Research Report

Pre-Kindergarten for the Modern Age:

A Scalable, Affordable, High-Quality Plan for Texas

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Introduction

Recent evaluations show quite clearly that large-scale, publicly funded pre-k programs have significant benefits for children's school readiness skills and future academic achievement. Importantly, these results come from *today's* state-funded pre-k programs, operated at scale in various states across the country. They are not from the usual suspects - dated and small-scale experimental projects that are typically cited as evidence of the benefits of preschool, but are not cost-sustainable or scalable. That we now see the benefits of public pre-k is good news for many states, including Texas.

As an example of the new wave of programs with results, an analysis of the impact of five state-funded preschool programs on young children's school readiness in Michigan, New Jersey, Oklahoma, South Carolina, and West Virginia showed 31% more annual growth in vocabulary skills for children enrolled in pre-k when compared to those who did not attend preschool.[1] Increases in math and early literacy skills were also pronounced, showing 44% and 85% more annual growth, respectively.[2] And a recent analysis combining results from 123 early childhood program evaluation studies estimated the short-term (one-year) impact of early learning programs to be about half the poverty achievement gap* , the equivalent of a four-year-old jumping from the 30th percentile to the 50th percentile on achievement tests.[3]

* *Using the assumption that the achievement gap is one standard deviation—which is very large and corresponds to approximately 3-6 years of middle-school learning. Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In Duncan & Murnane (Eds.), Whither opportunity (91-116). New York: Russell Sage Foundation.)*

Notably, recent evaluations have demonstrated that gains can be sustained through elementary school and beyond. Although fade-out of program effects had been cited previously as evidence of preschool's limited effectiveness, it is now clear that fade-out is far more likely a function of the stunning variation in quality of programs than in the value of pre-k per se.

Recent and rigorous research evaluations from multiple states, including studies of Texas programs, demonstrate that academic gains can be maintained at least through third grade and in many instances, beyond. Of note, in some evaluations the benefits of pre-k extend into early adulthood, with improved outcomes such as educational attainment and cognitive performance.[4]

In other words, the most current research indicates that high-quality pre-k programs can lead to significant and sustained gains for young children. Based on recent programs and rigorous research, there is no longer any question that publicly funded pre-k programs hold enormous potential for closing skills gaps, both in the short and long-term.

Notably, the contemporary statewide programs that show the impacts noted above are all funded at levels considered sustainable by state legislators. In other words, these programs are not "Cadillac" or boutique models with excessive costs that exceed state allocations or are offered to small select groups of children. Rather, they typically operate at per-pupil costs no greater than those of the K-12 system and still achieve these benefits.

What's more, these investments in early education return financial benefits downstream. Analyses of various statewide and experimental studies estimate a total return on investment between $3-7 saved per child for each dollar spent on pre-k.[5] Findings consistently show that the benefits of high-quality programs significantly exceed the costs by producing immediate improvements in school readiness, cuts in school spending related to retention and special education, and long-term impacts related to reduced delinquency and increased productivity.[6] These benefits over the lifetime have been estimated to lead to savings of $9,901 per participant taking into account short, middle, and long-term outcomes, making pre-k a highly cost-effective intervention.[7]

Moreover, the rate of return on investments in quality pre-k is larger than other well-known educational expenditures, such as class size reduction.[8] And although pre-k helps all children, it seems particularly beneficial for children who are low-income or dual language learners,[9] which is a significant and growing percentage of the Texas student population. So not only does pre-k work, the most recent research also makes it clear that quality preschool, especially for those children most at-risk for school failure, is a wise investment.[10]

The benefits of pre-k have been achieved through a cluster of key features of program design and implementation – effective teacher-child interactions, curriculum and early learning standards, full-day enrollment, workforce development, proven adult-child ratios, and aggressive use of data on program quality and child progress.[11]

The remainder of this paper draws on the latest research to examine the core features of effective programs—what they have in common that lead to children's significant *and* sustained gains—gains that stick. We compare these proven elements that are supported by both research and practice to the current state of pre-k in Texas, and use these proven practices to provide a roadmap for Texas legislators and state leaders to consider in evaluating options for improving the impact of Texas' pre-k program.

THEN

PRE 2010

NOW

2010 – PRESENT

THEN (PRE 2010)	NOW (2010 – PRESENT)
⊖ Research on impacts drawn heavily from Abecedarian and Perry Preschool.	⊕ Rigorous third-party evaluations of benefits of statewide pre-k programs.
⊖ Expensive pre-k programs ($16,000+) that don't scale.	⊕ Cost-sustainable pre-k programs with high potential for scaling.
⊖ Academic gains in pre-k are not sustained into elementary grades.	⊕ Pre-k programs showing academic gains through elementary grades.
⊖ Difficulty pinpointing amount of time in pre-k necessary for sustained gains.	⊕ Research showing increased gains with two years of pre-k and evidence of full-day benefits for at-risk children.
⊖ No consensus on how to create and deliver high-quality pre-k.	⊕ Field coalescing around the elements of high-quality that drive the best outcomes for children.
⊖ Lack of measurement of program characteristics, student outcomes, and teacher behaviors.	⊕ More systematic, evidence-based, data-driven approaches. Room for innovation.
⊖ Insufficient focus on teacher-child interactions and quality of instruction, generally not measured.	⊕ Teachers matter most. Focus: teacher-child interactions and instruction, broad adoption of observational measurements of classroom quality (e.g., the CLASS tool).
⊖ Lack of effective coaching and professional development (PD), no models to get to scale.	⊕ Coaching/PD, targeting instruction, using online coaching, video, and in-person and online coursework.
⊖ Low accountability for pre-k student outcomes.	⊕ Increased use of data for accountability, kindergarten readiness measurements post-pre-k, measuring Head Start grantees and dropping those that are low-quality.
⊖ Weak- or no standards in early learning.	⊕ Early learning standards now the norm.
⊖ Lack of proven curricula to boost student achievement.	⊕ Proven "What Works" curricula in literacy, numeracy, social-emotional skills.

