—those with the most marked poverty and those who qualified by virtue of both income and LEP. As these students are at greatest risk for school failure, it is particularly important that they seem to benefit most from Pre-K.

Because enrollment in Pre-K is voluntary, the data provided some information about characteristics of families who do and do not use the service. It is noteworthy that parents of Hispanic children have a relatively high rate of enrollment, but parents of Black and White Non-Hispanic children are slightly less likely to place their children in Pre-K.

### **Limitations**

Some limitations on the conclusions arise from the information available in the database. First, the sample was restricted to children enrolled in Texas public schools from kindergarten through third grade because information from both times was needed to answer the major question. This process omits children who moved out of the state after kindergarten and those who moved into Texas after kindergarten, and it also omits children who left the public schools for private schools. The demographics of the public school kindergarten population still enrolled at third grade were somewhat different than for the population no longer enrolled. Students remaining in public schools were more likely to be economically

disadvantaged and LEP, suggesting that some of the attrition was a function of more affluent, English-speaking families leaving the public schools.

A second limitation is the inexact method of determining eligibility, which could have diluted the results. Because there was no information on eligibility criteria during the Pre-K year for children who did not attend Pre-K, kindergarten information was used to infer eligibility in the prior year. That demonstrated indirectly that a relatively small percentage of children were misclassified, introducing a certain amount of error into the findings.

A third limitation is that the data does not provide a way of identifying children who attended other early childhood programs, including Head Start. It is likely that some percentage of the eligible children who did not attend Pre-K were in fact in other programs offering language, math, and social skills instruction. To the extent that this is the case, these analyses may underestimate the effects of academic enrichment during the Pre-K year. As Head Start and child care programs become more integrated as part of the state's efforts to enhance children's school readiness, it is particularly important to bring the databases for these various programs into future analyses.

It also is not possible to distinguish between those Pre-K programs offering a full day of instruction from those only offering a half-day using only the ERC database. Based on findings from other research studies, it would be reasonable to assume that the positive impacts are concentrated among those campuses offering full-day Pre-K but that level of analysis could not be discerned from the available data.

One big question remaining concerns the quality of Pre-K programs in Texas schools. National data make it clear that quality can be best defined at the level of classroom process, but it is not feasible to observe all classrooms in the state. The fact that Texas is judged as relatively low quality by NIEER raises important questions. On one hand, the ten quality criteria used by NIEER are not necessarily good indicators of what goes on in the classroom. On the other, the fact that Texas meets only four of them leads to the need for more information about the actual quality of instruction. It would be useful to do classroom observations of a sample of classrooms around the state to gain some information about what more distal indicators might be used to determine quality and to set standards.

It is likely that quality has improved since the 1999 school-year in which the children in this study attended Pre-K. In 2003, the Texas Legislature enacted SB 76, which resulted in the development of the Texas School Ready! program, which certifies Texas Pre-K

programs when they meet a set of detailed quality standards (State Center for Early Childhood Development, 2004).

### **Recommendations for Future Research**

The longitudinal information on Texas school children and Pre-K participants contained in the Texas ERC is a valuable resource that can be used to help policymakers better understand the nature of the program and its long-term effects on school performance. However, because the PEIMS data system (the source of the ERC data used for this analysis) was not originally designed for research and program evaluation, additional information would need to be linked with the information in this database to maximize its potential to evaluate the long-term effectiveness of the Pre-K program. Due to staff resource constraints, current ERC policies prohibit the linking of outside data files to the ERC database. However, should this restriction be lifted, the following data files could be added to future analyses to strengthen the research data sets that could be used to evaluate the effectiveness of the Pre-K program:

- Another longitudinal database containing detailed information on low-income families and their children (e.g., the Supplemental Nutrition Assistance Program files) who are potentially eligible for the Pre-K program that could be used to better measure take-up of children who are eligible for this program
- Program participation data from the subsidized child care and Head Start programs to better determine joint participation in other early childhood education programs
- Databases containing kindergarten assessment data to measure school readiness at a time period closer to Pre-K than third grade
- Primary data collection to distinguish between half-day and full-day programs and/or to add direct observational data for selected classrooms

Future research should also include conducting similar analyses on later cohorts so as to measure the impact of the Pre-K program during a time period after a substantial number of Texas Pre-K programs have met the newer quality standards. Such research enhancements would enable researchers to more conclusively judge the effectiveness of these programs and to isolate the location and nature of the effects for different groups of young Texas children.

