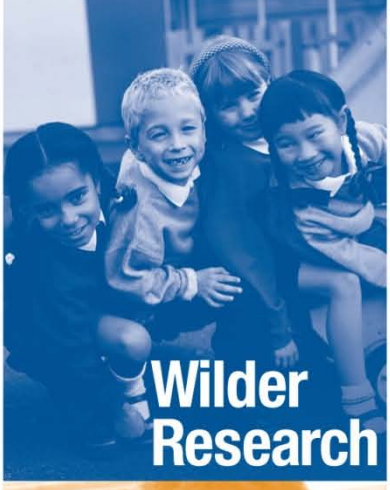

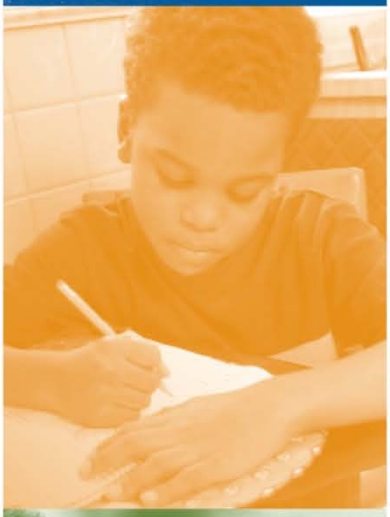

Project Early Kindergarten evaluation

Results through 2009-10 of a Saint Paul Public Schools initiative

NOVEMBER 2010

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November 2010

Prepared by:
Jennifer Maxfield, Edith Gozali-Lee, and Dan Mueller

Wilder Research
451 Lexington Parkway North
Saint Paul, Minnesota 55104
651-280-2700
www.wilderresearch.org

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Figures

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The PEK evaluation is led by Dan Mueller and Edith Gozali-Lee of Wilder Research. The following Wilder Research employees helped in collecting, processing, and analyzing data, and producing this report:

Mark Anton
Tanya Belanger
Ellen Bracken
Jackie Campeau
Phil Cooper
Marilyn Conrad
Paul Devereaux
Diane Elwood
Janell Felker
Louann Graham
Nancy Hartzler
Choua Her
Muneer Karcher-Ramos
Patsy Lee
Margaree Levy
Alicia Matos
Ryan McArdle
Caryn Mohr
Megan Murphy
Angelica Roberts
Miguel Salazar
Crystal Schmierer
Emily Sjostrom
Linda Sjostrom
Shelley Slominski
Andrea Sollie
Abby Struck
Dan Swanson
Mary Thoma
Brittney Wagner

Executive summary

The Saint Paul Public Schools' Project Early Kindergarten program aims to improve the school readiness of Saint Paul children. The program offers a rigorous academic approach and targets children who are English Language Learners, come from low-income families, or need Special Education services. Ultimately, the program intends to help close Saint Paul's achievement gap.

The program began in 10 Saint Paul schools in fall 2005, and expanded to community child care settings a year later. Project Early Kindergarten (PEK) has since become the model for pre-kindergarten programs district-wide and is now titled the Saint Paul Public Schools' Pre-Kindergarten Program. As of fall 2010, 28 district elementary schools, 9 child care centers, and 13 family child care homes offer pre-kindergarten programs following the PEK approach. School sites offer the program to 4-year-olds, and child care sites to 2½- to 4-year-olds.

PEK aligns pre-kindergarten education with the district's K-12 curriculum model, the Project for Academic Excellence. The model emphasizes standards-based education and extensive professional development. With sensitivity to young children's developmental needs, PEK extends this model to early education, bringing children's preschool experience into alignment with the educational experience they will have in later years.

A core component of PEK is the inclusion of an ongoing evaluation that can be used to inform programming.

Report contents

Wilder Research's fall 2010 report serves as an evaluation update and focuses on new results from the 2009-10 school year. For details about previous years' results, the reader is encouraged to consult last year's report (Schultz, Gozali-Lee, & Mueller, 2009). This executive summary combines new results with previous findings to provide a comprehensive summary.

Method

PEK participates in a rigorous, independent evaluation conducted by Wilder Research. Children are tested over time and in developmentally appropriate ways. Evaluators compare children's academic and social skills in kindergarten and early elementary years to comparison groups of peers who did not participate in PEK to estimate program impact. As of summer 2010, data are available for three cohorts of PEK school children and for four cohorts of 4-year-olds who participated in the child care component.

School results and implications

Results indicated that PEK participants had a substantial advantage in academic and social skills over classmates upon kindergarten entry. This advantage tended to narrow later on, and may fade out by third grade based on results for the first PEK cohort.

On average, PEK students experienced the following advantages:

- In the year before kindergarten, all three cohorts of children who completed PEK made faster progress than children

nationally in vocabulary and early reading and writing skills.

- When they reached kindergarten, PEK children had academic skills that were substantially more advanced than those of similar, same-age children in a comparison group who applied and were accepted for PEK, but who had not yet attended the program.
- All three cohorts of PEK children also showed advantages compared to their kindergarten classmates.
- Advantages between PEK children and their classmates tend to be stronger with each successive cohort. In all four academic areas assessed (vocabulary and early reading, writing, and math), Cohorts 2 and 3 scored significantly higher on average than both classmates with and without prior preschool or child care center experience.
- Teachers' ratings of children in kindergarten also suggested that overall, PEK tended to enhance social skills, lessen problem behaviors, and improve academic competence more than other experiences that classmates had prior to kindergarten.
- Principals, teachers, and parents provided very positive feedback about PEK.

PEK advantages over their classmates decreased over time.

- The amount of progress PEK students made on academic assessments between fall of kindergarten and fall of first grade as compared to progress made by their classmates varied by cohort and outcome. In some cases, PEK students made similar progress, and in other cases, they made less progress compared to their classmates, narrowing the gap between the groups. Nevertheless, PEK students continued to show academic advantages in first grade over classmates without preschool or child care center experiences, and in some cases, also maintained advantages over classmates with preschool experience.
- In fall of second grade, PEK children continued to have an advantage over their classmates in reading, but no longer had advantages in other areas assessed. Results indicate that, between fall of first grade and fall of second grade, PEK children in Cohort 2 (the only cohort with available data) made accelerated progress in vocabulary, expected progress in math, and slower than expected progress in reading and writing, on average. Their classmates made similar progress.
- Third grade student results were reported using the Minnesota Comprehensive Assessment. Results show that former PEK children in the first cohort performed similarly to their classmates in reading and math in third grade. In addition, PEK children were similar to their classmates in social skills, as rated by their teachers, and in third-grade attendance.

To address this "fade out" and to ensure that all children are able to achieve substantial advances in later grades, it seems important that all grade-level instruction be differentiated to varying skill levels, and that, for PEK children, lessons taught in PEK are not repeated in kindergarten.

Toward this end, PEK leaders began working intensively with four pilot schools to equip kindergarten teachers to differentiate their instruction based on children's incoming skill levels. As the study continues, we will

assess whether this effort impacts children's academic skills.

Child care results and implications

PEK child care children exhibited some advantages over classmates when they reached kindergarten, but did not seem to perform as strongly as children who participated in PEK at school sites. On average, PEK child care children experienced the following changes:

- Upon kindergarten entry, PEK child care Cohort 1 and 2 children appeared to have an advantage over classmates who did not participate in PEK on some academic measures, especially vocabulary. PEK child care Cohort 3 did not have a classmate comparison group, but performed similarly to children nationally on measures of academic skills.
- PEK school-based children appeared to have a slight advantage over PEK child care children on reading and math in kindergarten.
- In the areas of social skills and problem behaviors, child care Cohort 1 and 2 children did not appear to have any advantages compared to kindergarten classmates. Again, results tended to be more positive for PEK school children. Social skills results for Cohort 3 children show that their scores are similar to children in the national sample and higher than the previous two cohorts.
- Overall, child care center directors, center teachers, and family child care home providers gave positive feedback about their experiences with PEK.

Previously, children who participated in PEK child care had some advantages over kindergarten classmates in academic skills but not in social skills. This prompted the program to offer "Positive Behavior Support" training to teachers. Results were promising for Cohort 3 children who performed better than the previous two cohorts in social skills. The program may want to consider continuing and strengthening instruction and supports for behavioral management in child care settings.

Initially, the child care component evaluation focused on the professional development of providers and implementation of PEK practices in child care settings. Recently, interest in PEK child care outcomes and impacts on kindergarten readiness has increased. To strengthen the assessment of program impact, the following additions were made to the child care component of the evaluation: 1) student assessments in the fall of the PEK year so that academic progress can be estimated from fall of PEK to fall of kindergarten; 2) two cohorts of children, which happen to be larger in size than the previous cohorts, and 3) comparison groups of kindergarten classmates for those cohorts.

Introduction

Program background

Overview

Project Early Kindergarten (PEK) aims to improve the school-readiness of Saint Paul children and help close the achievement gap through offering high-quality educational experiences for preschool children. The program aligns Saint Paul's pre-kindergarten education with the district's K-12 curriculum model, the Project for Academic Excellence. In this way, the program brings children's preschool experience close to the educational experience they will have in kindergarten and beyond. The program emphasizes standards-based learning, extensive professional development, and parent education and support. Because parents use a variety of care arrangements for their pre-kindergarten children, PEK promotes a community-wide approach involving both schools and child care programs.

The program targets services to English Language Learners, low-income children, and children needing Special Education services. In practice, most participants also represent racial or ethnic minorities. Participating children either attend a half-day, five-day-a-week school year program at one of the participating Saint Paul schools, or receive similar curricular support at their child care center or family child care home. PEK schools began serving 4-year-olds in fall 2005, and child care programs extended the program to 2½- through 4-year-olds in fall 2006. A detailed description of the program goals and components can be found in the Appendix (pages 49-53).

PEK sites

Ten Saint Paul schools began offering PEK in fall 2005. These schools include Ames, Como Park, Dayton's Bluff, Four Seasons, Hayden Heights, Maxfield, Prosperity Heights, Wellstone, and World Cultures/American Indian Magnet, two schools which share a building and classroom. Since that time, PEK has become the model for all 4-year-old programs district-wide with the exception of Montessori programs. As of fall 2010, a total of 28 district elementary schools implement the PEK framework. Details about the district's consolidation of pre-kindergarten programs can be found in the Appendix (pages 54-55).

PEK extends the program to child care settings through a partnership with Resources for Child Caring, a community agency working to improve the quality of early childhood care and education (Resources for Child Caring, n.d.). The first cohort of partnering child care programs was asked to participate in PEK for two years, spanning the 2006-07 and 2007-08 school years. Six centers and 15 homes were originally selected to participate in the program. A second cohort of providers began offering PEK in fall

2008. They included 7 child care centers that were new to PEK at that time, 1 continuing center, and 13 new family child care homes. As of fall 2010, 9 child care centers and 13 family child care homes offer pre-kindergarten programs following the PEK approach. These include six child care centers and two family child care homes from the second cohort of providers and two family child care homes from the first cohort. Two child care centers that had participated in the program through PEK-Early Reading First will also continue to offer PEK programming.

Funding

The program operates primarily through funding from Saint Paul Public Schools and The McKnight Foundation. In 2004 The McKnight Foundation provided a three-year, $2.8 million grant for program development and implementation, and in 2007 McKnight contributed an additional $3 million for efforts through the 2009-10 school year. PEK extends the program to child care settings through a partnership with Resources for Child Caring. The Minnesota Early Learning Foundation also contributed funds to the child care portion of the program in the 2007-08 and 2008-09 school years. In summer 2010, The McKnight Foundation added $2 millions for PEK work through the 2011-12 school year.

In addition, from 2006-07 to 2009-10, PEK-Early Reading First provided funds at two of the PEK schools and two other child care centers under a federal grant. Wilder Research conducted a separate evaluation of the PEK-Early Reading First program. The annual and final evaluation reports are available on Wilder Research's website (see Mohr, Gozali-Lee, & Mueller, 2008a; Gozali-Lee, Broton, & Mueller, 2008; Gozali-Lee & Mueller, 2009; and Gozali-Lee, Mohr, & Mueller, 2010). Following the completion of the Early Reading First grant, those schools and child care centers will continue to participate in the PEK program.

Target population

PEK targets children who are English Language Learners (ELL), from low-income families, and/or need Special Education services. Most of the children served by the program represent one or more of these target populations. Detailed information on the characteristics of the children can be found in the Appendix (pages 56-79 and Figures A1-A17). This information includes numbers served in each cohort, demographic profiles of PEK children and their comparison groups, changes over time, changes due to attrition, and attendance in the community child care component.

Evaluation

Wilder Research serves as the independent evaluator of PEK. The evaluation assesses the program at the 10 original school sites and at participating child care centers and family child care homes. To date, three cohorts of school children and four cohorts of child care children are included in the evaluation study. Another cohort of child care children will be added in fall 2010.

The evaluation has program implementation and outcome components. The implementation evaluation addresses the overarching question: Does PEK provide a high-quality preschool program that is aligned with the Project for Academic Excellence? The implementation evaluation also assesses the degree to which PEK is serving the target population of high-need students, as well as parent involvement and school-family linkages. Researchers gather information on the children served and the extent to which schools and child care settings are implementing the program. Information is gathered from program records; classroom observations; surveys of parents, teachers, and principals; and focus groups with teachers.

The outcome evaluation addresses the key question: Does a high-quality preschool program aligned with the Project for Academic Excellence improve students' educational outcomes? To answer this, the evaluators need to know the following:

- Are children better prepared for kindergarten because they participated in PEK?
- Do they perform better in elementary school (kindergarten through third grade)?
- What are the benefits for children, families, and teachers of having pre-K programs integrated with schools?
- Is it cost-effective?

For the outcome evaluation, researchers use a quasi-experimental research design to assess impacts on children's school success. The impact of the program on children's school readiness upon kindergarten entry is assessed by comparing PEK children's academic skills with those of similar-age peers who applied and were accepted in the program, but who had not yet attended the program. In this analysis, children who just finished PEK constitute the "treatment" group, and children who are just beginning PEK constitute the "no-treatment" comparison group. Wilder Research uses a statistical model that estimates the difference between the two groups right at the program's September 1 birthday cutoff point. Near the cutoff point, children from both groups are essentially the same age, but treatment-group children have completed the program and comparison-group children have not. This analysis is referred to as the "birthday cutoff" method

(regression discontinuity design is the more technical name for it) and is illustrated in Figure A19. The "birthday cutoff" analysis for this evaluation is based on academic performance upon kindergarten entry of children attending PEK schools.

In order to examine the impact of the program over time, once PEK children reach kindergarten, their academic and social skills are compared to those of their kindergarten classmates at the 10 PEK schools. After kindergarten, students in both the former PEK group and the classmate comparison group are followed through third grade as long as they remain in schools in Saint Paul.

Children attending at child care sites are assessed in kindergarten to allow for comparisons at that time to children who attended PEK school sites and children who did not attend PEK. Beginning in 2008, assessments have also been conducted at child care sites with 4-year-old children. As with school cohorts, Cohort 3 child care children have been assessed in the fall of their PEK year to facilitate measures of change between fall of PEK and fall of kindergarten.