Effective State Pre-K Programs

Several states presently run pre-k programs that lead to significant and sustained academic gains at cost-effective levels for low-income children. A number of these programs have undergone rigorous evaluations by third parties and illustrate how to increase the impact of public pre-k, including North Carolina's *More at Four,* Maryland's *Extended Elementary Education Program (EEEP)*, and Tulsa's implementation of Oklahoma's Universal Pre-K. Each clearly demonstrates that scaled-up, high-quality pre-k can lead to significant and sustained gains for children, and each has distinct features and common characteristics critical for other states' consideration in improving quality and impact in their pre-k program(s).

North Carolina – *More at Four*

North Carolina's full-day program targets four-year-old children from low-income families. Third party evaluations showed that children served by *More at Four* made notable gains in math and reading test scores by third grade.[12] More specifically, poor children enrolled in *More at Four* scored significantly better than poor non-attenders on third grade math and reading tests, with reductions in the achievement gap between poor and non-poor children ranging from 12-18%. Cost per-child of North Carolina pre-k was $7,800 in the 2011-2012 school year.[13]

Maryland – Extended Elementary Education Program (EEEP) and "Judy Centers."

Maryland's programs target children in poverty and focus directly on building kindergarten readiness skills. Cohorts of children enrolled in these programs over the past several years showed dramatic improvements in kindergarten readiness—up to 32% across a nine-year period, and the long-term impacts of the program are currently being studied. And as a state, Maryland showed significant progress over the years on third grade standardized tests, with much of the state-level improvement attributable to attendance in the EEEP program. The effects at the state level have been estimated by some to include a reduction in the achievement gap of 39% and 50% in reading and math, respectively.*[14] Cost per-child per-year of the EEEP initiative was $9,800 for full-day pre-k in the 2010-2011 school year.[15]

Oklahoma – Universal Pre-K

Oklahoma offers free, voluntary pre-k to all four-year-old children and has done so for about a decade.[16] The effects of the program were systematically measured in Tulsa, Oklahoma's largest school district. Using rigorous statistical adjustments to control for various potential confounds, attending pre-k in Tulsa led to substantial gains in children's language, cognitive, and motor skills at the end of the pre-k year,[17] and these learning gains lasted through third grade**. For example, in third grade, children enrolled in the Tulsa pre-k program had significantly better third grade math state standardized test scores than peers who did not enroll in the pre-k program.

Importantly, although the program in Oklahoma is universal, economically disadvantaged students showed gains in math achievement in third grade equivalent to a 20% reduction in the achievement gap.[18] The cost per child of the program in Tulsa was $4,403 for half-day students and $8,806 for full-day students, in the 2012-2013 school year.[19]

* *Using the assumption that the achievement gap is one standard deviation—which is very large and corresponds to approximately 3-6 years of middle-school learning. Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In Duncan & Murnane (Eds.), Whither opportunity (91-116). New York: Russell Sage Foundation.)*

** *Although the comparison group(s) in these studies were found to be equivalent on most demographic characteristics, there were slight differences favoring maternal education and occupational status of pre-k group.*

	Extension of Impact	Effects from extended impacts	Cost per Child	Population Served	Full-or half-day funding
North Carolina Pre-K	3rd grade	.12-.18	$7,800	Low-income	Full-day
Maryland Pre-K	4th grade	.39-.50	$9,800	Low-income	Half and full-day
Oklahoma Universal Pre-K (Tulsa)	3rd grade	.18	$8,806 (full) $4,482 (half)	All children	Half and full-day

What Makes Pre-K Programs Effective?

Years of effort have now made publicly funded preschool available to very large numbers of at-risk children. This means that the issue is not just access, but access to *programs that really work* in providing early education experiences that produce accelerated and sustained learning gains, especially for low-income children and English language learners. Fortunately, we also now know which program elements produce high-quality in early education and real impact on certain key readiness skills. The current challenge is building scalable program mechanisms that can be adapted in thousands of settings and communities across the country, and that produce the breadth of skills necessary for school readiness.

Successful programs such as those described above systematically improve outcomes for children by focusing very intentionally on the elements of high-quality early learning that matter most, which can be divided into two categories: process quality elements and structural quality elements.

It is important to note that although the impact of any one of these elements in isolation is unlikely to produce significant improvements, it is the combination of these research-based elements into a coherent and well-designed program that can produce significant and sustained results. All of these elements require political leadership and ongoing support in order to be implemented and sustained. Each of these common factors of effective pre-k programs and the research base to support them follow.

Process Quality	Structural Quality
• Effective teacher-student interactions • Using data & measurement to drive improvement	• Aligned early learning standards and proven curriculum • Targeted professional development • Full-day (learning day/hours in year) • Adult-child ratio • Teacher credentials and wages

Effective Teacher-Student Interactions

Far and away, teachers and their actions account for the majority of students' achievement gains in early learning. Increasing the quality of teachers' interactions with children might be one of the highest-impact investments for improving pre-k.

Everyone talks about "quality" as the requisite feature of early learning programs, but everyone has their own definition. Evidence now strongly supports defining

quality in terms of the actual behaviors of teachers that foster learning across a range of instructional and social activities in the classroom. In dozens of replicated studies, of all the indicators in the "program quality" bucket (class size, teacher qualifications, parent involvement), teacher-child interactions and curricula most strongly account for program effects on children's learning gains. No surprise, teachers, and teaching, matter—a lot.

Effective teacher-student interactions in pre-k classrooms are the force that drives children's learning gains.[20] There is now strong evidence identifying teaching practices that can, and should, be the focus of program monitoring observations used to measure and improve teacher performance. What teachers do in the classroom that produces learning can be organized into three broad groups of teaching practices that are each linked to student learning: 1) Social/Emotional Support; 2) Organization/Management Support; and 3) Instructional Support.

When program directors and teachers are trained to observe these behaviors and program monitoring and improvement systems include these observations, change occurs—educators start focusing on these metrics, teachers use these types of practices, and students learn more.[21] Importantly, teachers can be trained and supported to learn and use these effective teaching behaviors.