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## Appendix A

**Table A1. T-tests of Control Variables Between Those Who Were Found in 2003/2004 PEIMS and Those Not.**

Variable	PEIMS by 2003/4	N	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Male	0	22644	0.5182	0.4997	0.00332	Pooled	Equal	1.27	290924	0.2041
	1	268282	0.5138	0.4998	0.000965	Satterthwaite	Unequal	1.27	26613	0.2041
	Diff (1-2)	_	0.00439	0.4998	0.00346					
Ethnicity Black	0	22644	0.1451	0.3522	0.00234	Pooled	Equal	2.82	290924	0.0048
	1	268282	0.1383	0.3452	0.000667	Satterthwaite	Unequal	2.77	26451	0.0056
	Diff (1-2)	_	0.00674	0.3458	0.00239					
Ethnicity Hispanic	0	22644	0.3301	0.4702	0.00312	Pooled	Equal	-34.94	290924	<.0001
	1	268282	0.4499	0.4975	0.00096	Satterthwaite	Unequal	-36.64	27103	<.0001
	Diff (1-2)	_	-0.1198	0.4954	0.00343					
Ethnicity Other	0	22644	0.0436	0.2043	0.00136	Pooled	Equal	15.67	290924	<.0001
	1	268282	0.026	0.159	0.000307	Satterthwaite	Unequal	12.7	25012	<.0001
	Diff (1-2)	_	0.0177	0.163	0.00113					
Ethnicity Anglo	0	22644	0.4812	0.4997	0.00332	Pooled	Equal	28.25	290924	<.0001
	1	268282	0.3859	0.4868	0.00094	Satterthwaite	Unequal	27.64	26402	<.0001
	Diff (1-2)	_	0.0954	0.4878	0.00338					
Age Sept 1, 1999	0	22644	5.059	0.3021	0.00201	Pooled	Equal	9.26	290924	<.0001
	1	268282	5.0438	0.2294	0.000443	Satterthwaite	Unequal	7.35	24896	<.0001
	Diff (1-2)	_	0.0151	0.2359	0.00163					
Limited Eng. Proficiency (LEP)	0	22644	0.1944	0.3958	0.00263	Pooled	Equal	-13.57	290924	<.0001
	1	268282	0.234	0.4234	0.000817	Satterthwaite	Unequal	-14.37	27207	<.0001
	Diff (1-2)	_	-0.0396	0.4213	0.00292					
At Risk of Dropping Out	0	22644	0.283	0.4505	0.00299	Pooled	Equal	-14.26	290924	<.0001
	1	268282	0.3292	0.4699	0.000907	Satterthwaite	Unequal	-14.77	26974	<.0001
	Diff (1-2)	_	-0.0462	0.4685	0.00324					
English as Second Language Program	0	22644	0.0547	0.2273	0.00151	Pooled	Equal	1.68	290924	0.0933
	1	268282	0.0521	0.2222	0.000429	Satterthwaite	Unequal	1.65	26427	0.0997
	Diff (1-2)	_	0.00259	0.2226	0.00154					

