

Effects of Preschool Programs

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Executive Summary

This report identifies research-based benefits of preschool education through a literature review and then provides a data analysis of Portland Public School's preschool programs.

In terms of research-based benefits of preschool education, these benefits include academic gains and future school success, especially for disadvantaged students. Several studies show sustained academic gains through third grade. Additionally, the report highlights social-emotional benefits of preschool on early learners, including a reduction in aggressive behavior and future criminal behavior. The report also identifies the characteristics of high-quality preschool programs, including social-emotional and physical health, building strong interpersonal relationships, small class size, and professional development for teachers. Programs that balance cognitive, mental, and physical health, promote reflective teaching, and target high-needs students are additional qualities that improve preschool education.

Following a review of the literature, the report provides a data analysis of Portland Public School's preschool program. Data from a variety of different PPS preschools was analyzed, including participation rates, kindergarten DIBELS Letter Naming Fluency (LNF) assessment, and third grade OAKS scores. Participation rates showed that Head Start has the largest proportion of students at 68%. Results from the data analysis of both DIBELS and OAKS scores need to be interpreted cautiously due sample size and poverty levels.

Effects of Preschool Programs

Current research strongly supports the benefits of preschool education for students (Bowman, Donovan, Burns & National Academy of Sciences, 2001). The benefits of early childhood education include future academic success and social and emotional knowledge and abilities (Fantuzzo et al., 2007; Merrell & Gueldner, 2010). National dialogue in the United States has begun to focus on funding pre-K education in public schools, and since 2013, over 30 states have expanded their access to preschool (Kamenetz, 2014). The Education Commission of the States (Zinth, Christie, & Education Commission of the States, 2012) released a report that called for a smoother transition for students from “P” grades to early grades and claimed that the mindset of the country needs to shift from believing kindergarten is the first grade of school to believing pre-K is the beginning of formal schooling. The report stated challenges in valuing pre-K education, including funding, program quality, and instructional leadership. However, the report also highlighted positive signs of shifting thoughts on pre-K education, including numerous states allocating funding for early childhood education and creating initiatives focused on program and leadership development.

Academic Gains

Although preschool students are young, early education has been shown to greatly impact future school success. A recent meta-analysis of 84 preschool programs across the United States revealed several benefits to this form of early childhood education (Brooks-Gunn et al., 2013). The analysis found that children who attended one year of preschool gained about a third of a year in language, reading, and math skills above and beyond the learning that occurred for those without access to preschool. Students who attended preschool for two years had further gains, most notably in disadvantaged students. Cities such as Tulsa and Boston showed between one

half to one full year of additional learning in students who had attended preschool. Previous analyses of preschool programs were dominated by programs serving high-poverty students; however, results from the Brooks-Bunn et al. (2013) analysis showed gains in students from both high and low-income families.

Further, a recent study found that two preschool programs in North Carolina reduced the likelihood of third-grade special education placements by 32% (Pals & Jameson, 2015). This study also highlighted the cost-savings to school districts due to this decrease in special education services, which cost districts twice as much per student than regular education services. Another recent study analyzing student data from Miami's publicly funded preschool program found long-lasting academic gains through the third grade (Ansari & Lopez, 2015). Ansari and Lopez analyzed academic data from 11,894 Latino students and found social and English language skills and other pre-kindergarten skills, such as knowing letters and numbers to all be above average. Researchers found that 9 in 10 of low-income Latino students who attended pre-school passed their third grade reading comprehension tests and earned an average GPA grade of a B.

Another example of the impact of pre-K education on students comes from the results of a New Jersey Supreme Court Case, *Abbott v. Burke*, which determined the state was not enabling all students to meet education standards. New Jersey then established a high-quality preschool program in 31 of the lowest-income districts in the state (Doggett & Wat, 2010). Teachers with a pre-K – third grade endorsement were hired, and an intensive literacy program was implemented. Researchers followed students through 2nd grade and found that students showed significant improvements in early language, literacy, and math skills at kindergarten entry; students performed significantly better in math, language comprehension, and vocabulary skills through

2nd grade; and students were 30% less likely to repeat a grade after one year of enrollment in the *Abbott* program and 50% less likely after two pre-K years.

A study regarding Tennessee's Voluntary Pre-K Program (TN-VPK) revealed different results regarding the sustainability of academic gains for preschool students (Lipsey & Farran, 2015). The researchers in this study found greater academic gains in kindergarten readiness for students who attended pre-K compared to those who did not attend, yet they found that academic scores in comparison with non-attending pre-K peers leveled out by the end of kindergarten. These results contradict results found in several other studies regarding the long-term academic benefits of preschool programs.