The best pre-k programs focus on helping teachers interact in warm and responsive ways, and they make sure that instructional time is productive and helps children develop higher-order thinking.[22] Across most pre-k programs in the country, teacher-child interactions tend to be positive and supportive social-emotionally, and classrooms tend to be well organized. However, the quality of teachers' instruction, which is the area of their behavior most tied to children's cognitive and academic gains, tends to be quite low.[23] Effective pre-k programs not only emphasize emotionally supportive and well-organized classrooms, but they also *make sure that instruction promotes children's language, reasoning, and understanding, as well as basic skills in math and reading*. The good news is that these practices can be reinforced through coaching, targeted professional development, and effective curriculum choices, all of which are discussed further in this paper.

Effective teacher-student interactions in pre-k classrooms are the force that drives children's learning gains.

Early Learning Standards and Curriculum

Improving qualities of teacher-child interaction is essential, but not enough. Effective programs use early learning standards to drive instruction, and ensure that proven curricula are adopted that align with these standards.

Early learning standards provide the targets for teachers and programs to help children reach goals that prepare them for kindergarten and beyond. These standards are important, as they define and make explicit what makes a child kindergarten ready.[24] Without these standards, there may be no clear goals for children's learning, and teachers' instruction, or programs' curricular choices, will lack direction and focus.

Thus, standards are critical for explicitly stating expectations about what children should know and be able to do by the time they leave preschool; these statements are fundamental to planning and alignment of program design, assessments, and classroom opportunities.

Effective standards are concise and focused rather than overly detailed (clear, manageable standards are more likely to get used), cover multiple domains of learning (social emotional/relational skills in addition to math and early literacy), and connect to elementary school learning standards and assessments.

Early learning standards must be combined with a toolbox of curriculum and instructional activities that build the right component skills (e.g., literacy, math, behavioral). To help teachers integrate standards into daily lessons, programs use curricula, which are the daily activities used to build progress toward standards. Curricula are an important point of leverage for program impact when proven to show results. Effective programs recognize that proven curricula are a key building block for success.

Great curricula matter – they provide engaging learning activities that draw children into skill-building work. Right now there are a half-dozen proven-effective curricula in areas of literacy, math, language, self-regulation, and science sitting on the shelf available for implementation. One place to start, for programs interested in adopting these resources, is the *What Works Clearinghouse* of the U.S. Department of Education.

States have taken different approaches to selecting curriculum: Maryland has a centralized, top-down procedure that selects curriculum throughout the pre-k system, while Oklahoma and North Carolina allow local choice subject to certain standards. North Carolina allows local choice as long as curriculum lines up with standards and can be proven to be research-based, and Oklahoma allows local choice in curriculum so long as it matches up with early childhood learning standards. So although all three programs have slightly different approaches, they share a common emphasis in state regulation for the use of standards-based curriculum that guides instruction toward meaningful academic outcomes and has a proven track record of showing results.

Effective programs make sure that curriculum matches early learning standards, is implemented as designed, and allows time to train teachers on its use. Although training on new or updated curriculum is time consuming, it is absolutely necessary for making sure that materials are used as intended. This combination of teacher quality, proven curriculum, and teachers who are well-versed on the curriculum yields the biggest gains in student achievement, gains that are most likely to stick.

Targeted Professional Development

The most effective pre-k programs tailor their professional development to closely link and align the key ingredients of high-leverage classrooms—effective teacher-child interactions, measures of children's learning, curriculum, and standards.

For example, effective programs use their training dollars to ensure teachers are observed regularly in the classroom, get feedback focused on effective teacher-child interactions, and are trained to implement a focused curriculum.[25] Reviewing videotapes of these interactions and receiving feedback has been especially promising in several studies.[26]

Even with young children, the teacher-child interaction and instruction can be observed and reliably measured with standardized observational assessments. And results from recent, skills-focused professional development show that providing direct feedback and training on effective interactions results in improved quality of teachers' instruction and improved academic outcomes for children.[27] These include:

- Coaching – Ongoing analysis/feedback on teacher-child interactions.
- Video Library – Video clips demonstrating effective classroom practices.
- In-Person and Online Courses – Improves teachers' knowledge of curriculum, effective interactions, and their skills to assess their practice.

This means that the usual approach to professional development – the one-day workshop - is seldom used and funds are redeployed to training teachers in the skills they need to be effective in the classroom.

Research and practice show that early-in-career teachers take advantage from this professional development more than do other teachers. In addition, providing training to entire programs rather than only selected teachers, and ensuring that administrators are trained on the same approach, is important.[28] Finally, effective programs

emphasize that informal professional development and collaboration with other staff members is invaluable—teachers in effective programs make use of the coaching and mentoring they receive from colleagues.

This framework of regular observational assessment of classroom practice, feedback, and coaching, helps teachers view professional development as an ongoing cycle of improvement, based on data.

Full-Day Enrollment

Most evaluations of state pre-k programs show that *enrollment in full-day, educationally focused programming is of greatest benefit to children in terms of early learning gains*. High-quality programs typically consist of at least 6-6.5 hours per day, 5 days a week, for at least 180 days. For low-income children, those for whom English is not spoken at home, or children who are significantly behind, more exposure to high-quality pre-k is critical to achieving learning gains on state tests. That is, more dosage of pre-k, particularly when it meets standards for quality described above, is more likely to close skills gaps than smaller doses.

This has been affirmed by experimental research showing that children (largely low-income and English learners) who were randomly assigned to attend extended programs out-performed their half-day counterparts in both reading and math after the pre-k year.[29] And, children in full-day programs had scores on reading and math tests that approached the national average, which was not the case for half-day attenders.[30] Even studies of large-scale national samples of kindergarten children demonstrate that, after controlling for a host of possible confounding factors, those children exposed to full-day pre-k outperform their peers.[31]

In terms of our exemplar programs, North Carolina offers full-day programs for 6-6.5 hours/day for between 180-205 days/year, while funding structures in Maryland and Oklahoma mean that both half and full-day programs are offered.* Of note, full-day enrollment in Oklahoma has jumped 82% since 2002, an increase that has occurred over time but reflects dedication to increasing time spent in pre-k.[32] The benefits of full-day pre-k are also suggested by results from Tulsa, where a significant number of students come from families who speak only Spanish. In Tulsa's pre-k, Hispanic children who attended full-day programs had significantly better scores than Hispanic children attending half-day programs.[33]

Together, the available data from a broad range of national, state, and local samples, support the conclusion that children at-risk for school failure (e.g., children in poverty, English learners) do best when offered the maximum amount of time in pre-k classrooms that have features of quality described earlier.