**Table A1. T-tests of Control Variables Between  
Those Who Were Found in 2003/2004 PEIMS and Those Not.**

Variable	PEIMS by 2003/4	N	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Home Language Spanish	0	22644	0.1854	0.3887	0.00258	Pooled	Equal	-17.97	290924	<.0001
	1	268282	0.2381	0.4259	0.000822	Satterthwaite	Unequal	-19.42	27442	<.0001
	Diff (1-2)	_	-0.0526	0.4231	0.00293					
Home Language Other	0	22644	0.0374	0.1896	0.00126	Pooled	Equal	17.32	290924	<.0001
	1	268282	0.02	0.1401	0.00027	Satterthwaite	Unequal	13.44	24773	<.0001
	Diff (1-2)	_	0.0173	0.1446	0.001					
Identified Immigrant	0	22644	0.0471	0.2118	0.00141	Pooled	Equal	20.7	290924	<.0001
	1	268282	0.0243	0.1539	0.000297	Satterthwaite	Unequal	15.85	24702	<.0001
	Diff (1-2)	_	0.0228	0.1592	0.0011					
Economic Disadvantage - Free Meal	0	22644	0.3544	0.4783	0.00318	Pooled	Equal	-14.91	290924	<.0001
	1	268282	0.4049	0.4909	0.000948	Satterthwaite	Unequal	-15.24	26829	<.0001
	Diff (1-2)	_	-0.0506	0.4899	0.00339					
Economic Disadvantage - Reduced Meal	0	22644	0.0831	0.2761	0.00183	Pooled	Equal	-0.96	290924	0.3382
	1	268282	0.085	0.2788	0.000538	Satterthwaite	Unequal	-0.97	26693	0.3341
	Diff (1-2)	_	-0.00185	0.2786	0.00193					
Economic Disadvantage - Other	0	22644	0.0461	0.2097	0.00139	Pooled	Equal	-15.08	290924	<.0001
	1	268282	0.0729	0.2599	0.000502	Satterthwaite	Unequal	-18.06	28853	<.0001
	Diff (1-2)	_	-0.0268	0.2564	0.00177					
No Economic Disadvantage	0	22644	0.5164	0.4997	0.00332	Pooled	Equal	23.04	290924	<.0001
	1	268282	0.4373	0.4961	0.000958	Satterthwaite	Unequal	22.9	26550	<.0001
	Diff (1-2)	_	0.0792	0.4963	0.00343					

**Table A2. Values of Reading Score Codes and Legitimate TAKS score flag**

Reading Score Description	Reading Score Value	Legitimate TAKS Score	Frequency
	.	0	9578
Absent	1	0	104
No Information For This Subject	2	0	417
Other(e.g. Illness, Cheating)	4	0	69
Student Did Not Take Reading Test	6	0	20505
Score	7	0	26
Score	7	1	237279
Student is LEP-Exempt	9	0	290
TAKS Reading Not Appropriate For The Student	11	0	11
A State-Approved Alternate Exam Was Administered			
Parental Waiver			

**Table A3. Values of Math Score Codes and Legitimate TAKS score flag.**

Math Score Description	Math Score Value	Legitimate TAKS Score	Frequency
	.	0	29591
Absent	1	0	1789
No Information For This Subject	2	0	277
Other(e.g. Illness, Cheating)	4	0	276
Score	7	0	25
Score	7	1	236073
Student is LEP-Exempt	9	0	251