Figure 1 summarizes the assessments conducted and the outcomes data available to date. A more detailed description of evaluation methods is provided in the Appendix (pages 80-88) and includes Figures A18-A19.

Contents of the report

This report comes at the conclusion of the sixth year of PEK. Following an initial planning year (2004-05), PEK has served children through the school component for five years (2005-06 to 2009-10) and through the community child care component for four years (2006-07 to 2009-10). As shown in Figure 1, at this point Wilder Research outcomes data are available for children attending the first three years of PEK at school sites and the first four years of PEK at child care sites. More child care than school-based cohorts are being studied due to smaller sized cohorts in child care.

This report summarizes the program's implementation and outcomes results to date, with an emphasis on new results from the 2009-10 school year (highlighted in gray in Figure 1). The report begins with a brief overview of the results from previous years. For detailed information on previous years' results, the reader is encouraged to consult previous reports available on Wilder Research's website (e.g., Schultz, Gozali-Lee, & Mueller, 2009). The remainder of the report focuses on the outcomes for which new data are available. For these outcomes, the new data are presented, as well as previous years' data on the same outcomes in order to examine stability and change in outcomes over time. This is an interim report, and future years' data will be provided in subsequent reports.

Results are separated into two sections: one on the school component and one on the community child care component. This year's results focus on student outcomes and school integration for the school component, as all study children have graduated from PEK. For the community-based component, both outcomes and PEK implementation results are reported. The final section of the report explores the lessons learned thus far in the evaluation. These lessons will be modified and expanded as the evaluation continues, and are intended to provide information that may be instructive to the early childhood education community and policymakers. It should be noted that, throughout this report, "teachers" is used to refer to school teachers, child care center teachers, and family child care home providers.

The report concludes with an Appendix providing supplemental information on the following:

- Program goals and components (pages 49-53)
- District pre-kindergarten consolidation (pages 54-55)
- Characteristics of children (pages 56-79 and Figures A1-A17)
- Evaluation (pages 80-88 and Figures A18-A19)
- School-based PEK results (pages 89-116 and Figures A20-A47)
- Community-based PEK results (pages 117-120 and Figures A48-A51)
- References (pages 121-122)

1. Summary of outcomes data available to date

	Progress from PEK to kindergarten[a]	Fall of K results compared to peers[b]	Progress from kindergarten to first grade	Fall of 1st grade results compared to peers[b]	Progress from 1st grade to 2nd grade	Fall of 2nd grade results compared to peers[b]	3rd grade results compared to peers[b]
School-based Cohort 1 (PEK 2005-06)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	N/A[f]	N/A[e]	✓[e,f,h]
School-based Cohort 2 (PEK 2006-07)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	✓[d]	✓[d,e]	N/A[i]
School-based Cohort 3 (PEK 2007-08)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	N/A[i]	N/A[i]	N/A[i]
Community-based Cohort 1[c] (PEK 2006-07)	✓[g]	✓[d,e]	N/A[j]	N/A[j]	N/A[j]	N/A[j]	N/A[j]
Community-based Cohort 2[c] (PEK 2007-08)	✓[g]	✓[d,e]	N/A[j]	N/A[j]	N/A[j]	N/A[j]	N/A[j]
Community-based Cohort 3[c] (PEK 2008-09)	✓[d,g]	✓[d,e]	N/A[j]	N/A[j]	N/A[j]	N/A[j]	N/A[j]
Community-based Cohort 4[c] (PEK 2009-10)	✓[d,g]	N/A[i]	N/A[j]	N/A[j]	N/A[j]	N/A[j]	N/A[j]

Note. *New data from the 2009-10 school year are highlighted in gray.*

[a] *Progress during PEK is presented as change in score from fall of PEK to fall of kindergarten. For community-based Cohort 4, results reflect fall of PEK baseline only since kindergarten data is not yet available (it will be collected in fall of 2010).*

[b] *The* classmate comparison group *was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. In addition to the classmate comparison group, school-based Cohorts 1 and 2 are also compared in fall of kindergarten to their same-age peers who had chosen but not yet received PEK. Community-based Cohorts 3 and 4 do not have a comparison group of kindergarten classmates.*

[c] *Results reflect 4-year-olds who attended community-based PEK.*

[d] *PPVT III and WJ III results are presented.*

[e] *Results of the teachers' ratings of students on the Social Skills Rating System.*

[f] *MCA II results from spring of third grade are presented.*

[g] *Results of Individual Growth and Development Indicators administered to 4-year-olds by PEK staff are presented.*

[h] *School attendance rates are presented.*

[i] *These data are not currently available, but will be collected in the future.*

[j] *No data will be collected.*

Overview of previous results

This section summarizes results from previous years (2005-06 to 2008-09). For details, please consult last year's report, which can be found on the Wilder Research website (Schultz, Gozali-Lee, & Mueller, 2009). The executive summary combines these results with new results presented in the remainder of this report.

School-based PEK

Results show promising progress for children attending PEK schools in 2005-06 (Cohort 1), 2006-07 (Cohort 2), and 2007-08 (Cohort 3). On average, children in each cohort showed academic and social advantages over peers when they reached kindergarten. Children's academic gains made during the pre-kindergarten year have also increased with each successive cohort. This trend may be associated with the development of PEK. That is, as PEK has become more fully implemented and mature as a program, its impact may have increased correspondingly. By first grade, differences between PEK students and their kindergarten classmates had narrowed for the first two groups of PEK students to reach first grade.

On average, children in the initial school cohorts experienced the following changes:

- In the year before kindergarten, all three PEK cohorts made faster progress than children nationally in vocabulary and early reading and writing skills. Cohort 2 also made accelerated progress in early math skills, while Cohorts 1 and 3 made expected progress in math.

- When they reached kindergarten, PEK children had academic skills that were substantially more advanced than those of similar, same-age children in a comparison group who had chosen but not yet received PEK. These comparison children were just beginning their PEK year. A statistical model was used to estimate the difference between the two groups when they were essentially the same age, but one had completed the program and the other had not.

- All three cohorts showed advantages compared to their kindergarten classmates, and the differences tended to be stronger with each successive cohort. In all four academic areas assessed (vocabulary and early reading, writing, and math skills), Cohorts 2 and 3 scored significantly higher on average than both classmates with and classmates without prior preschool or child care center experience.

- Teachers' ratings of children in kindergarten also suggested that, overall, PEK tended to enhance social skills, lessen problem behaviors, and improve academic competence more than other experiences that classmates had prior to kindergarten.

- Between fall of kindergarten and fall of first grade, the academic and social advantages that children in Cohorts 1 and 2 seemed to gain from PEK appeared to lessen somewhat on average. PEK students made less progress than their classmates did on average between kindergarten and first grade, narrowing the gap between the groups. Nevertheless, PEK students continued to show academic advantages over classmates without preschool or child care center experience. In addition, children in Cohort 2 maintained advantages in early reading and writing skills over their classmates with preschool experience.

Key evaluation findings to date also include the following:

- Compared to publicly-funded pre-kindergarten programs in several other states, the estimated effect of PEK upon kindergarten entry tended to be larger in vocabulary and early writing skills. Early reading skill results are comparable to the other studies.

- PEK school principals, teachers, and parents provided very favorable feedback about the program.

- Overall, structured classroom observations found that PEK classrooms have achieved a high level of alignment with the Project for Academic Excellence and are strong in their intentional supports for language and literacy.

Community-based PEK

Preliminary results suggest children who participated in PEK's first two years at child care sites experienced some advantages over classmates in kindergarten, but did not perform as well as children who attended PEK at school sites. Additional data are needed for researchers to make stronger claims about the child care component's impacts. Over the next few years, we also hope to assess differences in results between home and center sites. On average, findings for 4-year-olds in the first two child care cohorts were as follows:

- When they reached kindergarten, PEK child care Cohorts 1 and 2 children appeared to have an advantage over classmates who did not participate in PEK on some academic measures, especially in vocabulary.

- However, PEK school-based children appeared to have a slight advantage over PEK child care children on reading and math when both groups reached kindergarten. Average vocabulary scores were about the same across the child care and school-based cohorts.

- In the areas of social skills, PEK child care Cohorts 1 and 2 children did not appear to have any advantages compared to kindergarten classmates. Based on teachers' ratings, PEK school children exhibited fewer problem behaviors. Classmates with

other preschool or child care center experiences also appeared to have fewer problem behaviors on average.

- In the area of academic competence, teacher ratings indicated that PEK child care Cohort 1 and 2 children had advantages over classmates without prior preschool or child care center experiences. No significant differences in academic competence were found between children who attended PEK at school sites and at child care sites.

Key child care component findings to date also include the following:

- Overall, child care teachers participating in focus groups provided positive feedback about their experiences with PEK, the helpfulness of PEK's professional development, and the program's impact on children.

- Almost all parents with children entering kindergarten in the fall said their PEK child care teacher helped prepare their child for kindergarten.

- Overall, structured classroom observations found that PEK child care sites were strong in their support for language and literacy.

Progress summary: School-based PEK

This section focuses on outcomes for which there were new data from the 2009-10 school year, at which time the first cohort of PEK children was in third grade, the second cohort was in second grade, and the third cohort was in first grade (Figure 2).

2. Grade level by PEK school-based cohort

Cohort	2005-06	2006-07	2007-08	2008-09	2009-10
1	PEK	Kindergarten	1st grade	2nd grade	3rd grade
2	-	PEK	Kindergarten	1st grade	2nd grade
3	-	-	PEK	Kindergarten	1st grade

More specifically, this section addresses the following topics for the school component:

- Overview of results
- Progress between kindergarten and first grade (new data for Cohort 3 and previous data for Cohorts 1 and 2)
- Differences in first grade compared to classmates (new data for Cohort 3 and previous data for Cohorts 1 and 2)
- Progress between first and second grades (new data for Cohort 2)
- Differences in second grade compared to classmates (new data for Cohort 2)
- Differences in third grade compared to classmates (new data for Cohort 1)
- Issues for consideration

Throughout this section, the classmate comparison group is defined as kindergarten classmates of former PEK students in the 10 PEK schools. Each of the three school-based cohorts has its respective classmate comparison group. After kindergarten, students in both the former PEK group and the classmate comparison group are followed as long as they remain in schools in Saint Paul. For some of the analyses, the classmate comparison group is split into two groups: classmates with other preschool or child care center experience prior to kindergarten and classmates without such experience. Attrition (loss of students to the study) has occurred over time, but the PEK students assessed in 2009-10 were very similar demographically to the original study cohorts (see the Characteristics of Children section of the Appendix, pages 62-63, for details on attrition).

Analyses of academic outcomes are based on the *Peabody Picture Vocabulary Test III* and *Woodcock Johnson Tests of Achievement III* assessments conducted by Wilder Research in fall of the school year. The Peabody measures vocabulary and three subtests of the Woodcock Johnson – the Letter-Word Identification, Spelling, and Applied Problems subtests – measure early reading, writing, and math skills, respectively. Social skills are assessed by teachers using the Social Skills Rating System.

For some analyses, results are reported as age-standardized scores, which have a mean of 100 and a standard deviation of 15 in the national normative sample. This enables us to gauge the level of PEK children's academic skills with reference to a nationally representative sample of children. The national norms serve as useful reference points, in part because a key goal of the program is to close the achievement gap. However, PEK children, as a group, differ demographically from the national normative samples (for additional information about the norming samples, see the Appendix, pages 81-83). For this reason, the national norms are used only as reference points and are not used to estimate the impact of PEK. Instead, local comparison groups, developed for the study, are used for estimating the program's impact.

In some cases, results are reported as age-equivalent scores reported in years and months. The age-equivalent scores are not as mathematically precise as the age-standardized scores, but they are helpful in interpreting what the results mean (i.e., equating academic skill levels to chronological age).

Throughout the report, analyses comparing PEK cohorts with their respective classmate comparison groups adjust for differences between the groups in demographics (gender, age, race/ethnicity, free or reduced-price lunch eligibility, English Language Learner status, and Special Education status) and test date. Analyses measuring students' year-to-year progress in academic performance are first conducted separately by group and, therefore, do not adjust for differences between PEK cohorts and their classmate group in demographic characteristics. In addition, analyses are conducted to compare whether the year-to-year progress made by PEK cohorts differs significantly from the progress made by their respective classmate comparison groups. These analyses adjust for demographic differences between the groups. Technical details about the analyses are provided in the Appendix (pages 87-88).

Overview of results

The amount of progress made by PEK students between fall of kindergarten and fall of first grade as compared to progress made by their classmates varied by cohort and outcome. In some cases, PEK students made similar progress, and in other cases, they made less progress compared to their classmates, narrowing the gap between the groups. By second grade, PEK students continued to have an advantage over their classmates in reading, but no longer had advantages in other areas assessed. In third grade, former PEK students were similar to their classmates in academic skills, social skills, and school attendance.

Progress between kindergarten and first grade

Former PEK students' academic progress from fall of kindergarten to fall of first grade was presented along with the progress made by the total classmate comparison group, including both those with and those without prior preschool or child care center experience. The analysis is based on Peabody and Woodcock-Johnson test scores that are age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. Following are results organized by subject area.

Vocabulary

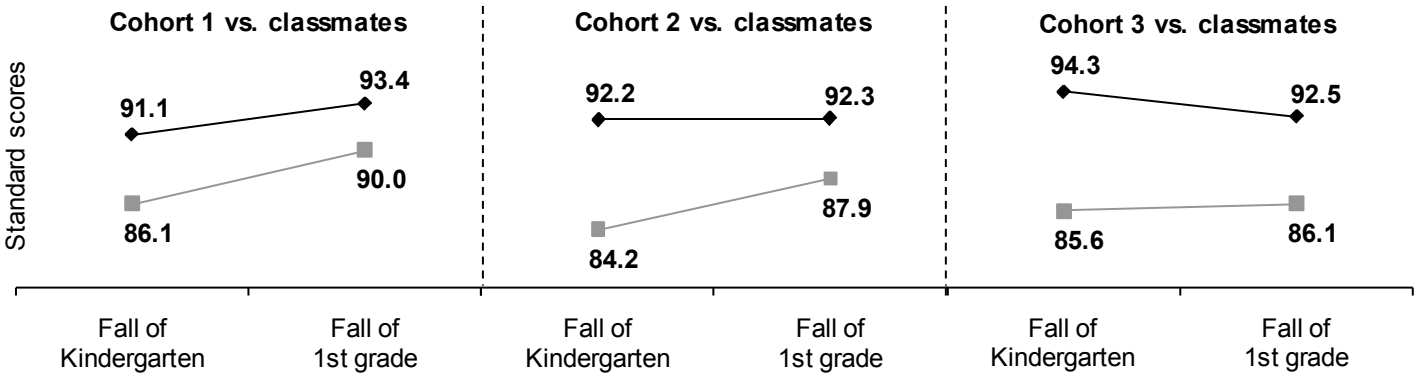
Results indicate that, on average, former PEK students in Cohort 1 made faster progress in vocabulary during the kindergarten year than did children nationally. Classmates of PEK Cohort 1 made similar growth, also progressing faster than children nationally.