Student-teacher relationships matter. It appears that these gains vary based on student-teacher relationships. Howes et al. (2008) examined the impacts of state-funded preschool programs in 11 states ($n = 2,800$ randomly selected students) intended to prepare students for kindergarten. They found the highest gains were achieved classes where teachers had closer relationships with students, rather than structural program dynamics, including student-teacher ratio. Greater gains were seen when teachers “encouraged communication and reasoning [in students] while being sensitive and responsive in her or his interactions with children, and teachers who constructed an atmosphere of respect, encouragement, and enthusiasm for learning” (p. 45). Children in these classes showed higher level thinking skills and greater proficiency in language and literacy, such as verbal responses to problems. Math gains also were related to oral language development, in that students needed to have the oral language skills to verbalize problem solving (Howes et al., 2008).

Social-Emotional Gains

In addition to academic improvements, preschool programs have also shown to improve students' social and emotional skills, which impact future life success. A meta-analysis (Brooks-Gunn et al., 2013) showed the benefits of the Head Start program for three-year-olds. "At the end of first grade, children with special needs who had attended Head Start as three-year-olds showed stronger gains in math and social-emotional development than children with special needs who had not attended Head Start" (p. 2). An additional longitudinal study analyzed the results of the Perry Program, a preschool intervention program that targets disadvantaged youth (Heckman, Pinto, & Savelyev, 2012). It was found that the Perry Program did improve later life outcomes, successfully reducing future criminal behavior. The Perry Program also impacted social-emotional behavior, showing a reduction in externalizing behaviors, such as aggressiveness, in elementary school (Brooks-Gunn et al., 2013).

Characteristics of High-Quality Preschool Programs

Research has discovered several characteristics of high-quality preschool programs. For example, it appears that high quality preschools provide stimulating teacher–student relationships, including: "interactions that help children acquire new knowledge and skills, provide input to children, elicit verbal responses and reactions from them, and foster engagement in and enjoyment of learning" (Brooks-Gunn et al., 2013, p. 1). This supports the findings discussed previously. Additionally, preschools that had teacher support through coaching and mentoring were categorized as higher quality. Bowman et al. (2001) further identified several key characteristics of quality preschool programs:

1. Cognitive, social-emotional (mental health), and physical development are complementary, mutually supportive areas of growth all requiring active attention

in the preschool years.

2. Responsive interpersonal relationships with teachers nurture young children's dispositions to learn and their emerging abilities.
3. Both smaller class size and reduced adult-child ratios are correlated with greater program effects.
4. While no single curriculum or pedagogical approach can be identified as best, children who attend well-planned, high-quality early childhood programs in which curriculum aims are specified and integrated across domains tend to learn more and are better prepared to master the complex demands of formal schooling.
5. Young children who are living in circumstances that place them at greater risk of school failure are much more likely to succeed in school if they attend well-planned, high-quality early childhood programs.
6. The professional development of teachers, including teachers' education and years of training, is related to the quality of early childhood programs, and program quality predicts development outcomes for children.
7. Programs found to be highly effective in the United States and exemplary programs abroad provide well-trained teachers who are reflective, respond to student needs, and revise teaching. (p. 7)

Methods

Portland Public Schools (PPS) implements several high-quality preschool programs, and wished to investigate the effects these programs were having on students. PPS therefore provided researchers with data on PPS preschool programs from the years 2008-2015. Data included student enrollment numbers, DIBELS Letter Naming Fluency (LNF) score results, and student

demographics. The data also included third grade OAKS reading and math scores in order to further analyze the effects of preschool programs on student achievement.

The limitations of the data include the inability to compare students who participated in a pre-K program with those who did not participate in a pre-K program. It is recommended that some sort of a system or ‘flag’ be utilized in the dataset to better understand who attends PPS pre-K, who attends non-PPS pre-K, and who does not attend pre-K at all. Because of this, the researchers recommend caution when analyzing the results of this study. Additionally, apparent mistakes were found in the data: notably, Bridlemile, ESL Newcomer Site, and Llewellyn Elementary School each only served one student in the past seven years, which seems implausible. Results from the data analysis of both DIBELS and OAKS scores need to be interpreted cautiously due to small sample sizes and the fact that socioeconomic status was not controlled for.

Results

The data were analyzed in three different ways. First, the data were analyzed by participation rates. This analysis sought to answer the following research question: Which programs were serving the greatest number of students and by which year? Second, the data were analyzed by the beginning of the year kindergarten DIBELS LNF assessment score. This analysis sought to answer the following research question: Were students who participated in certain preschool experiences more “kindergarten ready,” as measured by this LNF score? Third, the data were analyzed by third grade OAKS reading and math scores. This analysis sought to answer the following research question: Did students who participated in certain preschool experiences have higher OAKS reading and math scores?