**Table A4. T-Tests of Control Variables Between Those with Legitimate Reading TAKS Scores and Those Without**

Variable	TAKS Reading	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Male	0	0.624	0.4844	0.00275	Pooled	Equal	41.42	268280	<.0001
	1	0.4994	0.5	0.00103	Satterthwaite	Unequal	42.45	40134	<.0001
	Diff	0.1246	0.4982	0.00301					
Ethnicity Black	0	0.1773	0.3819	0.00217	Pooled	Equal	21.15	268280	<.0001
	1	0.1332	0.3398	0.000698	Satterthwaite	Unequal	19.34	37695	<.0001
	Diff	0.0441	0.345	0.00208					
Ethnicity Hispanic	0	0.4232	0.4941	0.00281	Pooled	Equal	-10.06	268280	<.0001
	1	0.4534	0.4978	0.00102	Satterthwaite	Unequal	-10.11	39681	<.0001
	Diff	-0.0302	0.4974	0.003					
Ethnicity Other	0	0.0171	0.1297	0.000737	Pooled	Equal	-10.4	268280	<.0001
	1	0.0271	0.1624	0.000333	Satterthwaite	Unequal	-12.34	44748	<.0001
	Diff	0.00998	0.159	0.00096					
Ethnicity Anglo	0	0.3824	0.486	0.00276	Pooled	Equal	-1.32	268280	0.1862
	1	0.3863	0.4869	0.001	Satterthwaite	Unequal	-1.32	39578	0.1856
	Diff	0.00389	0.4868	0.00294					
Age Sept 1, 1999	0	5.1378	0.3799	0.00216	Pooled	Equal	77.52	268280	<.0001
	1	5.0316	0.1984	0.000407	Satterthwaite	Unequal	48.38	33246	<.0001
	Diff	0.1062	0.2269	0.00137					
Limited Eng. Proficiency (LEP)	0	0.2081	0.4059	0.00231	Pooled	Equal	-11.47	268280	<.0001
	1	0.2374	0.4255	0.000873	Satterthwaite	Unequal	-11.89	40433	<.0001
	Diff	-0.0293	0.4233	0.00256					
At Risk of Dropping Out	0	0.3883	0.4874	0.00277	Pooled	Equal	23.56	268280	<.0001
	1	0.3215	0.4671	0.000959	Satterthwaite	Unequal	22.8	38816	<.0001
	Diff	0.0668	0.4695	0.00284					
English as Second Language Program	0	0.05	0.2179	0.00124	Pooled	Equal	-1.79	268280	0.0735
	1	0.0524	0.2228	0.000457	Satterthwaite	Unequal	-1.82	39952	0.0687
	Diff	-0.0024	0.2222	0.00134					
Home Language Spanish	0	0.2117	0.4085	0.00232	Pooled	Equal	-11.6	268280	<.0001
	1	0.2415	0.428	0.000879	Satterthwaite	Unequal	-12.02	40424	<.0001
	Diff	-0.0298	0.4258	0.00257					

**Table A4. T-Tests of Control Variables Between Those with Legitimate Reading TAKS Scores and Those Without**

Variable	TAKS Reading	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Home Language Other	0	0.0136	0.116	0.000659	Pooled	Equal	-8.54	268280	<.0001
	1	0.0209	0.1429	0.000293	Satterthwaite	Unequal	-10.02	44296	<.0001
	Diff	-	0.00723	0.1401	0.000846				
Identified Immigrant	0	0.0237	0.1521	0.000864	Pooled	Equal	-0.69	268280	0.4914
	1	0.0243	0.1541	0.000316	Satterthwaite	Unequal	-0.69	39780	0.4871
	Diff	-	0.00064	0.1539	0.000929				
Economic Disadvantage - Free Meal	0	0.4964	0.5	0.00284	Pooled	Equal	34.92	268280	<.0001
	1	0.3931	0.4884	0.001	Satterthwaite	Unequal	34.3	39136	<.0001
	Diff	-	0.1033	0.4898	0.00296				
Economic Disadvantage - Reduced Meal	0	0.0805	0.2721	0.00155	Pooled	Equal	-2.98	268280	0.0028
	1	0.0856	0.2797	0.000574	Satterthwaite	Unequal	-3.05	40053	0.0023
	Diff	-	0.00503	0.2789	0.00168				
Economic Disadvantage - Other	0	0.0771	0.2667	0.00151	Pooled	Equal	3.05	268280	0.0023
	1	0.0723	0.259	0.000532	Satterthwaite	Unequal	2.98	39033	0.0029
	Diff	-	0.00479	0.2599	0.00157				
No Economic Disadvantage	0	0.346	0.4757	0.0027	Pooled	Equal	-34.48	268280	<.0001
	1	0.4491	0.4974	0.00102	Satterthwaite	Unequal	-35.68	40384	<.0001
	Diff	-	-0.1031	0.4949	0.00299				