The gap that was seen between former PEK students in Cohort 2 and their classmates in fall of kindergarten had narrowed by fall of first grade, as PEK Cohort 2 made expected progress, while the classmate comparison group made accelerated progress compared to children nationally.

On average, PEK students in Cohort 3 made slower than expected progress in vocabulary during the kindergarten year, while their classmates made normative progress, narrowing the gap between the two groups.

In summary, the amount of progress made in vocabulary by former PEK students during the kindergarten year appeared to decrease with each successive cohort (Figures 3 and A20-A25). The advantage that PEK children in Cohorts 2 and 3 had in kindergarten had narrowed by fall of first grade, as their classmates tended to make more progress over the course of the year.

3. PEK school component. Changes in <u>vocabulary</u> standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009)



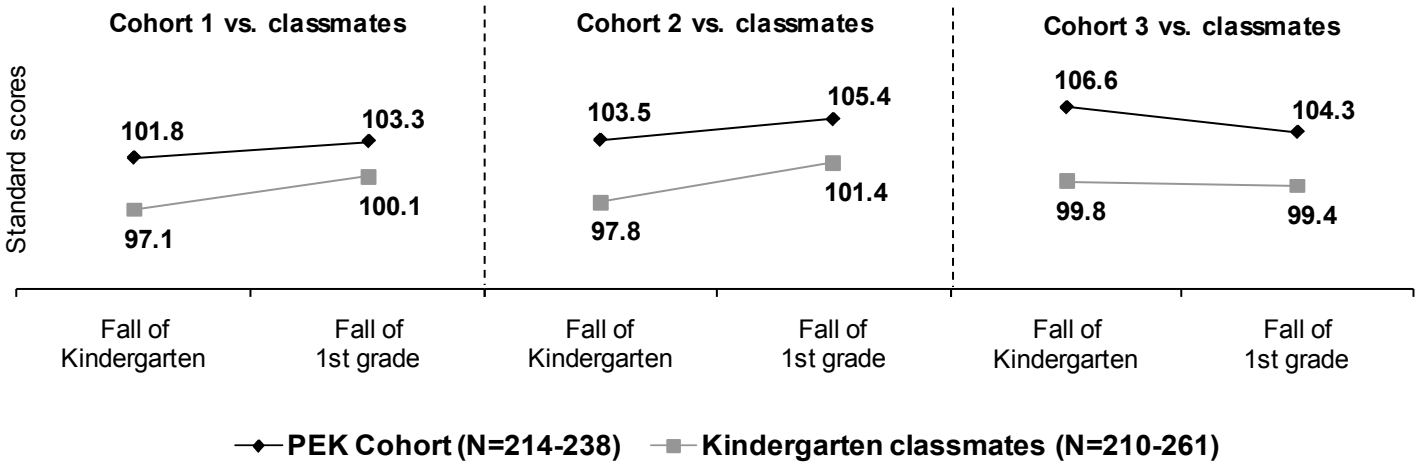
Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

Reading

Between fall of kindergarten and fall of first grade, former PEK children in Cohorts 1 and 2 made accelerated progress in reading, on average, compared to children nationally. Their respective classmate comparison groups made similar progress. PEK children in Cohort 3 made less than expected progress compared to children nationally, while their classmate comparison group made normative progress, on average. As a result, the gap that was observed between Cohort 3 and the classmate comparison group in fall of kindergarten had narrowed by fall of first grade (Figures 4 and A20-A25).

4. PEK school component. Changes in <u>reading</u> standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009)



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

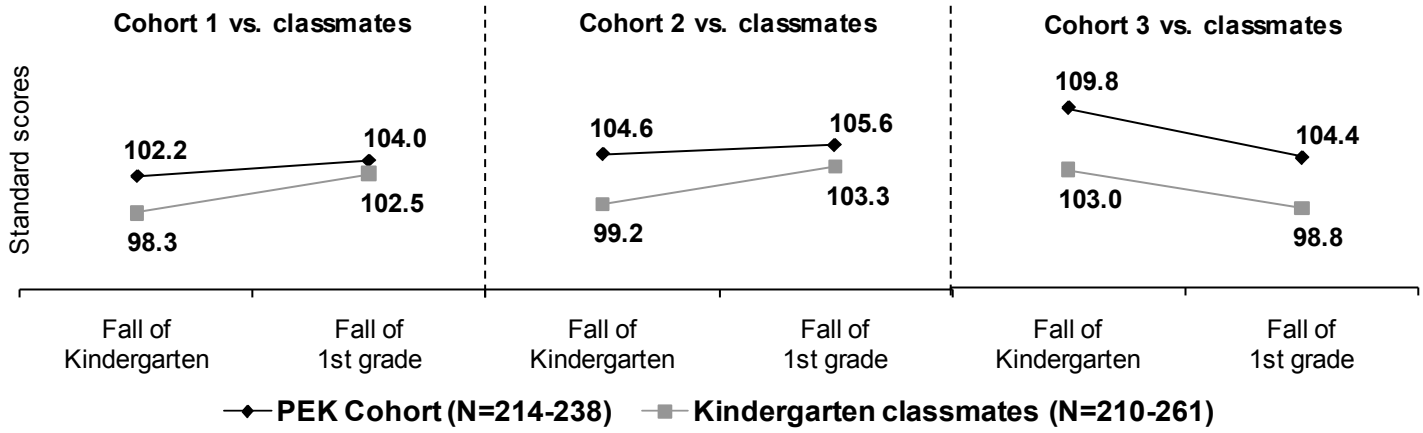
Writing

Results from the analysis examining progress made in writing during the kindergarten year show that both PEK Cohort 1 and the classmate comparison group made faster progress on average compared to children nationally. However, the classmate comparison group made significantly more progress than did PEK Cohort 1, narrowing the gap between the two groups.

Results for Cohort 2 indicate that PEK children made normative progress in writing during the kindergarten year, while their classmates made accelerated progress, on average. Hence, the gap between the two groups had narrowed by fall of first grade.

Compared to children nationally, former PEK children in Cohort 3 made less than expected progress in writing during the kindergarten year. Their classmates made similar growth, also progressing slower than children nationally (Figures 5 and A20-A25).

5. PEK school component. Changes in writing standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009)



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

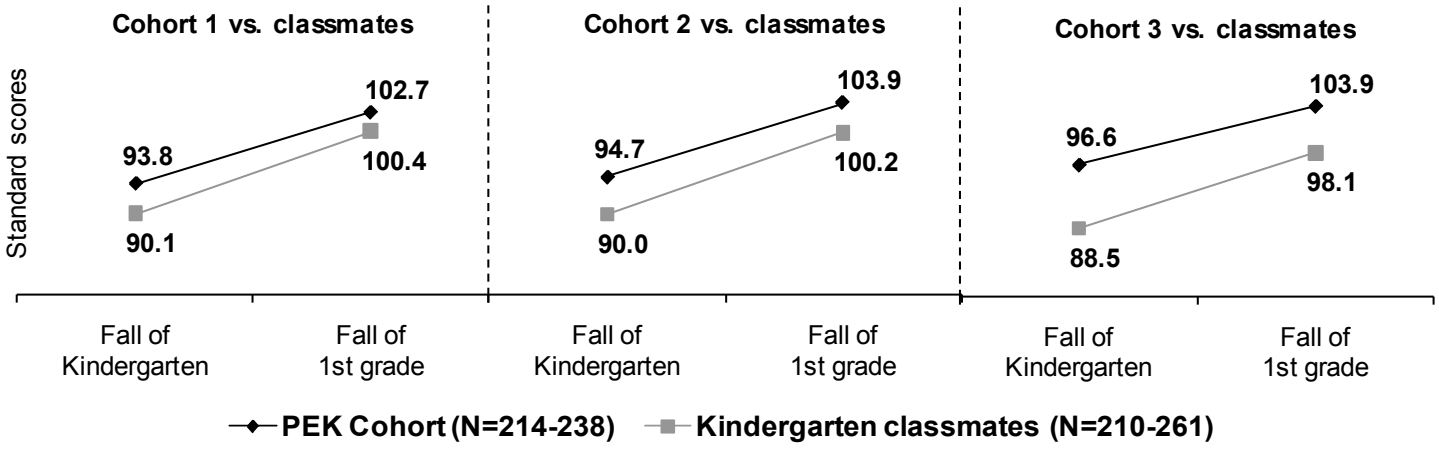
* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

Math

Between fall of kindergarten and fall of first grade, all three cohorts of PEK children, as well as their respective classmate comparison groups, made accelerated progress in math

on average compared to children nationally. PEK Cohorts 1 and 2 made comparable progress to that of their respective classmate comparison groups. Children in PEK Cohort 3 made slightly slower progress than their classmates did on average, and the gap between the two groups had narrowed somewhat by fall of first grade (Figures 6 and A20-A25).

6. PEK school component. Changes in <u>math</u> standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009)



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

In summary, looking across the subject areas, the number of outcomes for which the classmates' growth outpaced that of the PEK children increased with each successive cohort. Classmates progressed faster than Cohort 1 in writing, faster than Cohort 2 in vocabulary and writing, and faster than Cohort 3 in vocabulary, reading and math.

These results are also presented in Figures A26-A28 using age-equivalent scores, which represent a child's academic skill level in terms of age. Progress during the one-year period is indicated by the number of months of progress.

Differences in first grade compared to classmates

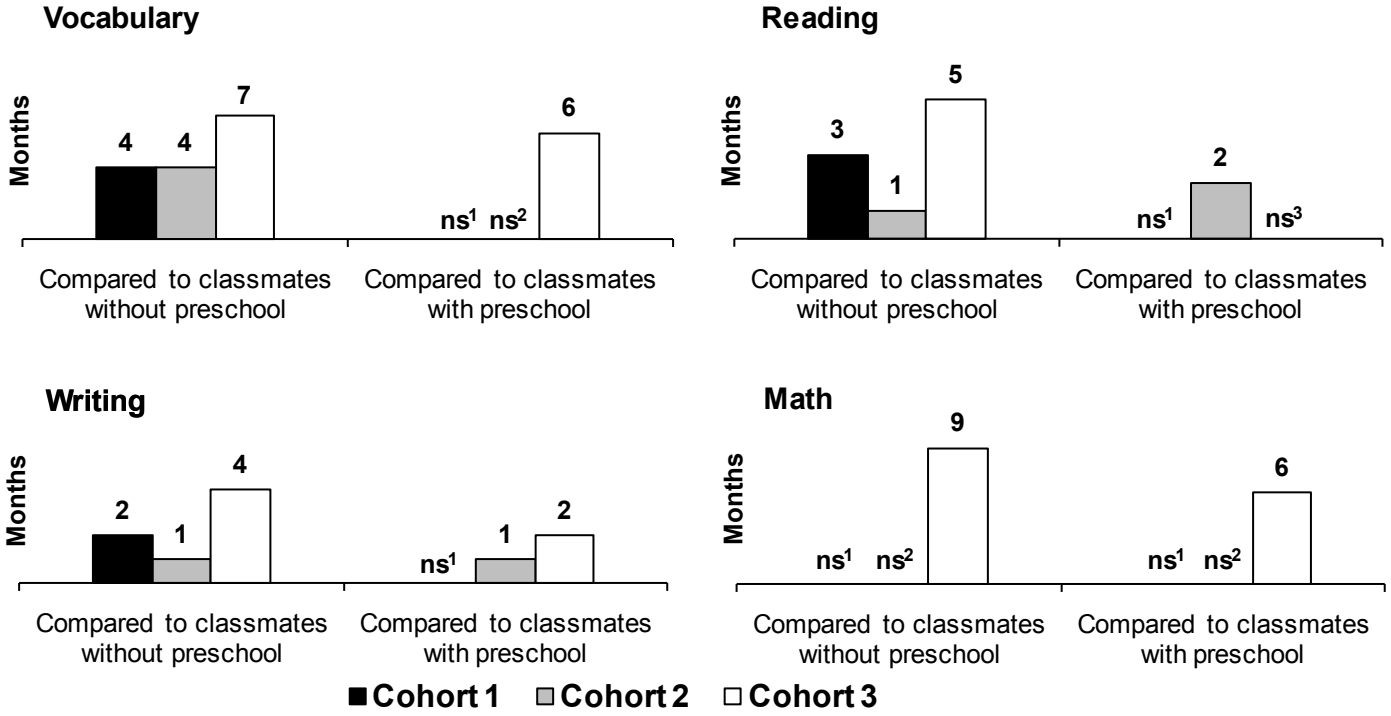
PEK students are compared with their classmates in academic and social skills in the fall of first grade. The classmate group was divided into those with other preschool or child care experience before kindergarten and those without. Differences in academic scores among groups are presented in age-standardized scores based on the national norms. Results are also presented using age-equivalency scores. These scores provide an estimate of how many months PEK children may be ahead of their classmates as a result of participating in PEK. Both standardized and age-equivalency scores are presented in the Appendix and summarized below. Differences in social skills among groups are summarized following the academic assessment results.

Academic assessments

In fall of first grade, PEK children continued to show advantages over classmates who did *not* have other preschool or child care center experience prior to kindergarten. Former PEK participants in all three cohorts scored higher on average than their classmate comparison groups without preschool on all four measures, with the exception of early math skills for students in Cohorts 1 and 2 (Figures A29-A33). As shown in Figure 7, which uses age equivalency scores, former PEK cohorts were ahead of their respective classmate comparison groups in vocabulary by an estimated four months for Cohorts 1 and 2 and seven months for Cohort 3. In reading, the advantage amounted to an average of three months for Cohort 1, one month for Cohort 2, and five months for Cohort 3. In addition, former PEK students were estimated to have an advantage in writing of two months for Cohort 1, one month for Cohort 2, and four months for Cohort 3. Cohorts 1 and 2 scored similarly to their classmates in math, whereas former PEK students in Cohort 3 demonstrated a nine-month advantage (Figures 7 and A29-A33).

Compared to classmates who *did* have other preschool or child care center experience before kindergarten, PEK Cohort 1 students did not score significantly differently on any of the measures in fall of first grade. Results were stronger, but mixed, for students in Cohorts 2 and 3. Both Cohorts 2 and 3 maintained significant advantages in writing, amounting to one and two months, over their respective classmate comparison groups. In addition, Cohort 3 students were ahead of their classmates with preschool experience by an average of six months in both vocabulary and math, but were not significantly different from classmates in reading skills. Cohort 2 no longer had significant advantages in vocabulary and math, but did maintain a significant two-month advantage in reading over classmates with preschool experience (Figures 7 and A29-A33).

7. PEK school component. Difference in age-equivalency scores in first grade: PEK Cohorts 1 – 3 compared to their classmates*



Note: This figure presents the differences in months between the age-equivalency scores of PEK Cohorts 1-3 and their respective classmate comparison groups in fall of first grade, shown only for differences that were statistically significant based on the standard score results. Positive numbers indicate that the PEK age-equivalency score was higher by that number of months than the classmate group age-equivalency score. In other words, children who attended PEK were estimated to be that many months ahead of children in the classmate group when they entered first grade. All scores are adjusted for demographic and test date differences between the groups being compared.

ns = No significant difference between the PEK cohort and the comparison group. The superscript numeral signifies the cohort.