Adult-child Ratio and Teacher Aides

Adult-child ratios are distinct from class size limits, as adult-child ratios dictate not only a maximum number of students, but also a minimum number of adults that must be present at any given time. In preschool, the number of adults in the classroom is directly related to teachers' effectiveness in fostering students' learning gains.[34]

The adult-child ratio is the structural component of effective programs that is necessary to enable the more process-oriented element of effective teacher-student interaction to produce meaningful gains. This makes sense, as anyone who has seen an early childhood classroom in action can see the benefit of having at least two adults in the classroom at all times. The adult-child ratio is important for the safety of all children, but it also

* *Although half-day programs are still offered, Maryland's Bridge to Excellence in Public Schools Act significantly increased state funding to local school systems, which use their General Funds to provide prekindergarten for all eligible 4 year-old children whose parents seek to enroll them. Oklahoma uses a per-pupil rate to reimburse school districts for services based on the age of a child and the length of the program day.*

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ensures that teachers are able to engage in sophisticated interactions with children in the classroom.[35] High-quality programs require a ratio of 1:10 or better.[36] These ratios are particularly important for classrooms that have children who are learning English or have special needs.

Teacher Credentials and Wages

Despite the debate around whether a B.A. matters for children's outcomes, North Carolina, Maryland, and Oklahoma all require their pre-k teachers to have a B.A. These states also require an early learning credential, which prepares teachers to understand how to meet young children's needs in particular. Large-scale studies suggest that classroom quality and a teacher's level of education are related,[37] but more recent work has not been as clear.[38]

Despite mixed evidence, most of the effective state programs believe that teachers with BAs are best able to take advantage of professional development and be part of a culture of high expectations, and an early learning credential ensures that teachers are prepared in the issues that are most critical to young children's development.

In addition, competitive wages are important for maintaining a high-quality workforce. Teacher pay in effective programs must be set equal to or close to K-3 to prevent turnover. Both research and practice indicate that when pay between prekindergarten teachers and their K-8 counterparts reaches a 25% discrepancy, teachers are likely to leave early childhood education for higher paying jobs in K-8 positions.[39]

Using Data and Measurement to Drive Improvement

Effective programs view measurement as a key part of their success. Measurement occurs at multiple levels—by state level, by teacher, and by student. In nearly all states operating effective pre-k, some form of measurement is used to track children's and teachers' progress across the year. This information is used to ask how well the program is working and how policy might be tailored for improvements.

In classrooms, teachers also gauge children's progress regularly, measure children's learning frequently, and often use procedures tied to the specific curricula being implemented. For example, a teacher might informally evaluate children's vocabulary or number sense every week, targeting the skills she is teaching in the curricula for those areas. These data are used to guide teachers' instruction to help children meet learning goals. Simultaneously, teachers' practice and classroom quality is also tracked and targeted. This helps continuously tie teacher behaviors to children's outcomes.

Effective programs use data to understand what is working and what is not, and they reach out to teachers and students who need additional help to be successful. Although understanding gaps is a priority, programs make sure data is acted on to improve outcomes. They allow access to available data, which is studied, drives policy, and improves outcomes for children.

Political Leadership and Ongoing Support

In every instance in which effective, high-impact pre-k has been scaled up and maintained, political leadership has been viewed as essential. Support at the gubernatorial level has been most critical. When states have lost top-level political support (e.g., North Carolina in 2011), early learning funding has been cut or grew at a reduced rate. On the other hand, in states that have gubernatorial support, programs maintain effectiveness, and sometimes even expand, in spite of fiscal pressure.

In addition to support from the governor and senior political leaders, effective pre-k programs benefit from senior early learning personnel with vision, knowledge, and leadership skills that help to make sure program elements work together. These leaders: a) focus on integrating different program components; b) hold high expectations for performance and impact; c) hire and retain effective senior program leaders; d) communicate well with political leaders who provide funding and agency leaders with whom cooperation is essential. Many states have formed a "Children's Cabinet" to manage cross-agency coordination, strategy, and resources.

Elements of Effective Pre-K Programs	Definition
Focus on Quality: Teacher-Student Interactions	Observing, measuring, and training teachers on interactions that **(a)** are warm and supportive, **(b)** support classroom organization and management, and **(c)** focus on academic and linguistic instruction.
Curriculum and Standards	Research-based, developmentally appropriate curricula and materials for teachers to use that are in alignment with clear learning goals that prepare children for kindergarten and beyond.
Professional Development	Continuous feedback on teacher-child interactions with effective curricula. Helping teachers engage in interactions that matter most for children's learning while delivering the curriculum as intended.
Full-Day Enrollment	Full day programs (6 hours minimum) for children who are at risk for school failure.
Adult-Child Ratios	Maximum ratios of 1 teacher to every 10 students. Teacher-aides present in the classroom.
Credentials and Wages	B.A. and an Early Learning Credential; competitive wages to retain high-quality teachers.
Using Data and Measurement to Drive Instruction	Centralized data reporting systems. Frequent measurement of children's progress and teacher behaviors. Solid direct measurements of children's entry and exit skills.
Political Leadership and Support	A precondition to any successful statewide program; elected officials must provide policy and funding support to ensure long-term positive outcomes.