**Table A5. T-Tests of Control Variables Between Those with Legitimate Math TAKS Scores and Those Without**

Variable	Math TAKS	N	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Male	0	32208	0.5968	0.4905	0.00273	Pooled	Equal	31.84	268280	<.0001
	1	236074	0.5025	0.5	0.00103	Satterthwaite	Unequal	32.31	41869	<.0001
	Diff (1-2)	_	0.0944	0.4989	0.00296					
Ethnicity Black	0	32208	0.1805	0.3846	0.00214	Pooled	Equal	23.37	268280	<.0001
	1	236074	0.1326	0.3391	0.000698	Satterthwaite	Unequal	21.24	39343	<.0001
	Diff (1-2)	_	0.0479	0.3449	0.00205					
Ethnicity Hispanic	0	32208	0.4238	0.4942	0.00275	Pooled	Equal	-10.04	268280	<.0001
	1	236074	0.4534	0.4978	0.00102	Satterthwaite	Unequal	-10.09	41634	<.0001
	Diff (1-2)	_	-0.0296	0.4974	0.00295					
Ethnicity Other	0	32208	0.0171	0.1298	0.000723	Pooled	Equal	-10.61	268280	<.0001
	1	236074	0.0272	0.1625	0.000335	Satterthwaite	Unequal	-12.57	47170	<.0001
	Diff (1-2)	_	-0.01	0.159	0.000944					
Ethnicity Anglo	0	32208	0.3786	0.4851	0.0027	Pooled	Equal	-2.84	268280	0.0046
	1	236074	0.3868	0.487	0.001	Satterthwaite	Unequal	-2.85	41569	0.0044
	Diff (1-2)	_	-0.0082	0.4868	0.00289					
Age Sept 1, 1999	0	32208	5.1306	0.3712	0.00207	Pooled	Equal	73.02	268280	<.0001
	1	236074	5.032	0.1996	0.000411	Satterthwaite	Unequal	46.73	34791	<.0001
	Diff (1-2)	_	0.0985	0.2272	0.00135					
Limited Eng. Proficiency (LEP)	0	32208	0.2117	0.4085	0.00228	Pooled	Equal	-10.1	268280	<.0001
	1	236074	0.2371	0.4253	0.000875	Satterthwaite	Unequal	-10.42	42311	<.0001
	Diff (1-2)	_	-0.0254	0.4233	0.00251					
At Risk of Dropping Out	0	32208	0.3868	0.487	0.00271	Pooled	Equal	23.44	268280	<.0001
	1	236074	0.3214	0.467	0.000961	Satterthwaite	Unequal	22.71	40708	<.0001
	Diff (1-2)	_	0.0654	0.4695	0.00279					
English as Second Language Program	0	32208	0.0476	0.213	0.00119	Pooled	Equal	-3.84	268280	0.0001
	1	236074	0.0527	0.2234	0.00046	Satterthwaite	Unequal	-3.98	42474	<.0001
	Diff (1-2)	_	-0.00507	0.2222	0.00132					
Home Language Spanish	0	32208	0.2154	0.4111	0.00229	Pooled	Equal	-10.19	268280	<.0001
	1	236074	0.2412	0.4278	0.00088	Satterthwaite	Unequal	-10.51	42300	<.0001
	Diff (1-2)	_	-0.0258	0.4258	0.00253					
Home Language Other	0	32208	0.0139	0.117	0.000652	Pooled	Equal	-8.4	268280	<.0001
	1	236074	0.0209	0.143	0.000294	Satterthwaite	Unequal	-9.78	46402	<.0001
	Diff (1-2)	_	-0.00699	0.1401	0.000832					