Participation Rates

Table 1 shows the distribution of the 6,371 students who participated in a PPS preschool program during the seven school years between 2008 and 2015. It appears that Head Start Early Childhood served the largest proportion of students: 68% of students participating in PPS preschool programs participated in Head Start's program. Seven programs served over 100 students in the past seven years, these include: 1) Head Start (68%), 2) Special Education Kindergarten Transition (10%), 3) Richmond Elementary School (4%), 4) Woodlawn PK-8 (3%), 5) Chief Joseph E.S. (2%), 6) Faubion PK-8 (2%), and 7) Beach PK-5 (2%). Of these, Chief Joseph E.S. and Beach PK-5 no longer appear to be serving preschoolers. The last two years have seen the largest numbers of preschool participants, at 1,147 and 1,143 in 2013-14 and 2014-15, respectively.

Table 1

Distribution of Students by Program and Year in Preschool Programs

Preschool Program	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Totals
Head Start Early Childhood	253	620	701	710	702	654	708	4,348
Beach PK-5		40	35	11	18			104
Boise-Eliot/Humboldt PK-5			16	17				33
Boise-Eliot/Humboldt PK-8					18	18		36
Bridlemile E.S.					1			1
Chief Joseph E.S.		44	41	37				122
Clarendon Regional Early Learning Center						15		15
E.S.L. Newcomer Site		1						1
Faubion PK-8		19	18	19	20	19	20	115
Humboldt PK-5		18	19	19				56
King PK-5		31	21	19	17			88
King PK-8						18	17	35
Llewellyn E.S.						1		1
Morrison Hand in Hand	5	11	7	8	14	13	5	63
Ockley Green School K-5				20				20
Ramona Early Learners Academy				21	8	10	8	47
Richmond E.S.	13	40	36	49	51	52	41	282
Rosa Parks E.S.		21	18	16	20	15		90
Sabin PK-5		21	20	17				58
Special Ed KG Transition						315	326	641
Vernon PK-5		16	21	20				57
Woodlawn PK-8		31	35	37	20	17	18	158
Year Totals	271	913	988	1,020	889	1,147	1,143	6,371

Letter Naming Fluency

DIBELS Letter Naming Fluency (LNF) is one of the assessments administered to incoming kindergarteners in PPS. LNF is a standardized, individually administered test designed to provide a measure of risk. Students are provided with a page of both upper- and lower-case letters arranged in a random order and are asked to name as many letters as possible within one minute. Letter naming has been found to be highly predictive of later reading success, and researchers believed that it would provide indication of kindergarten readiness, an indicator of attending a high-quality preschool program. Table 2 shows the means and standard deviations of the first DIBELS LNF assessment completed after the preschool experience by gender. The fall benchmark for kindergarten students is 11 letters named, and many of the students met this benchmark. Although females appeared to outperform males on LNF, this difference was not statistically significant ($p = .17$).

Table 2

First DIBELS Letter Naming Frequency Assessment after Preschool Experiences by Gender

Gender	<i>N</i>	Mean	<i>SD</i>
Female	1,421	25.32	19.19
Male	1,412	24.33	20.14

Table 3 further disaggregates these first DIBELS LNF assessment scores by preschool program. The table is organized by average score following completion of the program. With this in mind, one can see that students who attended the preschool programs at Beach, Vernon, Richmond, Ramona, and Chief Joseph had the highest LNF scores at the beginning of kindergarten. Additionally, the table indicates the percent of students meeting benchmark at each school. A school such as Faubion has a lower mean score (i.e., 24.98) than Humboldt (i.e., 30.45) but a higher percentage of students meeting benchmark (i.e., 84% compared to 80%).

These data must be interpreted cautiously, however, due to the fact that poverty is a varying issue for these schools; these data are noted in the percent Free and Reduced Lunch (i.e., a measure commonly used to represent socioeconomic status) column.

Table 3

First DIBELS Letter Naming Frequency Assessment after Preschool Experiences by Program

Preschool Program	% FRL	<i>n</i>	Mean	<i>SD</i>	Percent Meeting Benchmark
Rosa Parks E.S.	95%+	76	20.00	16.83	62%
Woodlawn PK-8	84%	107	21.40	15.72	70%
King PK-8	92%	17	22.76	14.18	71%
Head Start Early Childhood Ed	-	1,937	22.88	19.31	66%
King PK-5	92%	77	23.27	18.48	69%
Faubion PK-8	77%	91	24.98	13.63	84%
Special Ed KG Transition	-	170	26.30	22.22	66%
Humboldt PK-5	-	40	30.45	20.03	80%
Beach PK-5	58%	26	34.65	17.11	92%
Vernon PK-5	65%	49	36.41	22.48	88%
Richmond E.S.	13%	99	39.78	16.76	95%
Ramona Early Learners Academy	-	29	40.62	19.72	93%
Chief Joseph E.S.	51%	39	46.15	18.11	97%

Note. FRL stands for Free and Reduced Lunch.