Texas Prekindergarten Programs

Having reviewed the hallmarks of effective public pre-k programs around the nation, we now turn to Texas. To get a feel for where Texas fits in relation to other programs across the country, it is important to have a grasp of the population that Texas public pre-k serves and the current funding structure. In the 1985-1986 school year, the state of Texas began funding public pre-k to prepare at-risk four-year-olds for kindergarten. To be considered eligible for public prekindergarten, a child must be at least 3 years of age and qualify through one or more of the following criteria: (a) educational disadvantage, determined by a student's eligibility for free or reduced lunch (b) English language learner status, (c) homelessness, (d) current or former foster child, or (e) child of an active military duty parent or a parent who was killed or injured while on active duty. Tuition-paying students can also attend public prekindergarten, although this must not interfere with serving students who are eligible.[40]

Currently, any school district that has 15 or more eligible pre-k children and adequate space must support a half-day program, which is funded through the Foundation School Program. If additional federal, state, or local funds are available, the district may expand its services from half-day (3 hours) to full-day (minimum of 7 hours) and/or include three-year-old children or those who do not qualify under eligibility requirements. Funds obtained through tuition paying students can also be used to finance full-day pre-k. In the 2012-2013 school year, regular statewide funding per-pupil for half-day pre-k in Texas was estimated to be $3,366.[41]

Some Texas school districts formerly received additional funding to expand programs to full-day or implement quality enhancements. Known as the Texas Early Start Grant, the program was initiated in 1999 and was administered by the Texas Education Agency (TEA). Early Start was last funded at its full amount in 2009, when the 81st Texas Legislature allocated approximately $212 million for the 2010-11 biennium. However, among other dramatic cuts to the public education budget, the 2011 Legislative Session resulted in a zeroing out of the Texas Early Start Grant, and all districts lost this funding for 2013 and 2014. Only $30 million was restored to pre-k by the 83rd Legislature in 2013, but those funds weren't allocated to school districts in the form of the former grant.

Demographic Information

Data collected from the 2012-2013 school year provides further information on the children served by public pre-k. In 2012-2013, there were 114,686 children in half-day programs (between 2-4 hours/day) and 112,395 children in full-day programs (4 or more hours/day)*, for a combined total of 3,232 different schools serving 227,081 children. Of these students, 65.2% were Latino/Hispanic, 14.97% were white, and 14.81% were black or African American, with the remaining students being American Indian or Alaskan Native, Asian, Native Hawaiian, or two or more races. Approximately 87% of children were economically disadvantaged, and 51% of students were male.[42]

Estimates of the percentage of eligible children being served by Texas public pre-k range from 85-90%. The Texas Education Agency calculated that in the 2010-2011 school year, Texas pre-k served approximately 28% of the total statewide population of three and four-year-olds and 90% of pre-k children who were

* *Note that the definition of full-day (7 hours) versus half-day (4 hours) programs previously cited is outlined by the Texas Education Agency in its documentation under Frequently Asked Questions. The agency adopts a different definition of half-day programs (2-4 hours/day) and full-day (more than 4 hours) when calculating the number of half- and full-day programs statewide. As such, the current estimates are likely to be an over-representation of the number of children involved in a true full-day program as outlined in the Texas Education Agency Frequently Asked Questions document. (see http://loving1.tea.state.tx.us/TEA.TpeirPortal. Web/Reports/PK_Public_Readinees_State.pdf and http://www.tea.state.tx.us/index2.aspx?id=2147495517&menu_id=2147483718 for additional details)*

eligible for services. This calculation was based upon students who were classified as limited English proficient or economically disadvantaged in their kindergarten year. Other estimates, however, indicate a 15% service gap based on kindergarten enrollment accounted for by prekindergarten enrollment. Importantly, there is significant variability in these numbers by county—for example, Fort Bend County had only enough slots to serve 60% of eligible children, whereas the availability of slots in Bell County equaled 119% of eligible children.[43]

Taking into account the demographic shifts occurring in Texas, demand for public pre-k is likely to increase. The population of children in Texas is expanding, and this growth will be accompanied by an increasing number of children living in poverty. In addition, from the period of 2010-2015, Latinos, who are more likely to be English language learners, were projected to account for 65% of the growth in the childhood population in Texas.[44] These data in Texas underscore the important role of public prekindergarten as the population of eligible children continues to expand.

Results From Texas Pre-K

So how does Texas' pre-k program measure up to the impacts for the three state programs described earlier? Because Texas programs are not required to report assessment data or demographic data at the pre-k level in a statewide system, it is difficult to evaluate impacts during the pre-k or kindergarten year. Thus, the effect of Texas pre-k has been measured by various academic and non-profit organizations rather than by the state.

Effects of Pre-Kindergarten on Long-term Academic Performance

The most rigorous evaluations of Texas pre-k come from two studies investigating the relation between public pre-k attendance and elementary school outcomes. Both studies compared third grade outcomes between eligible children who attended public prekindergarten versus those who did not.

Andrews, Jargowsky, & Kuhne (2012) used the Texas Schools Microdata Panel, which houses individual data for more than 10 million students enrolled in Texas public schools from 1990-2002. Because students' eligibility in the pre-k year was unknown, the study used information gathered in the kindergarten year (as measured by limited English proficiency or qualification for free and reduced lunch). Children who were not enrolled in Texas schools continuously until third grade were not included.[45]

After controlling for differences among districts, eligible children who attended public prekindergarten scored better on third grade Texas Assessment of Academic Skills (TAAS), were less likely to be retained, and were less likely to be in special education. The odds of being placed in special education by third grade for attenders were 13% lower than non-attenders. The odds of retention were 24% lower for those who attended public prekindergarten versus those who did not.[46] These results are consistent with other states' pre-k impact studies and cost-effectiveness arguments for pre-k that are based on analysis of special education and retention cost recoveries, all of which show a net positive return on investment of varying proportions.