**Table A5. T-Tests of Control Variables Between Those with Legitimate Math TAKS Scores and Those Without**

Variable	Math TAKS	N	Mean	StdDev	StdErr	Method	Variances	tValue	DF	Probt
Identified Immigrant	0	32208	0.0237	0.1522	0.000848	Pooled	Equal	-0.69	268280	0.4925
	1	236074	0.0243	0.1541	0.000317	Satterthwaite	Unequal	-0.69	41741	0.4883
	Diff (1-2)	_	-0.00063	0.1539	0.000914					
Economic Disadvantage - Free Meal	0	32208	0.4943	0.5	0.00279	Pooled	Equal	34.93	268280	<.0001
	1	236074	0.3927	0.4884	0.00101	Satterthwaite	Unequal	34.31	41042	<.0001
	Diff (1-2)	_	0.1016	0.4898	0.00291					
Economic Disadvantage - Reduced Meal	0	32208	0.0793	0.2702	0.00151	Pooled	Equal	-3.91	268280	<.0001
	1	236074	0.0857	0.28	0.000576	Satterthwaite	Unequal	-4.01	42213	<.0001
	Diff (1-2)	_	-0.00647	0.2788	0.00166					
Economic Disadvantage - Other	0	32208	0.0796	0.2707	0.00151	Pooled	Equal	4.97	268280	<.0001
	1	236074	0.0719	0.2584	0.000532	Satterthwaite	Unequal	4.79	40627	<.0001
	Diff (1-2)	_	0.00767	0.2599	0.00154					
No Economic Disadvantage	0	32208	0.3468	0.476	0.00265	Pooled	Equal	-34.97	268280	<.0001
	1	236074	0.4496	0.4975	0.00102	Satterthwaite	Unequal	-36.16	42394	<.0001
	Diff (1-2)	_	-0.1028	0.4949	0.00294					

## Appendix B

On the basis of these analyses, the following variables were entered as controls in all regressions. Per the year the students sat for the TAKS administration (2003 on grade; 2004 1 year retained), campus level demographics, from AEIS, were included as controls in each regression:

cpetlepp	LEP Students, Percent
cpetecop	Economically Disadvantaged Students, Percent
cpetblap	Black Students, Percent
Cpethisp	Hispanic Students, Percent
cpetindp	Native American Students, Percent
cpetpacp	Asian/Pacific Islander Students, Percent
cpetspep	Students in Special Education Programs, Percent
cpemallp	Mobility Percent

In addition, individual-level controls were included from the PEIMS data:

sex	Gender
sept1_ag	Age on Sept 1, 1999
lep	Limited English Proficiency, 1999
speced	Special Education, 1999
ret_flag	Retained flag – sat for third-grade TAKS administration in 2004
econ_1	Economic Disadvantage = 1 , 1999
econ_2	Economic Disadvantage = 2, 1999
econ_99	Economic Disadvantage = 99, 1999
eth_blk	Ethnicity – Black
eth_hisp	Ethnicity - Hispanic
eth_other	Ethnicity – Other, non white
homelang_spa	Home Language - Spanish
homelang_other	Home Language – Other, non English

## **Glossary of Terms**

### **Pre-K Eligibility\***

(5-1) To be eligible for enrollment in a Pre-Kindergarten class, a child must be three or four years of age on September 1 of the current school year and must be [TEC §29.153(b)]:

1. Unable to speak and comprehend the English language; or
2. Educationally disadvantaged (eligible to participate in the National Free or Reduced-Price Lunch Program); or
3. Homeless.

A child who is three years old is eligible for Pre-Kindergarten only if the district operates a three-year-old Pre-Kindergarten program. A child who is five years of age on September 1 of the current school year is not eligible for enrollment in a Pre-Kindergarten class.

It is the agency's position that children who reach age five on September 1 are most appropriately served in kindergarten, and that the law specifically established the Pre-Kindergarten program to serve students who have not reached age five. In that context, a district should be able to enroll a qualified five-year-old student in the Pre-Kindergarten program only if a waiver of the attendance accounting rules authorize such an action.

### **LEP\*:**

If the student is eligible for Pre-Kindergarten because the student does not speak and comprehend the English language, the following documentation must be on file.