* The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

Teacher ratings of social skills

As was done in kindergarten, teachers used the Social Skills Rating System (SSRS) to rate former PEK children and their classmates on their social skills, problem behaviors, and academic competence in fall of first grade. The social skills results suggest that PEK children's advantages were reduced by fall of first grade.

In the fall of kindergarten, former PEK children in Cohorts 1-3 received significantly higher teacher ratings in social skills on average compared to their classmates without preschool or child care center experiences before kindergarten. PEK Cohorts 2 and 3 also had a significant advantage in social skills over their classmates *with* preschool experience. However, a year later, in fall of first grade, these advantages in social skills were no longer evident (Figures 8 and A34-A37).

8. PEK school component. Teachers' ratings of Social Skills in first grade: PEK students vs. classmates

Assessment SSRS Social Skills	Compared to kindergarten classmates[a] With preschool/ child care center	 Without preschool/ child care center
PEK Cohort 1	No difference	No difference
PEK Cohort 2	No difference	No difference
PEK Cohort 3	No difference	No difference

Note: *Includes only students who were tested on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

As for problem behaviors, PEK children in Cohort 1 were rated similarly to their classmates with and without preschool experience both in fall of kindergarten and in fall of first grade. On the other hand, PEK Cohorts 2 and 3 were rated as exhibiting significantly fewer problem behaviors in kindergarten compared to both of their classmate comparison groups, those with and those without preschool experience. By fall of first grade, PEK Cohort 2 continued to have a significant advantage in behavior over classmates with preschool experience, but not over classmates without such experience. For PEK Cohort 3, the initial advantages over both of the classmate comparison groups were no longer evident in fall of first grade (Figures 9 and A34-A37).

9. PEK school component. Teachers' ratings of Problem Behaviors in first grade: PEK students vs. classmates

Assessment SSRS Problem Behaviors	Compared to kindergarten classmates[a]	
	With preschool/ child care center	Without preschool/ child care center
PEK Cohort 1	No difference	No difference
PEK Cohort 2	Lower for PEK[b]	No difference
PEK Cohort 3	No difference	No difference

Note: *Includes only students who were tested on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[b] *Lower means fewer problem behaviors.*

In academic competence, PEK students in Cohorts 1-3 had an advantage in fall of kindergarten over their respective classmate comparison groups with no preschool experience. In addition, Cohorts 2 and 3 had an advantage over their classmates *with* preschool experience. By fall of first grade, PEK Cohort 1 maintained its advantage in academic competence over classmates without preschool experience. PEK Cohort 2 maintained its advantage over classmates with preschool experience, but not over classmates without experience. For PEK Cohort 3, the advantage over classmates without preschool experience was maintained, while the advantage over classmates with experience was no longer evident (Figures 10 and A34-A37).

10. PEK school component. Teachers' ratings of Academic Competence in first grade: PEK students vs. classmates

Assessment SSRS Academic Competence	Compared to kindergarten classmates[a]	
	With preschool/ child care center	Without preschool/ child care center
PEK Cohort 1	No difference	Higher for PEK
PEK Cohort 2	Higher for PEK	No difference
PEK Cohort 3	No difference	Higher for PEK

Note: *Includes only students who were tested on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

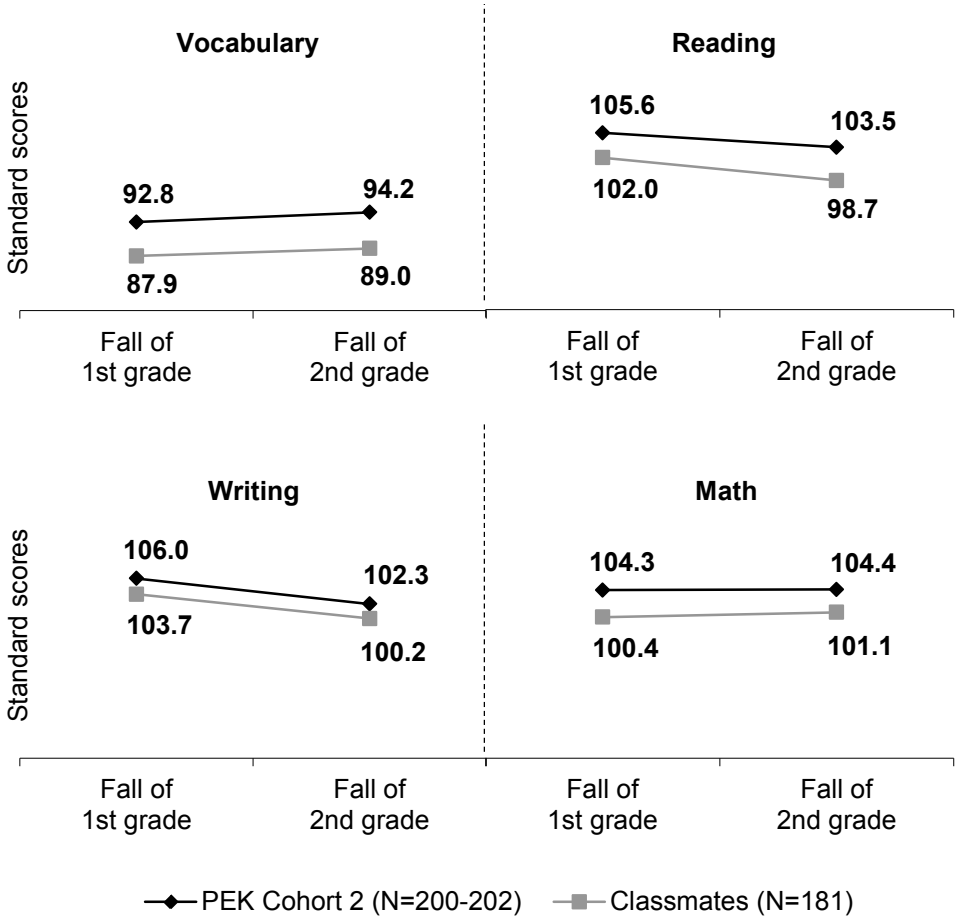
Progress between first and second grades

Academic assessments

Figure 11 depicts progress made in vocabulary, reading, writing, and math from fall of first grade to fall of second grade. To date, results are available for former PEK students in Cohort 2. Cohort 1 children were not assessed in second grade and Cohort 3 children will be assessed in fall 2010. Progress made by PEK Cohort 2 students is presented along with progress made by their classmate comparison group, including both those with and those without prior preschool or child care center experience.

In vocabulary, the former PEK students made accelerated progress compared to children nationally. PEK students and their classmates progressed at quite similar rates in vocabulary. Likewise, both groups made similar progress in the areas of reading, writing, and math. In reading and writing, former PEK students and their classmates made slower than normative progress compared to children nationally. In math, both groups made normative progress (Figures A38-A40).

11. PEK school component. Changes in academic test standard scores from first to second grade: PEK Cohort 2 vs. classmates* (fall 2008 to fall 2009)



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. One-year changes in standard scores were statistically significant for Cohort 2 in vocabulary, reading, and writing, and for the classmate comparison group in reading and writing (see Figure A36).*

* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience*

Differences in second grade compared to classmates

Academic assessments

We compared PEK Cohort 2 students' fall of second grade Peabody and Woodcock-Johnson test results with those of the classmate comparison groups. Once again, we separated the classmate group into those with and without prior preschool experience. Analyses presented here incorporate adjustments for demographic differences among PEK and classmate comparison groups as well as when in the fall each child was tested. Results show that Cohort 2 students maintained a significant three-month advantage in reading over classmates with prior preschool experience. However, no other advantages were evident by fall of second grade (Figure A41-A42). Apparent advantages of Cohort 2 students over classmates in vocabulary and math disappear when adjustments are made for demographics and test date differences between the two groups.

Teacher ratings of social skills

Results indicate that children in PEK Cohort 2 scored similarly to their classmates with and without prior preschool experience on teachers' ratings of social skills, problem behaviors, and academic competence, made in the fall of second grade (Figure A43). Hence, advantages seen in the fall of first grade were no longer present.

Differences in third grade compared to classmates

Children who participated in the first cohort of PEK were in third grade in 2009-10. Data on these children, along with their classmate comparisons, allow us to estimate the potential ongoing impact of PEK. Rather than conducting Peabody and Woodcock-Johnson assessments as in the earlier grades, we relied on available data from the statewide assessment. Spring of third grade is the first time that students take the Minnesota Comprehensive Assessment (MCA-II), which measures reading and math skills. To supplement this academic data, we examined third-grade attendance data and also collected teachers' ratings of students' social skills based on the Social Skills Rating System completed in spring of third grade. Analyses compare PEK Cohort 1 children with their kindergarten classmates now in third grade. Once again, the classmate comparison group was split into two groups: classmates with and classmates without preschool or child care experience.

Academic assessments

We compared the MCA-II reading and math scale scores of PEK Cohort 1 children with the scores of their classmates, controlling for demographic characteristics. The range of possible scale scores is 301 to 399 for third graders. Children in PEK Cohort 1 scored in the

middle of this range, on average, in both reading (353) and math (354). Their classmates with and without preschool experience performed similarly on average (Figure A44).

In addition to examining scale scores, we also examined proficiency levels. The Minnesota state standards define cut points that establish four levels of proficiency: 1) does not meet standards, 2) partially meets standards, 3) meets standards, and 4) exceeds standards. Students who meet or exceed standards are considered to be "proficient."

Results show that 60 percent of PEK children were proficient in reading and 69 percent were proficient in math. The comparable results for comparison group children with and without preschool experience, respectively, were 51 and 46 percent proficient in reading and 62 and 54 percent proficient in math. Although these results suggest that the proportions of children who were proficient in reading and math were higher for PEK children than for comparison group children, it is important to note that these numbers do not adjust for demographic differences between the groups. After adjusting for these differences, results show that PEK children and their classmates had similar odds of meeting or exceeding the state proficiency standards in reading and math. Hence, the academic advantages of PEK that were observed in earlier grades were not evident in the third grade MCA-II scores.

Teacher ratings of social skills

Results indicate that, in fall of third grade, there were no significant differences between PEK Cohort 1 children and their classmates with and without preschool experience in teachers' ratings of their social skills, problem behaviors, and academic competence (Figure A45).

Attendance

We compared the third-grade attendance of PEK Cohort 1 children with that of their classmates with and without preschool experience, adjusting for demographic differences. Results show that PEK children attended school 96 percent of the days they were enrolled, on average. The average attendance rate was similar for classmates with and without preschool experience, at about 95 percent for both groups (Figure A46). In addition to examining the percentage of days attended, we also examined chronic absenteeism. Students are considered to be "chronically absent" if they miss 11 or more days of school within a school year. Results indicate that children who were chronically absent represented 19 percent of PEK Cohort 1, 29 percent of classmates with preschool experience, and 31 percent of classmates without preschool experience. These results suggest that PEK children had better attendance than their classmates, but these results do not take into account the demographic differences between groups. After adjusting for demographics, results still show that PEK Cohort 1 children had significantly lower odds,

on average, of being chronically absent compared to classmates without preschool experience. However, the difference between the groups is substantively small.

School integration

As part of the district's efforts to further the connections between pre-kindergarten and kindergarten classrooms, beginning in the 2008-09 school year kindergarten teachers received a two-day workshop in differentiated instruction, and in many schools, pre-kindergarten and kindergarten teachers worked together in Professional Learning Communities. More intensive training was also offered to kindergarten teachers at Dayton's Bluff, Wellstone, American Indian, and World Cultures during the 2008-09 and 2009-10 school years. Kindergarten teachers in these schools received one-on-one biweekly coaching sessions. The coaches also worked with both kindergarten and PEK teachers in Professional Learning Communities.

This portion of evaluation focuses on integration between PEK and kindergarten classrooms and the professional development offered to kindergarten teachers during 2009-10. Information from this evaluation may be instructive in discerning ways to sustain PEK advantages over time.

The findings presented here are organized into the following topics:

- Kindergarten teacher satisfaction with PEK
- Professional development

Kindergarten teacher satisfaction with PEK

In spring 2010 Wilder Research asked the kindergarten teachers in the 10 original PEK schools to complete a survey about their experiences with the program. Twenty-four of the 26 eligible teachers completed the survey, including 11 teachers who completed the survey on their own and 13 teachers who completed the survey as a phone interview with Wilder Research staff. Two teachers did not respond to the e-mails or phone calls. Results indicate that all teachers either "strongly" or "somewhat" agreed (96% and 4%, respectively) that their school better prepares children for kindergarten because of the school's participation in PEK. Most teachers described how the PEK children are more prepared academically and socially to enter kindergarten, as compared to other children.

Examples of teachers' comments follow:

> The kids are more prepared. I can tell which kids have had the program within the first few days. They know more.

> My students come to school knowing the essential concepts to start kindergarten (i.e., how to write [their] name, letter identification, counting to 10, etc.). This is very useful in that we can dive right into the kindergarten curriculum.
>
> The families that choose to keep their children here [school name] are [seeing their children] beginning kindergarten with great foundational skills that build upon the concepts learned in kindergarten. The children that attend our Pre-K program make connections and comprehend on a different level than students who are beginning kindergarten with no Pre-K experience.
>
> The students that come from Pre-K are already prepared for the school day. Most students came into kindergarten with readiness skills. I noticed a drastic difference in social and emotional skills between students who went through the Pre-K program and those who didn't. Also, I see much more parent involvement from those students.
>
> We work together and share strategies and ideas. Students from the Pre-K program are better prepared than some other students.
>
> Higher academic scores in reading, writing, and mathematics. More socially adjusted students that can attend to lessons longer and understand what school is all about.

Professional development

PEK has made a number of strides in fostering linkages between PEK and kindergarten teachers. Such linkages are necessary to ensure children are well prepared for kindergarten, and to ensure their gains in PEK are built on and sustained in subsequent years. Understanding the skills of incoming PEK students can also help kindergarten teachers prepare to differentiate their instruction to the needs and abilities of individual students. Fostering these linkages is an ongoing process, and the program continues to focus attention in this area.

The spring 2010 kindergarten teacher survey also included several questions asking teachers about connections with PEK teachers and differentiated instruction in their classrooms. Results in Figure A47 show that almost all kindergarten teachers agreed (indicating "strongly agree" or "somewhat agree") that they have received training and support on how to differentiate instruction to meet the needs of their students (92%).

While kindergarten teachers indicated there are positive connections with PEK teachers, information about students' needs and skills for the purpose of differentiation of instruction in kindergarten is not always shared or discussed. Most teachers reported that there is sufficient communication between the PEK teachers and kindergarten teachers, with 87 percent of the teachers indicating that they somewhat or strongly agreed.