The study further found that public pre-k attendance for children that were eligible based on economic disadvantage was associated with a 5% reduction of the achievement gap in reading and math. For children who were eligible due to English proficiency, the achievement gap in reading was closed by around 7%. For children who qualified based on both English proficiency and low-income status, there was an 8% reduction in the achievement gap in reading. Participation in public prekindergarten also improved test scores for children taking the state tests in Spanish; the effect of attending public prekindergarten on Spanish math scores was a 6% reduction in the achievement gap.[47]

A second evaluation extended the findings above by comparing the performance of eligible pre-k attenders versus non-attenders on the Texas Assessment of

Knowledge and Skills (TAKS), a state standardized test that replaced the TAAS and was designed to improve the test's measurement quality.[48] Results from this study were largely consistent with findings from the Andrews et al. (2012) study—pre-k attendance for eligible children was associated with a 4% reduction in the achievement gap on third grade reading and math scores. In general, there were greater differences for attenders versus non-attenders among children with higher levels of economic disadvantage and multiple eligibility criteria (i.e., limited English proficiency and economic disadvantage). With respect to differences within ethnic groups, the effect size of attending preschool for eligible Hispanic children was equivalent to a 7% reduction in the achievement gap in both reading and math.

The results from these two studies show that public pre-k attendance was related to better academic outcomes for children. Results for retention and special education were sizeable in the Andrews et al. (2012) study, while the effect size of public pre-k attendance on third grade standardized test scores is modest in both studies, especially compared to the 20% reductions in the achievement gap that effective programs have shown.

In summary, although the results for Texas pre-k benefits are promising and show that attendance in public preschool is associated with benefits for eligible children—in particular with respect to retention and special education—the overall effects on achievement remain modest. It is also important to put the results of the program in perspective—although the Texas pre-k program is large and well-established, the program is not considered high-quality or highly effective based on many of the basic benchmarks for quality noted earlier in this report. Thus, the results from these studies suggest that even under conditions that are less than ideal, the program is associated with modest gains for eligible children, findings that imply that the educational and economic returns on the Texas investment in pre-k can be strengthened—with dedicated focus on quality interactions and efforts to expand full-day access to quality programs, results are likely to be significantly more promising. Finally, it is important that private funding has supported this research—future state-level data systems will be critical for understanding the impact of pre-k statewide.

Effects on Kindergarten Readiness

In 2011, the organization Education Equals Economics (E3) surveyed central Texas kindergarten teachers to investigate whether children were ready for kindergarten. Teachers filled out information on a sample of representative Texas pre-k students using an assessment based on the Texas Pre-K Guidelines and the kindergarten essential knowledge and skills. They rated children across the domains of social-emotional development, language and communication, early literacy, and mathematics. A total of 1,140 kindergarten children from 61 classrooms in 10 districts participated in the study, although only 853 students with complete data were used in the analysis.

Teachers rated half (50%) of children in central Texas as ready for kindergarten. Girls were more likely to be ready for kindergarten than boys, and children from low-income households were less ready for kindergarten (40%) than children from homes that were not low income (62%). Children who attended any type of preschool program (54% ready) were more likely to be ready for kindergarten than children who had not attended preschool (38% ready). Although these comparisons are subject to a number of confounds, analyses suggested that students who had attended full-day prekindergarten were more ready in the domain of language and literacy than half-day students. And students who attended prekindergarten in a district with full-day prekindergarten and a low student-teacher ratio were more ready than students in a half-day program, a program with high student-teacher ratios, or both.[49] While more comprehensive statewide analysis of school readiness is needed, this work suggests both that many kindergarteners in Texas enter school unprepared and that attending pre-k, especially in a full-day program with low student-teacher ratios, was associated with children's school readiness as rated by their kindergarten teachers.

Do Features of Texas Pre-K Mirror Those of Other Effective State Programs?

A key question for Texas, if it is interested in strengthening the impact of its pre-k investment, or improving and expanding on existing programs, involves how the features of Texas pre-k stack up against what we know to be the key aspects of effective programs from other states described above.

Effective Teacher-Student Interactions

Whether effective teacher-child interactions are occurring in classrooms across Texas is largely unknown—there is no regular observation of teachers in pre-k, nor is there a requirement for programs to report or measure teachers' classroom interactions.

At present, the measurement of pre-k quality is done by external rating agencies, such as the National Association for the Education of Young Children (NAEYC), as a function of accreditation. In 2010, only 12% of pre-k programs participated in accreditors' rating systems.[50] Plus, participation is completely voluntary and district-funded. Although programs can apply for funds that support national certification or accreditation by a national organization, this is done mostly by private providers. And, most of the quality indicators used by accreditors are not clearly linked to student learning and do not include assessments of teacher-student interaction.

Thus, although effective state programs make measuring and focusing on high-quality teacher-student interactions a priority, little is known about these interactions in Texas pre-k classrooms.

Pre-K Learning Standards and Curriculum

In Texas there is no set of required Texas Essential Knowledge and Skills (TEKS) at the pre-k level, as the Texas Prekindergarten Guidelines that were approved in 2008 are optional. Like effective programs' standards, however, the Texas pre-k guidelines lay out achievable skills and concepts for children to master for kindergarten.[51] These guidelines are connected to K-3 standards and span 10 areas including: (a) social-emotional development, (b) language and communication, (c) reading, (d) writing, (e) mathematics, (f) science, (g) social studies, (h) fine arts, (i) physical development, and (j) technology.[52] If districts wish to use their textbook funds to purchase curricula, they must choose from an approved list of seven programs that the state has pre-selected.

However, the lack of clear policies with respect to curricula and standards means that many classrooms may not be implementing the pre-k guidelines or a research-based curriculum, making it challenging to ensure that children are being prepared for kindergarten and beyond.

Full-day and Half-day Enrollment

In 2012-2013, over half of children enrolled in Texas pre-k programs were receiving half-day services.[53] Texas does not currently collect data on the number of hours per day or hours per year that students participate in pre-k, leading to wide variability across programs and data collection. All eligible children served by Texas pre-k are from at-risk families and so are likely to benefit from increased time in pre-k. However, because the state is only required to fund half-day programs, there are many children who are not receiving sufficient time in pre-k to truly benefit and sustain gains. Unified funding for full-day programs targeted to at-risk populations—rather than reliance on financial input from other sources—is particularly important in Texas, where there is an increasing portion of children who are at-risk for school failure.