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\*Taken from 1998/1999 Student Attendance Accounting Handbook

1. Home language survey. The home language survey shall be administered in English and Spanish; for students of other language groups, the home language survey shall be translated into the home language whenever possible. The home language survey shall contain the following questions [19 TAC §89.1215(b)]:

- a. "What language is spoken in your home most of the time?"
  - b. "What language does your child (do you) speak most of the time?"
2. Proof of a qualifying score on an approved Oral Language Proficiency Test. The official scores must be documented in the student's records. Students in PK may also be determined to be LEP by an Informal Language Inventory.

**Economic Status:**

<b>0</b>	Not identified as economically disadvantaged
<b>1</b>	Eligible for free meals under the National School Lunch and Child Nutrition Program
<b>2</b>	Eligible for reduced-price meals under the National School Lunch and Child Nutrition Program
<b>99</b>	Other economic disadvantage, including: a) from a family with an annual income at or below the official federal poverty line, b) eligible for Temporary Assistance to Needy Families (TANF) or other public assistance, c) received a Pell Grant or comparable state program of need-based financial assistance, d) eligible for programs assisted under Title II of the Job Training Partnership Act (JTPA), or e) eligible for benefits under the Food Stamp Act of 1977.

**At Risk:**

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). 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.

A student at-risk of dropping out of school includes each student who is under 21 years of age and who:

1. is in Pre-Kindergarten, 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;
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 by 42 U.S.C. Section 11302, 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.

**Legitimate TAKS score:** score code = '7' and non-missing /non-zero scale and raw scores

**Mobility** (*from Campus Profile Section*):

A student is considered to be mobile if he or she has been in membership at the school for less than 83% of the school year (i.e., has missed six or more weeks at a particular school). (number of mobile students in 2001-02 divided *by* number of students who were in attendance at any time during the 2001-02 school year). This rate is calculated at the campus level.

**Bilingual Programs**

(retrieved from:

<http://sc.lpsid.org/education/components/scrapbook/default.php?sectiondetailid=1027>,

April 14, 2010)

**Grades PK-6**

Bilingual Education is an instructional delivery model, offered in the elementary through the 6th grades for students whose native language is other than English and who need to develop English proficiency skills. The bilingual program gives these students access

to the curriculum through content area instruction in the native language (Spanish) while acquiring English language proficiency through English as a Second Language methodology. Bilingual education is supported by educational research on the education of limited English proficient students. This research shows that strong bilingual programs and bilingualism promote academic success. Bilingual students benefit cognitively, educationally, socially and economically from participation in the program.

- Traditional Bilingual Program (one-way bilingual program model). In this bilingual program model, students who are identified as Limited English Proficient (LEP) receive primary (native) language instruction for concept development while acquiring English. In this educational approach the Spanish and English language have equal value and status in the teaching and learning process. English instruction increases annually through grade 3. Students who entered the bilingual program prior to third grade, progress into a pre-exit phase of the program during grades 4-5. While maintaining introduction or reinforcement of concepts in the primary language (Spanish), this phase of the program emphasizes English instruction. This bilingual program model is available at selected elementary campuses.
- Dual Language or Two-Way Bilingual/Enrichment Program In this bilingual program model a combination of LEP (limited English proficient) and non-LEP (students proficient in English) students are taught together in an effort to develop full bilingualism and biliteracy for both groups. Instruction follows a 50/50 model with each language group learning to read in their respective primary language while acquiring language skills in the second language. Each grade level cohort has an ESL and a bilingual certified teacher. The first dual language program in LPISD was implemented in 1996 at Rizzuto Elementary and continues to be available at that campus and at Baker 6th Grade Campus.

## **English as a Second Language (ESL)**

### **Program Grades PK-12**

English as a Second Language is an intensive program of English instruction in all subjects with a focus on language arts - listening, speaking, reading, and writing- by teachers certified in ESL methodology. This program is offered to students whose native language is other than English and who need to develop their English language skills in order to ensure academic success. ESL is also a component of all bilingual programs. In these programs ESL is usually taught by a bilingual classroom teacher who is certified ESL. In the dual language cohorts, there is an ESL teacher who co teaches with the bilingual teacher. ESL instruction is offered at all LPISD schools.