Slightly fewer teachers (70%), however, strongly or somewhat agreed that there is communication between them and PEK teachers during the kindergarten transition period about students' skills and needs, such as by discussing their assessment results. Similarly, while all kindergarten teachers reported using the individual student data regularly to inform their teaching, fewer teachers (58%) reported using the student information provided by PEK teachers to help develop lessons, activities, or grouping strategies in the classrooms.

As mentioned earlier, Dayton's Bluff, Wellstone, American Indian, and World Cultures kindergarten teachers received more intensive training from PEK coaches. Compared to other kindergarten teachers, these teachers were more likely to report that they have received training and support on how to effectively differentiate instruction to meet the needs of a diverse student population (100% of teachers at these four schools vs. 86% of teachers at other schools indicating they strongly or somewhat agree); that during the kindergarten transition period they and the PEK teacher communicated about students' skills and needs (88% vs. 57%); and that they used student information given by the PEK teacher to develop lessons, activities, or grouping strategies for their students (80% vs. 43%).

The spring 2010 kindergarten teacher survey also included an open-ended question asking teachers for their ideas for furthering the connections between PEK and kindergarten classrooms at their school. Although the degree of collaboration seems to vary by school, most teachers suggested ways to further develop collaboration at their school. Almost all teachers mentioned that they would like to have more time to observe PEK classrooms and work together with the PEK teachers. Some kindergarten teachers specifically mentioned that it is important to have dedicated time to observe PEK classrooms and start to make the connections at the beginning of the school year. A few kindergarten teachers also wished to have shared training experiences with their PEK counterparts and more staff in their classrooms.

Examples of their comments follow:

> We should be given sub coverage to visit each other's classrooms. There should be a transition meeting with Pre-K and kindergarten after the first two weeks of school. The high level of support that is in Pre-K should follow students to kindergarten – that is the adult ratio of 1 to 5. Currently it goes from 4 adults per 20 students in Pre-K to 1 adult per 24 students in kindergarten. Typically only one-third of those students have had a Pre-K experience.

> I would like to see more developmentally appropriate practices in kindergarten such as those that are implemented in Pre-K. We also need more time in the beginning of the year to discuss previous students and strategies that work or don't work. I never saw any of the assessments or portfolios that were done on my students in Pre-K. This would have been beneficial information at the beginning of the year so that I could plan appropriately from the start. I would like to see more projects and play in kindergarten that is similar to Pre-K, especially in the beginning of the year to make the transition easier and to include more developmentally appropriate activities. It would be helpful for kindergarten classrooms to have access to the various theme kits the Pre-K [classrooms use] as well. I have asked about this, though, [and] have not heard a response.
>
> Our school has an only Pre-K and K PLC [Professional Learning Community]. That really helps bridge the two grades together. We communicate how things are taught in both grades and really work together. I love it.
>
> We will continue to have our reading night, music program, and 100 Day celebration with the Pre-K [students] and their families. We could also think about having a Reading Buddy program in late spring and more visits between the two grades. It all takes time.
>
> Most of our kindergartners can read at least some simple pattern books or more. We could arrange some visits where the Ks could read familiar books from their reading boxes to the Pre-Ks.
>
> They came in and did not look at what we were doing at all. They used the same units we were doing. They should have looked at what we were doing and built from that. Now we are repeating units and kids get bored.

When asked for additional comments about the PEK program, some teachers mentioned that the program needs to continue to reach out to children who are in need of a pre-kindergarten program experience and find ways to retain more PEK children within the same school after they graduate from PEK. A new kindergarten teacher reported that she would like an opportunity to observe the PEK classroom, more than just a brief walk-in visit. She also commented that it would be helpful to have communication with PEK teachers on students who may need help during transition at the beginning of the year. Other comments included connecting parents of PEK and kindergarten students and integrating PEK and kindergarten activities. A few teachers' comments suggested that additional teacher support to differentiate instruction is needed, as more PEK students came to kindergarten with higher academic skills than other students.

Examples of their comments follow:

> I feel it is a very valuable program. We need to continue to find ways to reach the kids that are in need of a Pre-K program that are coming to school with few skills and with no Pre-K [or] Head Start experience.
>
> Our Pre-K program is great. Unfortunately, it is not reaching all of the students who come to us in kindergarten.
>
> I really applaud all that I see the Pre-K program doing! I would like the opportunity to observe the Pre-K classroom for more than just walk in questions. I also think it's important to set up a Pre-K/K parent meeting and integrate some activities with Pre-K students who will be transitioning into our kindergarten classes. I would also like to applaud the Pre-K team for their help with two students who had a difficult time transitioning into kindergarten. These teachers frequently stop by to check in on these students and have also sat down with me to go over specific plans for individual students. This is very helpful, though if we were given time at the beginning of the school year for this, the students who struggled would have had an easier transition.
>
> It's beneficial to have in our school. The kids in the program are better prepared for kindergarten. It would help if we had time to observe each other.
>
> Pre-K is obviously creating more of an achievement gap between students that have attended a Pre-K program and those who have not. This year I had eight students in my classroom as Gifted and Talented. Of the eight students, six of them were enrolled in a Pre-K program.
>
> I do think it's valuable. I think they [PEK program] are a separate entity and support and now they [PEK children] are expected to do first-grade work. Someone should have given kindergarten [teachers] a voice. We need more supports. We have larger, longer classes and not enough aids.
>
> I think that Pre-K is leaning too much on assessment … instead of going by what the children need. There are too many people who are not in the classroom who are determining what has to happen in the classroom, and they may have good book knowledge, but they need to look at what actually is going on in the classroom and what the children's needs are. They should come and watch the Pre-K and K relationship. They are pushing the first-grade curriculum onto younger and younger kids.

Issues for consideration

A core component of PEK is the inclusion of a rigorous, ongoing evaluation that can be used to inform programming and ultimately assess program results. Based on the findings presented in this report, following are issues that can be taken into consideration in future planning for PEK school sites.

- Results indicated that PEK participants had a substantial advantage in academic and social skills over classmates upon kindergarten entry. This advantage tended to narrow later on and fade out by third grade. To address this "fade out" and to ensure that all children are able to achieve substantial advances in later grades, it seems important that all grade-level instruction be differentiated to varying skill levels. Toward this end, in 2008-09 PEK leaders began working intensively with four pilot schools to equip kindergarten teachers to differentiate their instruction based on children's incoming skill levels. Preliminary results from one cohort thus far suggest that there was more progress in vocabulary for students whose teachers received coaching. Other results are not significantly different. Strengthening teacher training and support in differentiation of instruction seems to be important, not only in kindergarten but also in later grades. As the study continues, we will continue to assess whether this effort impacts children's academic skills.

- Along with the importance of differentiating instruction, it seems important that schools continue to work on aligning pre-kindergarten and kindergarten curricula so that, for PEK children, lessons already taught in PEK are not repeated in kindergarten. Teachers' participation in Professional Learning Communities may also help facilitate the connections between grade levels in this matter.

Progress summary: Community-based PEK

This section provides results for the community-based child care portion of PEK. As described earlier, PEK extended the program to Saint Paul child care settings in recognition that parents use a variety of care arrangements for their children. The program considers this component a pilot, with the intent that a community-wide approach will help more children enter school with the skills needed to succeed. Participating sites include child care centers as well as family child care homes.

The first group of providers recruited for the program offered PEK from fall 2006 to spring 2008, although there was considerable turnover among center teachers and home providers during that time. Using what was learned with this initial group of providers, PEK launched the program with a second cohort of providers in fall 2008. During 2008-09, 7 new centers, 1 continuing center, and 13 new homes offered PEK. As of fall 2010, 9 child care centers and 13 family child care homes offer pre-kindergarten programs following the PEK approach. It should be noted that both child care center teachers and family child care home providers are referred to here as "teachers."

This section focuses on outcomes for which there were new data from the 2009-10 school year, at which time the third cohort of community-based PEK children was in kindergarten and the fourth cohort was in PEK (Figure 12).

12. Grade level by PEK community-based cohort

Cohort	2006-07	2007-08	2008-09	2009-10
1	PEK	Kindergarten	1st grade	2nd grade
2	-	PEK	Kindergarten	1st grade
3	-	-	PEK	Kindergarten
4	-	-	-	PEK

Note: *In 2009-10, only former PEK students in Cohort 3 and PEK students in Cohort 4 were assessed.*

Topics addressed in this section include the following:

- Overview of results
- Progress while in PEK
  - Picture naming, rhyming, and alliteration targets (new data for Cohort 4 and previous data for Cohorts 1-3)
  - Growth in vocabulary, reading, writing, and math compared to national norms (new data for Cohort 3)

- Kindergarten readiness compared to national norms (new data for Cohort 3 and previous data for Cohorts 1 and 2)
- Implementation efforts (new information for Cohorts 1-4)
- Issues for consideration

Overview of results

The amount of progress made by Cohort 3 child care children between fall of PEK and fall of kindergarten, as compared to progress made by children nationally, varied by outcome. Despite this, the children still scored above average in early reading and writing and average in vocabulary and early math by fall of kindergarten. In addition, their social skills, as rated by their kindergarten teachers, were similar to children in the national sample. Results in academic performance for Cohort 3 children in the fall of their kindergarten year are similar to the previous two cohorts. Their social skills appeared to be better than the previous two PEK child care cohorts.

To monitor student progress while in the PEK program, the PEK teachers assess their students in fall, winter, and spring. By the end of the program year, half or more of the Cohort 4 children met the targets in the areas measured. Cohort 4 children appeared to score higher than Cohorts 1 and 3, but lower than Cohort 2.

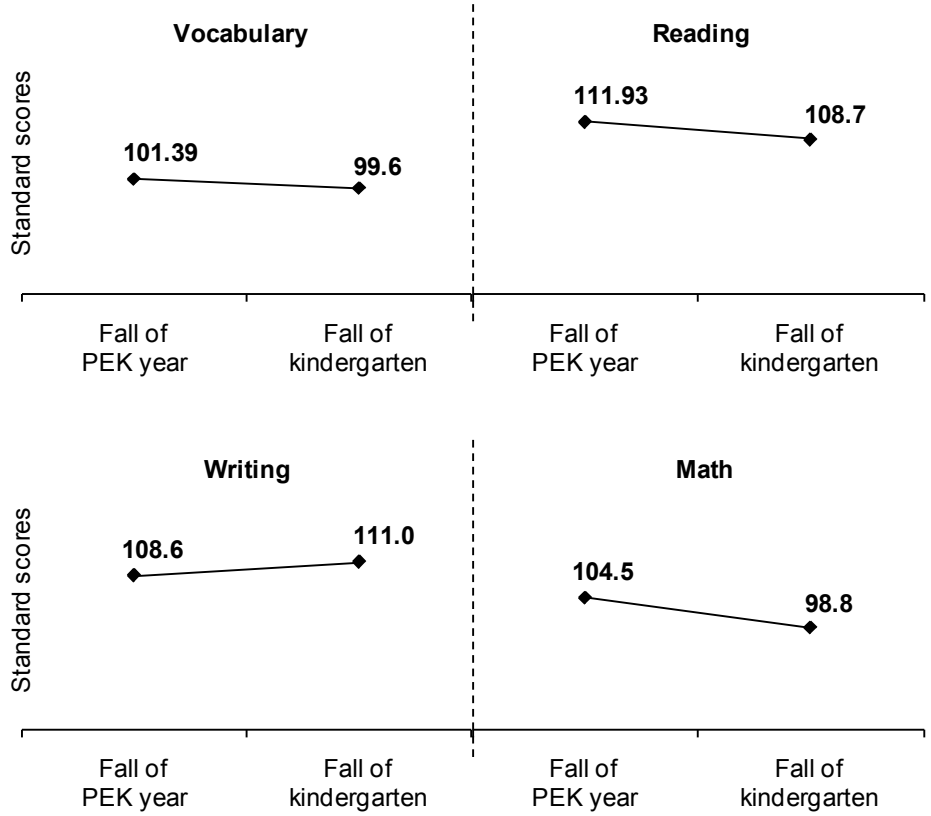
Progress while in PEK

Academic assessments

Figure 13 depicts progress from fall of the PEK year to fall of kindergarten for children in PEK community-based Cohort 3. The analysis is based on test scores that are age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.

Results show that PEK children made accelerated progress in early writing skills and normative progress in vocabulary during their PEK year. In the fall of their kindergarten year, children scored above average in writing and average in vocabulary. Results also show that PEK children made slower than expected progress in early math and reading, as compared to children in the national sample. Their average score in reading was still above the national average in the fall of their kindergarten year (i.e., above the mean of 100 in standard scores). Also, students scored close to the national average in math (Figures 13 and A48).

13. PEK community component. Changes in academic test standard scores from pre-kindergarten to kindergarten: PEK Cohort 3 (fall 2008 to fall 2009)



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. One-year changes in standard scores were statistically significant for Cohort 3 in reading, writing, and math (see Figure A45).*

Early language and literacy development assessments during PEK year

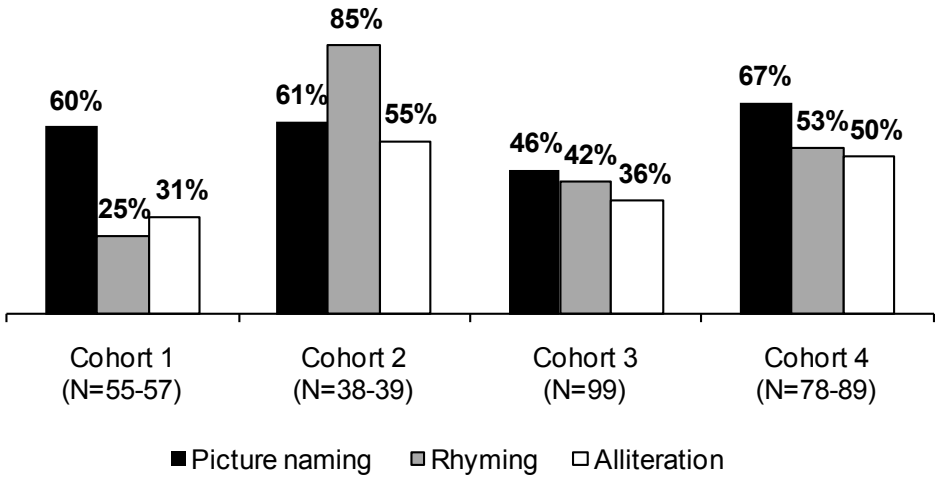
Teachers use Individual Growth and Development Indicators (IGDIs) to monitor individual children's early language and literacy development over time. Preschool IGDIs measure children's progress in three areas: picture naming, alliteration, and rhyming. During the assessments, teachers hold up cards with pictures and ask children to name pictures, identify pictures starting with the same initial sound, and identify pictures that rhyme. The assessments provide teachers with feedback on individual children's progress over time toward developmental outcomes, and alert teachers when additional interventions may be needed (ECRIMGD, 1998; Get It! Got It! Go! website, n.d.). This section summarizes results for 4-year-olds in PEK. It should be noted, however, that IGDIs are also administered to 3-year-olds in PEK's community child care component.