Adult-child Ratios

In Texas, there are no rules that address class size or adult-child ratio (also known as student-teacher ratio), making Texas one of only four states nationally with no class size limit for pre-k and one of only two with no adult-child ratio.[54] Texas law does not require a teacher aide be present in a pre-k classroom, although programs are encouraged to maintain adult-child ratios that do not exceed 1:22.[55] This means that class sizes are likely to exceed numbers—perhaps by more than double—that are optimal for children's learning. Failing to specify adult-child ratios that are equal to or better than 1:10 (or 2:20) may jeopardize the beneficial effects that high-quality programs can provide.

Teacher Credentials and Wages

In Texas, teachers are required to hold Bachelor's degrees, complete an Educator Preparation Program, and pass appropriate certification exams.[56] However, educator training and certification programs are not early childhood specific. For teacher-aides and teaching assistants, districts are responsible for determining the training and credentials required.[57] Thus, like exemplars, teachers in Texas are required to hold Bachelor's degrees, but the training they receive is not necessarily tailored towards early childhood education. This means that teachers may not be receiving support and guidance around what issues drive young children's success—most critically, effective teacher-child interactions.

Although pre-k teachers in Texas are paid at the same rate as their colleagues who teach school-age children, according to data from the bureau of labor statistics, in 2012, Texas prekindergarten teachers on average made $33,010, whereas their K-8 colleagues make an average of $49,520—a discrepancy of close to 33%.[58] Given that wage structures are equivalent for pre-k and K-8 teachers, it may be that these differences are a product of the number of half-day programs and the fact that K-8 teachers are likely to have been in the public school system for more years. Studies have verified that early childhood turnover his high in Texas.[59] Although formal evaluations have not assessed public pre-k teacher turnover in particular, these salary discrepancies imply that staying in early childhood education is less competitive. It will be important for Texas to gather information on teacher-turnover and its reasons to ensure that high-quality teachers stay in the profession.

Professional Development

Pre-k teachers in Texas are required to participate in 150 hours across 5 years of in-service training.[60] However, there is no requirement that pre-k teachers participate in training or professional development that is specific to early childhood, or to effective curricula, interactions, or standards, although some regional education service centers (ESCs) provide professional development related to early childhood topics.[61]

Thus, unlike exemplar programs that frame professional development as a continuous cycle of proven coaching and improvement programs tailored towards early childhood, Texas professional development is fragmented and may not offer teachers research-based training that is most relevant for young children's needs. Given that proven professional development models have been shown to be particularly beneficial for novice teachers, Texas stands to gain from these models. The state has a relatively high percentage of novice teachers—33% have five years of experience or fewer (compared to 26% nationally), and 55% have 10 years of experience or fewer (as compared to 42% nationally).[62]

Measurement and Data

Currently, Texas does not have uniform measurements and data collection systems in place at the pre-k level for gathering information on either children's learning or teachers' skills in the classroom. Even when data are collected, the process is fragmented and not tied to a decision-making process. In 2007-2008, the state used the Texas School Ready Certification System (SCRS), a quality rating system that was implemented by public

pre-k programs that participated in the *Texas School Ready!* initiative and the Prekindergarten Early Start grants. In 2011-2012, SCRS was changed and renamed the Kindergarten Readiness System (KRS), which gathered demographic and descriptive information from pre-k programs (e.g., children enrolled, teacher-student ratios). However, funds were not appropriated for the continuation of KRS, and the Texas Education Agency decided to move the collection of data in-house.[63]

The Texas Student Data System (TSDS) was launched in Summer 2014. A central location will house student and program-level data spanning pre-k through 12th grade and will replace KRS. This effort will require kindergarten through second grade classrooms to report demographic and reading assessment data. Districts with pre-k programs have the option to participate and report on the demographics of children enrolled, the number of full- and half-day programs, and their funding sources. In other words, no mandatory data collection is required under this provision at the pre-k level.[64]

The lack of measurement and data collection in Texas makes it hard to know if pre-k is working. No pre-entry or final direct measurements of children's skills are required, making it hard for teachers, parents, and other stakeholders to understand how children are progressing across the pre-k year. Moreover, formative evaluations, which generally stem from solid beginning and end of year measurement of children's skills, are critical to ensuring and tracking children's process. Again, because clear learning standards and measurements of skills are not being systematically used, teachers are unlikely to track their students' progress in a standardized way. And, measures of teacher-student interactions are not currently in place uniformly, making it hard to determine which classrooms are engaging in effective practices and which classrooms may need additional help.

In addition, the Texas Education Agency is currently entirely lacking in sufficient staff to provide effective oversight and management for a high-quality statewide pre-k program. It was recently noted that, "No state with a pre-k program has less state-level capacity (in terms of absolute numbers of staff) to monitor and oversee pre-k than does Texas – even states as small as Delaware."[65]

Taken together, this lack of data makes accountability nearly impossible—Texas needs a solid plan for gathering demographic and program-level information, measuring children's skills during the pre-k year, and measuring teacher-student interactions to make targeted and financially sound decisions to improve the state's public pre-k program.

Political Landscape in Texas

Numerous Texas non-profit organizations, business officials across the state, and community leaders in cities such as San Antonio, Austin, Houston and Dallas continue to advocate for expansion of high-quality pre-k for the state's at-risk children.

However, the reality is that Texas has a thin funding source for its programs, and early learning funds have been significantly reduced since 2011. There are also very few statewide requirements for programs, making it difficult to efficiently lead and make changes at a systems-level.

Having leaders at the state-level that advocate for resources dedicated to creating high-quality pre-k, in particular support from the Governor, Lt. Governor, Commissioner of Education and legislators, will be critical for improving Texas' educational standing in the future.

Summary: How does Texas Pre-K stack up?

Texas currently supports half-day public prekindergarten programs for at-risk four-year-olds to increase their chances of future academic success. Estimates of the number of eligible children being served by Texas pre-k across the state is high—85-90%, although this varies across the state.[66] The population changes in Texas mean that there will be more young children in poverty and an increasing percentage of young children with limited English proficiency. This drives home the importance of expanding high-quality services across the state to improve educational outcomes for eligible children.