Table 4 disaggregates these data by ethnicity. Data were coded in this analysis, as it was in the dataset to maintain the largest potential differentiation of the data. Future rounds of data analysis may combine the data to create a “Multiple Ethnicities” category instead of the specificity noted here. Again, these are organized from smallest to largest mean score of LNF. One can see that there are disparities by ethnicity: White and Asian students performed highest on the LNF task.

Table 4

First DIBELS Letter Naming Frequency Assessment after Preschool Experiences by Ethnicity

	<i>n</i>	Mean	<i>SD</i>
White/Hispanic	520	17.62	17.48
Native American/Hispanic	214	17.74	18.22
Black/Hispanic	59	21.19	19.84
Asian/Hispanic	12	21.83	17.60
Pacific Islander	54	23.72	16.67
Black	733	24.11	18.06
Pacific Islander/Hispanic	12	25.42	16.17
Native American	63	26.43	21.00
White	773	29.50	20.43
Asian	392	30.95	20.44

OAKS Reading and Math Scores

Analysis of the effects of participating in these preschool programs was also measured through the OAKS reading and math scores; however, the sample sizes for this particular analysis were quite small. Only students who were in third grade in the 2013-14 school year (i.e., had attended kindergarten in 2010-11 and preschool in 2008-09 and/or 2009-10) could be

included in this analysis. Although those students who were in third grade in 2014-15 were also included in the above analysis, because of the switch to Smarter Balanced in this year these data could not be included. The Smarter Balanced data were also not available at the time of this analysis. Table 4 shows the mean OAKS reading scores by program and the percent of students meeting the grade level standard. These results are again sorted from smallest to largest mean score; note that the percent meeting standard may be higher in schools that have a lower mean, such as Woodlawn. Again, these scores must be interpreted cautiously both due to sample size and due to poverty levels. Because of the small sample sizes, these data were not disaggregated further.

Table 4

Third Grade OAKS Reading Scores by Program

	% FRL	N	Mean	SD	Percent Meeting Standard (211+)
Rosa Parks E.S.	95%+	9	201.11	10.11	33%
Head Start Early Childhood Ed	-	255	210.78	11.85	70%
Faubion PK-8	77%	14	214.36	9.22	86%
Vernon PK-5	65%	5	216.20	14.27	80%
Beach PK-5	58%	27	216.44	14.43	78%
Woodlawn PK-8	84%	16	217.69	6.44	94%
King PK-5	92%	17	218.94	14.96	88%
Chief Joseph E.S.	51%	26	218.96	9.89	92%
Humboldt PK-5	-	9	219.67	15.36	89%
Richmond E.S.	13%	26	226.15	8.38	100%
Sabin PK-5	35%	17	230.59	9.74	100%

Note. FRL stands for Free and Reduced Lunch.

Table 5 shows the mean OAKS math scores by program and the percent meeting standard. These results are again sorted from smallest to largest mean score. Again, these scores

must be interpreted cautiously both due to sample size and due to poverty levels. Because of the small sample sizes, this data set was not disaggregated further.

Table 5

Third Grade OAKS Math Scores by Program

	% FRL	<i>N</i>	Mean	<i>SD</i>	Percent Meeting Standard (212+)
Rosa Parks E.S.	95%+	10	203.20	13.60	40%
Head Start Early Childhood Ed	-	239	209.93	12.07	64%
Faubion PK-8	77%	14	210.86	7.79	71%
Humboldt PK-5	-	8	213.38	14.10	75%
King PK-5	92%	14	214.50	12.84	86%
Chief Joseph E.S.	51%	20	215.75	8.16	90%
Beach PK-5	58%	20	215.95	11.95	85%
Woodlawn PK-8	84%	10	221.50	8.32	90%
Sabin PK-5	35%	18	222.00	6.39	100%
Richmond E.S.	13%	24	222.54	10.67	96%
Vernon PK-5	65%	6	223.83	11.92	100%

Note. FRL stands for Free and Reduced Lunch.

Summary

This first analysis sought to understand the effects of the different PPS pre-K programs. Because it was not possible to truly identify which students had attended non-PPS pre-K and which students had not received pre-K at all, it was not possible to conduct a comparison analysis. Future research should strive to better identify these students so this type of analysis can be conducted. It does appear that majority of students who attended a PPS pre-K program were, “kindergarten ready” and received passing scores on the OAKS reading and math. In fact, for all three assessments, the average scores were largely passing or meeting benchmark.

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