Teachers administer IGDIs three times each year. During 2009-10, IGDIs were administered in October, January, and April. Progress is reported from pre- to post-test (i.e., October to April).

PEK established target scores of 26 for picture naming, 12 for rhyming, and 8 for alliteration for the end of the pre-kindergarten year. Results show that 33 percent of Cohort 4 4-year-olds met the program's target for picture naming at pre-test, and 67 percent at post-test. For rhyming, 25 percent of 4-year-olds met the target at pre-test, and 53 percent at post-test. Nineteen percent of 4-year-olds met the target for alliteration at pre-test and 50 percent at post-test (Figure 14).

Comparisons between settings show that more children at homes than at center sites met the targets for all three indicators – picture naming (80% vs. 65%), rhyming (58% vs. 52%), and alliteration (75% vs. 45%) – at post-test. Results should be interpreted with caution, however, due to the small number of children in each setting. Detailed results for Cohorts 1-3 are presented in our previous reports (Mohr, Gozali-Lee, & Mueller, 2008b; Schultz, Gozali-Lee, & Mueller, 2009).

14. PEK community component. Percentages of Cohort 1, 2, 3, and 4 children meeting IGDI targets at post-test, 2006-07, 2007-08, 2008-09, 2009-10



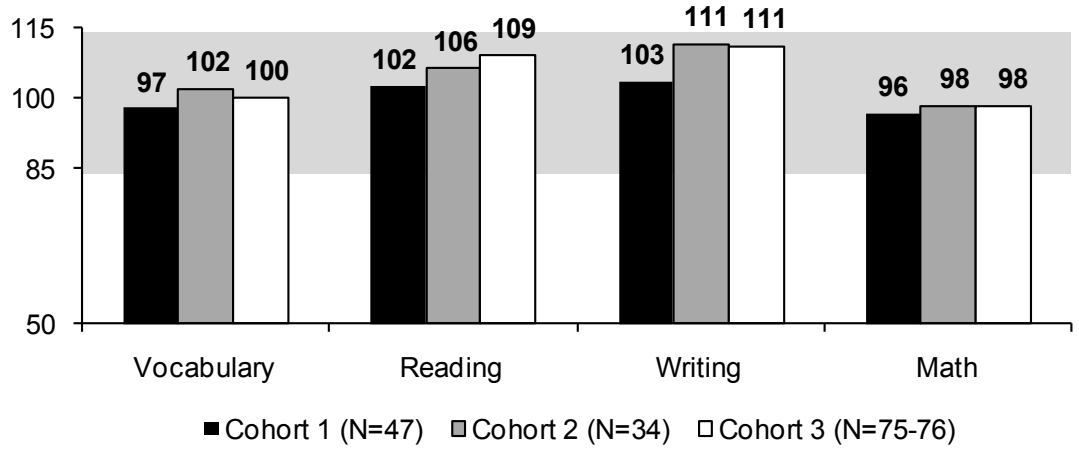
Kindergarten readiness compared to children nationally

Kindergarten readiness is examined using the Peabody and Woodcock-Johnson academic assessments conducted by Wilder Research, as well as the Social Skills Rating System assessments completed by teachers. In our previous evaluation report, the results for the first two community-based cohorts were compared to their respective kindergarten classmate comparison groups and to children who attended PEK at school sites during the same school year (Schultz, Gozali-Lee, & Mueller, 2009). These comparison groups are not available for community-based Cohort 3, so the results presented here compare former PEK children's kindergarten readiness to that of children nationally. These results are presented for all three former PEK cohorts. Note that the results should be interpreted with caution due to the small number of children participating in community-based PEK, especially during the first two years.

Academic assessments

Figure 15 presents the results of the academic assessments conducted with former PEK children in fall of their kindergarten year. Results show that children who participated in the first three cohorts of community-based PEK scored average or slightly above average (i.e., above the mean of 100 in standard scores) on each of the areas assessed (vocabulary, reading, writing, and math), compared to children nationally. For each of the cohorts, average scores were highest in the areas of writing and reading, followed by vocabulary and math, respectively.

15. PEK community component. Achievement test standard scores in kindergarten

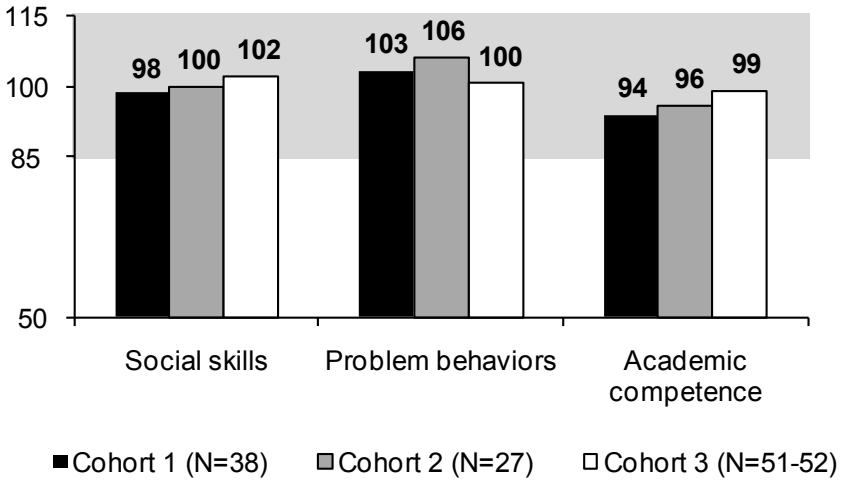


Note: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. This interval is represented by the gray shading in the background of the chart. Scores presented are unadjusted means.*

Teacher ratings

Kindergarten teachers used the Social Skills Rating System to rate former PEK children on their social skills, problem behaviors, and academic competence in the fall of their kindergarten year. The results suggest that children who participated in community-based Cohort 3 were rated similarly to children in the national sample on their social skills, problem behaviors, and academic competence. Compared to the previous two cohorts, Cohort 3 appeared to have slightly better scores in all three areas measured (Figures 16 and A49).

16. PEK community component. Teachers' ratings of social skills in kindergarten



Note: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. This interval is represented by the gray shading in the background of the chart. Scores presented are unadjusted means. Higher scores indicate higher social skills, more problem behaviors, and higher academic competence.*

Implementation efforts at PEK child care settings

This section explores the extent to which PEK's child care component has been implemented as intended. Implementation results are provided through the end of the program's fourth year of operation in child care settings, 2009-10. This marks the second year of PEK participation for most of the child care providers. Findings presented here are organized into the following topics:

- Alignment with the Project for Academic Excellence
- Language and literacy supports

For child care implementation results from previous years, the reader is encouraged to consult previous reports (e.g., Schultz, Gozali-Lee, & Mueller, 2009).

Alignment with the Project for Academic Excellence

In summer 2010, an outside observer completed the fourth-annual classroom observations assessing PEK child care centers' and homes' alignment with the Project for Academic Excellence. A detailed report on these results was prepared by the University of Minnesota's Center for Early Education and Development (CEED) (Hawley, 2010). A few key findings are summarized here.

Overall, PEK child care sites showed instruction and practices that are aligned with the Project for Academic Excellence, according to the CEED report. Based on 2010 observations, most environmental components and routines were implemented to some extent across sites. In general, the observations found the child care environments to be "literacy rich." There seemed to be room for improvement, however, in the extent to which teachers actively used environmental components throughout the day to promote literacy. For example, all of the classrooms posted a daily schedule and had a word wall, but only a few teachers actually referred to them (Hawley, 2010).

PEK child care sites attained strong fidelity with the following indicators related to classroom routines: 1) "ease into the day" routines; 2) morning meeting; 3) read aloud; 4) active learning time; 5) routines associated with the "regroup to revisit" portion of the day; and 6) the extent to which teachers differentiated small groups and the number of children included in small groups. A few areas of alignment were identified as having "varied fidelity," meaning fidelity was "high in some programs, low in others." Observations found wide variation in practices associated with the use of shared reading, interactive writing, use of transitions, the intentional use of conversation to promote vocabulary, and opportunities to communicate with parents about school readiness (Hawley, 2010).

The CEED report also describes child care providers' perceptions of the importance of PEK coaches:

> Participants were very vocal in their praise for coaches. In several situations, teachers are also part of other quality initiatives and commented that the PEK process is supportive and makes a difference whereas their experience in some other initiatives has been more stressful. They appreciate the coaches' ability to work with what they have, see their strengths, and continue to try new things if something does not work as well as expected (Hawley, 2010).

Language and literacy supports

Structured observations also assessed language and literacy supports in PEK child care settings. The Early Language Literacy and Classroom Observation tool (ELLCO) is used to assess center classrooms, and the similar Child/Home Early Language and Literacy Observation (CHELLO) tool is used in family child care homes. A summary of observations conducted in spring and fall 2009 and spring 2010 was prepared by CEED (Hawley, 2010). Following is a summary of the results for 10 classrooms at child care centers and 13 family child care homes that were observed in summer 2009 or fall 2009 (pre-assessment) and spring 2010 (post-assessment). Five of the 13 family child care homes began offering PEK programming in fall 2009. All of the classrooms had the same teachers during both of the observations.

The spring 2010 classroom observations indicate that, most ELLCO scores remained the same at a high level from spring 2009 to spring 2010, but there were a few improvements (Figure A50). Both spring 2009 and 2010 ELLCO results show that PEK classrooms were strong in their support for language and literacy. The biggest improvement was found in the use of assessments to evaluate learning and adjust instruction, followed by recognition of the diversity that students bring into the classroom and approaches to curriculum integration. Teachers indicated in the interview with the observer that their participation in the second year solidified what they have learned from PEK. In the second year, teachers reported greater understanding of the instructional concepts.

Results of spring 2010 CHELLO observations in family child care homes showed improvement across all areas, from the availability of books and writing materials to implementation of teaching strategies that support early literacy (Figure A51). The observer reported that the improvement occurred across all sites, including those new to PEK and those that had been with the PEK program the previous year (Hawley, 2010).

While center and home sites were strong in their supports for language and literacy overall, there were also variations among sites. The observer noted that teacher-child interactions that are more general in nature, such as classroom climate and behavior management, continued to be a struggle for some center teachers. In child care homes, teachers had to make adjustments to their routines because they work with multi-age groups of children. Despite these challenges, the observer noted that early literacy environments and interactions were remarkably consistent across home sites. Sometimes younger children in child care homes also received benefits of the program, according to the observer. They read along and did the same activities as the older children targeted by PEK (Hawley, 2010).

The observer indicated that there is still room for growth in centers and homes, especially in individualizing instruction, making intentional interactions throughout the day, and

continuing communication with families. Overall, however, child care sites were found to be strong in their language and literacy supports and alignment with the Project for Academic Excellence. Summarizing the ELLCO, CHELLO, and Project for Academic Excellence observations, the CEED report concludes as follows:

> The 2010 Project Early Kindergarten child care alignment data indicate that participants consistently implemented nearly all PEK strategies for supporting early literacy routines and environments. Observers documented stronger consistency across nearly all PEK recommendations for best practice. The results of the past two years indicate strong positive change [in child care sites] since the [PEK] program entered in 2008 (Hawley, 2010).

Issues for consideration

Based on the findings presented in this report, following are issues that can be taken into consideration in the future planning of PEK's child care component. As in the school section, some of the considerations pertain to PEK staff and some pertain to the researchers studying PEK.

- *Improving student outcomes during PEK year.* Results show that Cohort 3 child care children made expected progress or slower than expected progress in vocabulary, early reading, and math in their PEK year. The results also show that Cohort 3 child care children began their PEK year with quite high academic skills. At the end of the PEK year, half to two-thirds of Cohort 4 child care children assessed by their teachers met targets in early language and literacy development. This suggests that the PEK program is not having as strong an academic impact as desired. It seems important that the program finds additional ways to accelerate student academic progress and ensure that all children are able to build on their skills during the PEK year.

- *Strengthening child care evaluation.* Our understanding of the impact of PEK child care on kindergarten readiness is limited. Initially, evaluation of the child care component focused on the professional development of providers and implementation of PEK practices in child care settings. Recently, project funders' interest in PEK child care outcomes and impacts on kindergarten readiness has increased. To strengthen the assessment of program impact, the following additions were made to the evaluation: 1) student assessments in the fall of the PEK year so that academic progress can be estimated from fall of PEK to fall of kindergarten; 2) two cohorts of children (Cohorts 4 and 5); and 3) comparison groups of kindergarten classmates for those cohorts.

Lessons learned

Results from the PEK evaluation will provide valuable information for determining the best and most cost-effective strategies for preparing children for school. In addition to providing information on the effectiveness of the overall PEK model, the evaluation offers insights into what components of the model seem integral and what components may need to be strengthened or may be more discretionary. Ultimately, the PEK evaluation will also incorporate an analysis that provides information on the cost-effectiveness of the overall program.

This section provides a preliminary list of "lessons learned" in the PEK evaluation that may hold policy implications. These include initial lessons about what seems important to the program's success, and what has not worked as well or may be more discretionary. Six years after receiving initial program funding and five years after serving the first group of children, a number of programmatic successes and challenges have been identified. Evaluators will continue modifying and adding to this list as part of the program's ongoing evaluation.

- *School component's effectiveness at promoting kindergarten-readiness*. At this point, there is fairly strong evidence of the effectiveness of the school component in preparing children for kindergarten. All three cohorts of children in the school component showed significant academic and social advantages over their peers when they reached kindergarten, and their results are stronger with each successive year. Less is known at this point about the effectiveness of the child care component, or about home vs. center environments within that component.

- *Importance of professional development component*. Similar to the Project for Academic Excellence, PEK emphasizes intensive, ongoing professional development. To date, teacher reports validate the importance of the professional development component. Teachers have credited the program's professional development with impacting their teaching practices. Within this component, coaching seems to be an important means for ensuring teachers understand and can implement what is learned in training, and for providing accountability for expectations communicated in trainings.

- *Importance of emphasis on early literacy skills*. Based on results available to date, PEK's strong emphasis on early literacy skills seems to be a key program component. When they reached kindergarten, PEK school-based children showed advantages in vocabulary and early reading and writing compared to similar children who had chosen but not yet received PEK. Structured classroom assessments found that, overall, PEK school sites meet standards for promoting language and literacy in the classroom.

- *Importance of administrative buy-in*. The program's integration into schools and expansion across the district have required the support and buy-in of school principals and district administrators. As the "instructional leader" of PEK at their school, principals are involved in classrooms and oversee classrooms' implementation of the program model. The program has recognized a need for similar buy-in at child care centers, and assigned the second cohort of center directors with a comparable role. At the district level, leadership within the Office of Academics has been actively involved in the consolidation of 4-year-old programs under the PEK model. In the larger community, leadership at Resources for Child Caring has championed the program model with child care providers and initiated similar programs with four other school districts.