The research shows that successful pre-k programs have common features that have led to meaningful gains, but many of these elements are not in place in Texas—from curricula and standards, to adult-child ratios, to workforce development, to full-day services for at-risk students, to measurement, to focusing on effective teacher-student interactions. Moreover, the lack of unity in policies and data reporting makes it difficult to understand the current state of public pre-k programs.*

Although data in Texas show that the impact of public prekindergarten in Texas has beneficial impacts, private research has been responsible for spearheading these endeavors. E3 (2012) has shown that many children arrive unready for kindergarten, especially low-income children, driving home the importance of effective public pre-k programs. Third-grade test scores, retention rates, and special education placements all suggest that attending pre-k is associated with later academic benefits. Thus, while relatively limited spending has led to sustained gains through third grade, there is ample room to maximize the benefits of attending public pre-k. Using lessons from the research base and programs that have achieved gains, Texas pre-k can deliver meaningful impacts that benefit children and the state. The following section offers concrete steps for Texas to take.

Elements of Effective Pre-K Programs	How Does Texas Stack Up? An Evaluation of Public School Pre-K Statewide Requirements and Funding
Focus on Quality: Teacher-Student Interactions	No
Curriculum and Standards	Partial*
Professional Development	No
Full-Day Enrollment	No
Adult-Child Ratios	No
Credentials and Wages	Partial**
Using Data and Measurement to Drive Instruction	No
Political Leadership and Support	Partial***

* *While Texas has pre-k guidelines, they are voluntary, which means there is little uniformity with respect to quality across the state.*

** *Texas requires a B.A. and regular PK-6 credentialing; no Early Learning Credential required. Wages are on same local pay scale as K-6 teachers.*

*** *The Texas Legislature initially supported the creation and growth of pre-k, but defunded the pre-k grant in 2011 and has not focused on quality or increased funding in recent years.*

* *These conclusions were recently echoed by Dr. Stephen Barnett, director for the National Institute of Early Education Research in his testimony during the Texas School Finance System case. His conclusions reaffirm the need for Texas to reevaluate pre-k programming across a variety of areas, including teacher-child ratios, full-day status, quality, and measurement. His conclusions can be found on here: http://s3.amazonaws.com/static.texastribune.org/media/documents/DietzFinalJudgment.pdf (pp. 152-154)*

Recommendations

In order to create greater alignment between the research base and Texas pre-k policy and practice, we would recommend state legislators consider the following policy changes to improve the quality of the Texas pre-k program:

Fund High-quality, Targeted Full-day Pre-K

Providing full-day programs for all currently eligible pre-k students is a key aspect of improving the Texas pre-k opportunity. Research shows that children with risk factors benefit from more time in pre-k, and more time in a high-quality pre-k environment will lead to greater and more sustained gains for these students. Multiple evaluations have shown that the benefits of high-quality pre-k outweigh the costs. Providing the funding to enable districts to offer high-quality, full-day pre-k will produce dividends for the state in the years ahead.

Implement Structural Quality Elements to Improve Pre-K Quality

In order for Texas to have a high-quality pre-k program that will make meaningful impacts on school readiness and student achievement, policymakers should consider putting in place key, proven elements of a quality program, including:

- **Required early learning standards and proven curricula.** The state should formally adopt the Texas Prekindergarten Guidelines and provide a list of curricula that covers literacy, language, math, and self-regulation in alignment with these standards. It will be critical for these programs to be drawn from the research. In addition, parallel and frequent measures of children's progress towards curricular goals and guidelines should be a critical component of the adoption process. The result would be a state-approved "menu" of proven effective tools for classrooms and corresponding developmentally appropriate measures that track children's skills upon pre-k entry, across the year, and at the end of pre-k.
- **Require targeted pre-k specific professional development.** Professional development for teachers and front-line staff should be a priority, and must be targeted and focused on skill development and feedback to early childhood teachers. The state should require that a specified number of professional development hours be dedicated to early childhood-specific knowledge and skills development, and that a minimum number of professional development hours involve clinical practice and coaching.

  This programming should be aligned to focus on high-quality teacher-student interactions and training in effective use of curricular tools. Engaging in cycles of continuous, ongoing professional development (i.e., coaching, in-house supports) to focus on teacher behaviors and practices that are shown to matter most for young children will ensure that dollars are well-spent. Using professional development models that have demonstrated clear effectiveness should drive decisions around what tools to adopt.
- **Require effective adult-child ratios.** Adult-child ratios should be capped at levels that consistently relate to children's outcomes in pre-k. Research suggests that adult-child ratios as close to 1:10 as possible are most beneficial for children's learning goals and needs.

Require Uniform Measurement, Data Collection and Oversight to Ensure Quality

Without providing the staffing, required data collection and measurement necessary, Texas cannot know whether it is making progress towards a high-quality pre-k program that contributes meaningfully to sustained student outcomes. Key elements include:

- **Require pre-k programs to participate in uniform measurement and data collection under the Texas Student Data System.** Currently, this participation is optional for pre-k providers. The TSDS should collect all relevant structural information, such as demographic information, hours in learning day/hours per year, class-size, and funding sources,
- **Require districts to collect and report data regarding children's learning and teachers' skills.** Data regarding structural elements is not enough, and knowing about measurements of children's learning and observations of teacher-student interactions is crucial to understanding the efficacy of programs. Districts should be able to choose from a list of approved monitoring programs, and the resulting data should be housed in a central warehouse with reports and feedback to districts and state leaders. Collecting this information will be a key component of setting goals, measuring progress, and ensuring eligible children receive high-quality programming.
- **Provide sufficient staff to ensure effective program management and oversight.** Sufficient staff at the Texas Education Agency will be important for making sure that policies are implemented effectively and in concert. This will ensure that increased services expand with high quality services. The formation of an early advisory council within TEA would ensure that resources are used efficiently and implemented in concert. Using the research to drive effective policies, and using what has worked in other states' high quality programs, will be an important part of the council's role.

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