- *Inclusion of parent involvement component*. In the 2009 survey, several principals at the PEK schools mentioned that PEK helps educate parents about the importance of parent involvement in their children's education. Principals also appreciated building the connections with parents early on. At this point, it is difficult to know the relative importance of the parent involvement component to the results we have seen in children. Results indicate that parents are involved in their children's learning in a number of ways and that there also may be room for improvement in some areas. Although it may be difficult to make claims about the parent involvement component based on data currently available from this study, other research validates the inclusion of this component. Research indicates that strong center-based early childhood programs involving parents can impact parenting in ways that affect school readiness (Brooks-Gunn & Markman, 2005).

- *Importance of linkages with early elementary instruction*. Early results from the school component suggest that program strategies need to address the program's implications for early elementary grades. Results in general indicate that PEK advantages over their classmates began to narrow after the children reached kindergarten. Principals described a need for differentiated instruction in kindergarten to meet the varying needs of incoming children, including relatively high skill levels of children who attended PEK. Toward this end, PEK leaders have begun working with schools to equip kindergarten teachers to differentiate their instruction based on children's incoming skill levels. Differentiation of instruction is also needed beyond kindergarten.

- *Gauging program cost-effectiveness*. Ultimately, researchers intend to provide information on the cost-effectiveness of the PEK program. The intent is that once sufficient data are available, Wilder Research's economists will conduct an analysis on the cost-effectiveness of the overall program. This analysis will compare the

relative effectiveness of PEK and other similar programs for preschool-age children in relation to their costs.

In addition to preliminary lessons developed by researchers based on evaluation results, program staff have also suggested lessons they perceive as important based on their work with the program:

- *Using data to drive instruction*. PEK teachers use Work Sampling System assessments and Individual Growth and Development Indicators (in schools and child care settings) to monitor children's progress over the course of their PEK year. Program staff perceive this progress monitoring as an important tool for differentiating instruction based on individual students' needs. According to program staff, these assessments can also be used to motivate teachers by demonstrating students' progress over time. Evaluation results also suggest that teachers value the data received from these assessments.

- *Establishing high expectations*. Program staff also perceive a key component of the program to be its establishment of clear and high expectations for teachers and students. The program emphasizes academic rigor and the development of critical thinking skills. Program staff perceive teachers' and students' awareness of specific program expectations to be key to the progress they have made.

As previously noted, this list represents a preliminary compilation of lessons learned from the PEK evaluation that may be useful to practitioners and policymakers making decisions about planning and funding early childhood programs. Over the next two years, data gathered through the study will be used to modify and expand this list.

Appendix

Program goals and components

PEK's goals include providing programming aligned with the district's K-12 curriculum model and using a research-based approach to delivering services. Ultimately, the program intends to help close Saint Paul's achievement gap. Key program components include alignment with the Project for Academic Excellence, involving extensive professional development; parent education and support; and participation in a rigorous evaluation. This section and the later section on evaluation describe these program goals and components as well as the program's activities in these areas.

Central goals

PEK's central goals, as stated by the program, follow:

1. *School-based:* To develop optimal, developmentally and academically focused early childhood programming aligned with the District's K-12 standards-based comprehensive reform model, Saint Paul's Project for Academic Excellence, for 4-year-old English Language Learner students, Special Education students, and students who qualify for free and/or reduced-price meals.

2. *Community-based:* To use a research-based approach to deliver accurately targeted specialized services and support to early learners (primarily 3- and 4-year-old children), families, child care providers, and the greater local community that aligns with the district's standards-based comprehensive reform model and creates a smooth transition into kindergarten.

Alignment with the Project for Academic Excellence

With differences based on young children's developmental needs, PEK brings children's preschool experience into alignment with the educational experience they will have in kindergarten and beyond. This educational experience centers on the Project for Academic Excellence. The district introduced the Project for Academic Excellence in 2001 as a comprehensive academic reform model. Since that time, the Project for Academic Excellence has expanded from a pilot project in selected elementary schools to a district-wide approach implemented in every grade level. With the replication of PEK's model across 4-year-old programs, instruction aligned with the Project for Academic Excellence now extends to early education district-wide as well.

The Project for Academic Excellence model emphasizes standards-based education and extensive professional development. It aligns the district's curriculum model with state and national standards in reading, writing, math, and science. It also provides ongoing training for teachers and administrators based on national standards for effective training. Professional development includes best practices in standards-based instruction of core academic subjects. The model also emphasizes on-the-job coaching to help teachers develop lessons with clearly defined learning goals. Principals play an important role as instructional leaders who are involved in classrooms and oversee classrooms' implementation of the model (Saint Paul Public Schools, 2005).

In the district's own language, following are the 10 core components of the Project for Academic Excellence (Saint Paul Public Schools, n.d.):

1. Standards-based curriculum and instruction as the foundation of reform;
2. Extensive continuing professional development for teachers and administrators;
3. Focus on a small number of core academic skills;
4. Demonstration sites to promote replication;
5. A shared sense of instructional leadership across the school and district;
6. Content-based coaching of teachers, principals, and district leaders;
7. Availability of essential materials for learning;
8. Peer support for teachers;
9. Standards-based assessment to monitor progress; and
10. Increasing to scale across the district.

Early Childhood Workshop

Local and national experts in early childhood development and education developed a preschool curricular model for PEK aligned with the Project for Academic Excellence. This "Early Childhood Workshop" combines the Project for Academic Excellence's Reader's and Writer's Workshops. Contributors included the district's Reader's and Writer's Workshop professional development trainer and her consultant group, the California-based Foundation for Comprehensive Early Literacy Learning (CELL); the University of Minnesota's Center for Early Education and Development; English Language Learner, School Readiness, and Special Education staff; and Project for Academic Excellence and PEK staff.

Materials are geared toward the developmental needs of young children and are based on best practices in early childhood education. They emphasize specific standards in personal and social development, language and literacy, mathematical thinking, and physical development and health. The Early Childhood Workshop model is presented in a comprehensive implementation manual for teachers. Manuals also provide information on the Project for Academic Excellence and underlying Principles of Learning, PEK core content and early childhood standards, standards-based instruction, using standards-based assessment to monitor progress, and other topics relevant to program goals. Separate editions of the manual are provided to PEK school and child care teachers (Saint Paul Public Schools, 2007).

At school sites, licensed teachers use the implementation manual to develop lesson plans and integrate lesson themes throughout the classroom environment. Reflecting their unique needs and operations, child care centers use their manual in conjunction with *Doors to Discovery,* a complete literacy-focused curriculum. Family child care homes use their manual along with a theme-based curricular model developed specifically for them. Beginning in the 2007-08 school year (Cohort 3), school classrooms also implemented *Everyday Mathematics,* a curriculum used in district kindergarten through sixth-grade classes.

Professional development

Consistent with the Project for Academic Excellence, PEK emphasizes extensive ongoing professional development and on-the-job coaching for participating school and child care teachers. For school teachers, this training builds on the required educational credentials of teaching licenses and preschool certification. As an indication of the program's investment in training, it supports three Resources for Child Caring coaches, four school coaches for pre-kindergarten and kindergarten classrooms, national literacy consultants, and one community and family specialist who promotes the program's parent education efforts. At the beginning of the second grant period, the program also hired one additional part-time parent educator supported by the Minnesota Early Learning Foundation. The Program also worked with a behavioral specialist and an assessment coach for the 2009-10 school year.

PEK teachers attend an intensive training workshop at the beginning of the school year, spanning three days for school teachers and one or two days for child care teachers. During the year, school teachers meet in regular Professional Learning Communities and child care teachers attend monthly training meetings. Both school and child care teachers also participate in one-on-one weekly or biweekly coaching sessions. Program coaches, in turn, participate in master coaching sessions. School and child care teachers receive training on the following topics, for example: the role of rituals and routines; standards-based instruction; progress monitoring to guide data-driven instruction; reading and writing

strategies, including read alouds, shared reading, interactive writing, active learning, and guided oral reading; the Principles of Learning, which underlie the Project for Academic Excellence; Positive Behavior Support; differentiated instruction; components of the Classroom Assessment Scoring System (CLASS) instrument; and parent education. PEK also arranges for school and child care teachers and school principals to visit other PEK sites.

As part of the district's efforts to further the connections between pre-kindergarten and kindergarten classrooms, beginning in the 2008-09 school year kindergarten teachers received a two-day workshop in differentiated instruction, and in many schools, pre-kindergarten and kindergarten teachers worked together in Professional Learning Communities. More intensive training was also offered to kindergarten teachers at Dayton's Bluff, Wellstone, American Indian, and World Cultures during the 2008-09 and 2009-10 school years. Kindergarten teachers in these schools received one-on-one weekly coaching sessions. The coaches also worked with both kindergarten and PEK teachers in Professional Learning Communities.

Professional development is also provided to school principals and child care center directors and assistant directors to equip them to assume the role of the instructional leader at their school or center. Child care center directors receive six months of monthly training before their teachers begin working with the program.

Principals and center directors as instructional leaders

A tenet of the Project for Academic Excellence is that principals assume the role of the instructional leader at their school. Likewise, principals at PEK schools and directors at participating child care centers assume the role of the instructional leader of PEK at their site. This role provides site-level accountability for fidelity with the program model. At schools, the role also facilitates PEK's integration into the school as a whole. The program places a strong emphasis on developing linkages between PEK, kindergarten, and early elementary teachers as a way of ensuring smooth transitions for students and curricular alignment across grade levels. The program assigned child care center directors this role as of fall 2008. In this role, center directors are equipped to provide initial training to new teachers who start after the intensive training workshop at the beginning of the year.

School principals and center directors receive professional development to prepare them for assuming this role. Program coaches also provide them with memos to guide them in making classroom observations. These memos describe instructional best practices from the latest professional development teachers have received that should be evident in the classroom. Program administrators, principals, and child care center directors also play a role in monitoring the fidelity of program implementation, as described below.

Progress monitoring

The Project for Academic Excellence emphasizes ongoing progress-monitoring. PEK teachers use developmentally appropriate tools to monitor progress in children's skills and their growth toward developmental milestones. Work Sampling System assessments and Individual Growth and Development Indicators (IGDIs) help teachers understand changes in individual children and alert them when a child may require more intensive interventions. As with their K-12 counterparts, PEK teachers use information gathered through the ongoing assessments to inform their instruction. In addition, since fall 2007, program administrators, principals, and child care center directors have conducted "Progress Monitoring Walks" to check fidelity of program implementation.

Parent education and support

PEK also emphasizes parent involvement in their children's learning as well as parent-school connections. PEK supports work to increase parents' understanding of the skills children need for school, and parents' engagement with their children in literacy activities at home. PEK also aims to help parents feel comfortable navigating the school system and participating in school activities. Parent-education efforts are coordinated by the program's community and family specialist as well as a part-time parent educator who works to connect child care families with neighborhood schools.

PEK developed extensive parent-education materials, titled "School and Home – Partners in Learning," that were initially implemented in 2007-08. Materials include literacy activities that parents can do with children at home. Math activities were added in the 2008-09 school year. Every week, parents also receive take-home information in different languages that reinforces skills being taught in PEK and explains how to use the literacy and math materials. Parents also receive information about community resources. To facilitate home learning over the summer, teachers also distributed summer writing kits to PEK school and child care children who were going on to kindergarten.

In addition to developing parent-education materials, PEK offers parenting events and parent-education sessions at the schools, and brings school services to child care centers. For example, the program offers parent orientations at the schools and provides welcome packets with information about transitioning to school. As another example, PEK provides "Understanding School Choice" sessions at participating child care centers during which district student placement staff answer parents' questions and help parents register their children for kindergarten and Early Childhood Screening.

District pre-kindergarten consolidation

In fall 2008, the Saint Paul Public Schools consolidated pre-kindergarten programs district-wide and determined that all programs, except the Montessori programs, would use the PEK curricular approach. This consolidation unifies five programs that previously operated separately. The consolidated program is titled the Saint Paul Public Schools' Pre-Kindergarten Program. In this evaluation report, however, we still use the former program's name, Project Early Kindergarten (PEK). In 2008-09, 28 district elementary schools offered pre-kindergarten classes. As of fall 2010, 28 elementary schools, with 30 classrooms and over 1,200 children participate in the PEK curricular framework. Following are the elements of consolidation adopted by the district:

- Classes meet five days a week for two and a half hours a day;
- Class times align with school start and end times to enable pre-kindergarten staff to participate in Professional Learning Communities and other school functions;
- Transportation is provided using the elementary school busing system (with separate busing provided for some Early Childhood Special Education children);
- Pre-kindergarten enrollment is processed by the district's Student Placement Center;
- Suggested class size is 20 students;
- Classes are taught by a licensed teacher and an assistant teacher. Additional staff work in classrooms that include children with Special Education needs;
- Program management and staff supervision occur at the local school level under the direction of the principal, encouraging a team approach within the school;
- Early childhood professional development workshops and ongoing job-embedded coaching are standardized across programs;
- Using PEK's Early Childhood Workshop framework, pre-kindergarten curriculum and instruction is aligned with the district's Project for Academic Excellence elementary model, with a specific focus on alignment with kindergarten and first grade;
- Student, classroom, and program accountability measures are standardized;
- An Early Childhood Special Education (ECSE) inclusion model is maintained in 15 of the 28 schools;
- Parent education, family support, and student behavior support are provided district-wide;

- The Early Childhood Curriculum Resource center is made available district-wide; and
- Referendum funds are used to cover the cost of all pre-kindergarten general education teachers and assistants. The McKnight Foundation funds and School Readiness state aid are used for program support for all pre-kindergarten program schools. Special Education covers all ECSE teachers, assistants, therapists, and social workers.

To ensure that gains made in its pre-kindergarten programs are sustained and built on in future years, the district is also working to connect pre-kindergarten with kindergarten teachers. Efforts are made to align programming during these early years and equip kindergarten teachers to differentiate instruction based on the varying needs of incoming students. For example, in 2008-09 and 2009-10, PEK provided weekly coaching to kindergarten teachers in four schools (Dayton's Bluff, Wellstone, American Indian, and World Cultures) to strengthen their capacity to differentiate instruction. To increase the connections with PEK teachers, the coach worked with both PEK and kindergarten teachers in Professional Learning Communities in these schools.

Characteristics of children

School-based PEK

Ten Saint Paul elementary schools began offering PEK to 4-year-olds in fall 2005. Between morning and afternoon sessions, these schools have the capacity to serve a total of 360 PEK children. Figure A1 shows the number of children in the three cohorts at PEK school sites. It is important to note that these numbers reflect most but not all children who have participated in the program. Wilder Research defines each cohort as those who are assessed in fall of their PEK year, and there have been some participants who were not assessed as part of the study. Some children were not assessed because they started the program later in the year, left the program in the fall, transferred schools, were absent, or did not have parental permission to participate in the assessments.

A1. Children attending PEK school sites, 2005-06 to 2007-08

Cohort	Number of children
Cohort 1 (PEK 2005-06)	326
Cohort 2 (PEK 2006-07)	329
Cohort 3 (PEK 2007-08)	312
Total	**967**

Note: *A total of 360 children can be served by the 10 PEK schools. Wilder Research defines each cohort as children who were assessed as part of the study in fall of their PEK year. As explained in the text, this definition includes most but not all children who have participated in the program. Numbers in this figure may also differ slightly from those in other figures in this and other PEK reports depending on the inclusion or exclusion of children tested in Spanish, children whose birth date was outside the range for their cohort based on the program's birthday cutoff date, and children completing only the Peabody or the Woodcock-Johnson but not both. There may also be variations based on missing data for some variables.*

Demographics

Figure A2 provides demographic profiles of students in school-based Cohorts 1, 2, and 3. Some demographic characteristics can change over time, and these profiles reflect demographic data from fall of the PEK year. In each year, a majority of PEK students were low-income (61-74%), defined here as eligible for free- or reduced-price lunch. Just under half were English Language Learners (45-49%). Among those with a primary home language other than English, Hmong was the most common home language followed by Spanish. More than 1 in 10 children in each cohort needed Special Education services (11-12%). Looking at these three categories together, 79-88 percent were in the program's target population across the three years, meaning they were either low-income, English Language Learners (ELL), or needed Special Education services. Additionally, most students were from racial or ethnic minorities (81-85%).

A2. PEK school component. Demographic characteristics of Cohorts 1, 2, and 3 in fall of their PEK year

Characteristics		Cohort 1 (fall 2005) N=325-326	Cohort 2 (fall 2006) N=324-329	Cohort 3 (fall 2007) N=312
Gender	Female	51%	47%	49%
	Male	49%	53%	51%
Race/ethnicity	American Indian	3%	4%	4%
	Asian	27%	24%	30%
	Latino	20%	16%	18%
	Black	31%	39%	33%
	White	19%	17%	15%
Home language	English	50%	55%	52%
	Hmong	24%	20%	22%
	Spanish	17%	13%	13%
	Other	9%	12%	12%
ELL	Yes	49%	45%	48%
	No	51%	55%	52%
Free/reduced-price lunch eligibility	Eligible	61%	74%	71%
	Ineligible[a]	39%	26%	29%
Special Education	Yes	12%	12%	11%
	No	88%	88%	89%
In target population[b]	Yes	79%	88%	87%
	No	21%	12%	13%

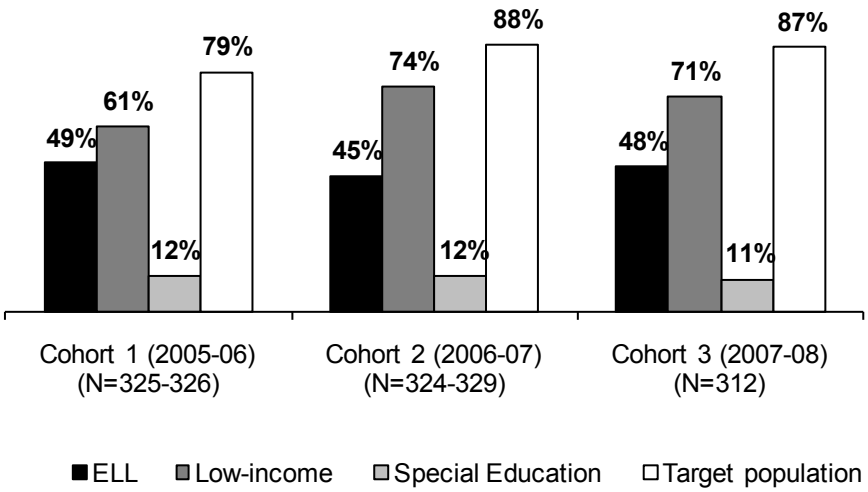
[a] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[b] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *This figure presents demographic data from fall of the PEK year for children who were assessed at that time. The "Ns" in this figure may differ somewhat from those in other figures in this report and previous reports. One reason is that for purposes of this demographic profile, we included children who were assessed in Spanish and therefore excluded from analyses of results. Another reason is that a few children who were tested were subsequently excluded from results because their birth date did not fall within the range for their cohort based on the program's birthday cutoff date. There could also be some slight differences in "Ns" between this and other figures based on children being assessed with either the Peabody or Woodcock-Johnson, but not both. It is important to note that methods for obtaining PEK children's demographic characteristics changed in 2006 after the district introduced a new application process for 4-year-old programs. It should also be noted that children's demographic characteristics, such as their free- or reduced-price lunch status, can change over time.*

Figure A3 depicts the representation of PEK's target populations in the first three cohorts.

A3. PEK school component. Representation of PEK target populations, 2005-06 to 2007-08



Note: PEK targets children who are English Language Learners (ELL), from low-income families, or need Special Education services. "Target population" reflects the percentage of children who are in any of these three groups.

Comparison group demographics

Demographic characteristics of the classmate comparison groups are presented in Figures A4-A6. The demographic information reported is based on the information provided by the district in kindergarten. As noted in the figures, there were some differences between cohort children and their classmates. For example, there were more children in comparison groups than in Cohort 1 and 3 who were eligible for free or reduced-price lunch. In cases where former PEK students differed in meaningful ways from the comparison groups, we statistically adjusted for those demographic differences in our analysis. We also adjusted for any differences among the groups based on when in the fall they were tested.

A4. PEK school component. Demographic characteristics of Cohort 1 and comparison group (preschool and no preschool) in fall 2006 (kindergarten), using fall 2006 demographic data

Characteristics		Cohort 1 (N=263)	Comparison group[a]	
			With preschool/ child care center (N=156)	Without preschool/child care center (N=100)
Gender	Female	52%	47%	54%
	Male	48%	53%	46%
Race/ethnicity	American Indian	3%	7%	5%
	Asian	27%	19%	37%
	Latino	18%	16%	17%
	Black	31%	40%	19%
	White	21%	19%	22%
ELL	Yes	47%	40%	50%
	No	53%	60%	50%
Free/reduced-price lunch eligibility	Eligible	65%	89%*	87%*
	Ineligible	35%	11%	13%
Special Education	Yes	14%	15%	3%
	No	86%	85%	97%

[a] *The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

* *p<.05, compared to Cohort 1.*

A5. PEK school component. Demographic characteristics of Cohort 2 and comparison group (preschool and no preschool) in fall 2007 (kindergarten), using fall 2007 demographic data

Characteristics		Cohort 2 (N=266)	Comparison group[a]	
			With preschool/ child care center (N=139)	Without preschool/child care center (N=145)
Gender	Female	47%	42%	48%
	Male	53%	58%	52%
Race/ethnicity	American Indian	5%	1%	2%
	Asian	24%	22%	38%*
	Latino	17%	25%	13%
	Black	36%	40%	32%
	White	18%	12%	15%
ELL	Yes	44%	53%	46%
	No	56%	47%	54%
Free/reduced-price lunch eligibility	Eligible	56%	68%	55%
	Ineligible	44%	32%	45%
Special Education	Yes	17%	12%	3%*
	No	83%	88%	97%

[a] *The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not. Children with missing data on preschool/child care experience were included in the no preschool/child care center group.*

* *p<.05, compared to Cohort 2.*

A6. PEK school component. Demographic characteristics of Cohort 3 and comparison group (preschool and no preschool) in fall 2008 (kindergarten), using fall 2008 demographic data

Characteristics		Cohort 3 (N=235)	Comparison group[a] With preschool/ child care center (N=156)	Comparison group[a] Without preschool/ child care center (N=79)
Gender	Female	48%	49%	46%
	Male	52%	51%	54%
Race/ethnicity	American Indian	5%	6%	8%
	Asian	28%	14%*	39%
	Latino	20%	22%	24%
	Black	34%	44%	18%*
	White	14%	14%	11%
ELL	Yes	50%	44%	62%
	No	50%	56%	38%
Free/reduced-price lunch eligibility	Eligible	57%	77%*	76%*
	Ineligible	43%	23%	24%
Special Education	Yes	10%	14%	3%
	No	90%	86%	97%

[a] *The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

* *p<.05, compared to Cohort 3.*

Changes over time

It is important to note that in some cases, children's demographic characteristics can change over time. For example, it may not be known that a child needs Special Education services until after that child has been in the school system. As another example, a child may be eligible for free or reduced-price lunch one year and ineligible another year. Additionally, methods for obtaining PEK children's demographic characteristics changed in 2006 after the district introduced a new application process for 4-year-old programs that collects applicants' demographic information.

Changes due to attrition

Demographics presented here reflect all students in the original PEK cohorts. However, attrition occurs over time in the study. Subsequent years' analyses reflect only those students who were tested in a given year. Children attending PEK at school sites are followed after their PEK year as long as they remain in schools in Saint Paul. Children

attending kindergarten or first grade outside of Saint Paul are not reflected in analyses presented in this report for fall of those years. Attrition also occurs in the comparison groups. Comparison groups are defined as kindergarten classmates of PEK children at the 10 original PEK schools. After kindergarten, comparison group students are followed as long as they remain in schools in Saint Paul.

Figure A7 shows the number of PEK and comparison group children who were assessed in fall 2009. At that time, Wilder Research conducted assessments with 911 children who attended PEK school sites in Cohorts 2 and 3, and their comparison groups. Based on the numbers in Figure A1, we were able to assess 68 percent of the original Cohort 2 children when they were in second grade, and 76 percent of the original Cohort 3 children when they were in first grade. For Cohort 1 students who were in third grade during the 2009-10 school year, Wilder Research used data available from the Minnesota Comprehensive Assessment. MCA data are available for 65 percent of Cohort 1 students.

A7. PEK school component. Fall 2009 study groups

	Number assessed	
Study groups	**Wilder assessments[a]**	**State assessment[b]**
Cohort 1 (PEK 2005-06)	none[g]	212
Cohort 1 comparison[c]	none[g]	198
Cohort 2 (PEK 2006-07)[f]	223	n/a
Cohort 2 comparison[d]	192	n/a
Cohort 3 (PEK 2007-08)	237	n/a
Cohort 3 comparison[e]	259	n/a
Total	**911**	**410**

[a] *These numbers reflect students with whom Wilder Research conducted academic assessments (Peabody and Woodcock Johnson).*

[b] *Minnesota Comprehensive Assessment (MCA-II).*

[c] *Kindergarten classmates of PEK school-based Cohort 1 children in 2006-07 at the 10 PEK schools.*

[d] *Kindergarten classmates of PEK school-based Cohort 2 children in 2007-08 at the 10 PEK schools.*

[e] *Kindergarten classmates of PEK school-based Cohort 3 children in 2008-09 at the 10 PEK schools.*

[f] *Children who attended both PEK at school sites and at child care sites are included in the school-based component numbers (six children in Cohort 2).*

[g] *Wilder Research did not conduct the Peabody and Woodcock Johnson assessments with Cohort 1 and its comparison, but rather used data available from the Minnesota Comprehensive Assessment (MCA-II).*

We compared the demographic characteristics of children who remained in the study to those in the original cohorts who were no longer in the study to see if they differed

significantly. For the three cohorts, those assessed in 2009-10 generally resembled the original cohorts, with one exception. For Cohort 2 the percentage of children who were eligible for free or reduced-price lunch differed significantly between children tested in fall 2009 (68%) and children in the original cohort who were not tested (83%).

Home life

Most PEK school children participating the first three years lived with both parents (70-73% in Cohorts 1, 2, and 3), and more than 1 in 10 lived with their mother only (15-17%). Quite frequently other adult relatives also lived in the household. A majority of children's parents graduated from high school or attended some college but did not receive a four-year degree (67-69% of mothers and female caretakers, and 63-68% of fathers and male caretakers) in Cohorts 1, 2, and 3.

School experience

Children often enrolled in PEK without any prior preschool or child care experience. About 4 in 10 attended preschool, Head Start, or a child care center before they started PEK (36-40% in Cohorts 1, 2, and 3). Children also were typically not in another preschool or child care program while they attended PEK. When not in their PEK class, children were most commonly cared for by parents (45-47% in Cohorts 1, 2, and 3). Other common arrangements involved – sometimes in combination with parental care – care from relatives, neighbors, or friends.

Community-based PEK

In fall 2006, PEK extended the program to children at participating child care sites in Saint Paul. Figure A8 shows the number of children who participated in the first three cohorts at PEK child care sites. It is important to note that these data reflect all children enrolled in PEK child care during this time, whereas school cohorts are defined as students *tested* in fall of their PEK year. A total of 137 3- and 4-year-old children participated in PEK at child care sites during 2006-07 (Cohort 1), 114 participated in 2007-08 (Cohort 2), 183 participated in 2008-09 (Cohort 3), and 252 participated in 2009-10 (Cohort 4). Some of those children did not participate in PEK for the entire year either because of their entry or exit from the child care site or their provider's entry or exit from the program during the year. Child care programs also extend PEK to 2½-year-olds, although those children are not reported on here.

A8. Children attending PEK child care sites, 2006-07, 2007-08, 2008-09, and 2009-10

Cohort	3-year-olds	4-year-olds*	Total
Cohort 1 (PEK 2006-07)	65	72	137
Cohort 2 (PEK 2007-08)	59	55	114
Cohort 3 (PEK 2008-09)	84	99	183
Cohort 4 (PEK 2009-10)	125	127	252

* *Some children who participated in Cohort 1 as 3-year-olds also participated in Cohort 2 as 4-year-olds. Similarly, some children who participated in Cohort 2 as 3-year-olds also participated in Cohort 3 as 4-year-olds, and some children who participated in Cohort 3 as 3-year-olds also participated in Cohort 4 as 4-year-olds.*

Note: *Child care Cohorts 1, 2, 3, and 4 reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year. It should also be noted that child care settings extend the program to 2½-year-olds, although those children are not reported on here.*

Demographics

In both family child care homes and child care centers, approximately half of the PEK participants were age 3 and half age 4 in each of the four years of PEK. Across the years, 40-72 percent of the children in family child care homes and 73-91 percent of the children in child care centers were in the PEK target population, meaning they were English Language Learners, came from low-income families, or needed Special Education services. Higher percentages of center than home care children came from low-income backgrounds (69-92% vs. 27-58%). PEK child care children typically spoke English as their primary home language, including 81 to 100 percent of home care children and 85 to 94 percent of center care children across the four years. A very small number of children (2 to 7 children) received Special Education services in each of the first three years of PEK; the number increased to 17 children in the fourth year (Figures A9-A12).

A9. PEK community component. Demographic characteristics of PEK community-based Cohort 1 (2006-07)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2006				
3	13	48%	52	47%
4	14	52%	58	53%
Total	27	100%	110	100%
Gender				
Male	15	56%	50	45%
Female	12	44%	60	55%
Total	27	100%	110	100%
Free/reduced-price lunch eligibility				
Eligible	13	50%	90	87%
Ineligible[a]	13	50%	13	13%
Total	26	100%	103	100%
Ethnicity				
American Indian	-	-	2	2%
Asian	4	15%	7	6%
Latino	1	4%	19	17%
Black	8	31%	58	53%
White	13	50%	21	19%
Bi-racial or Multiracial	-	-	2	2%
Total	26	100%	109	100%
Home language				
English	27	100%	94	85%
Hmong	-	-	4	4%
Spanish	-	-	8	7%
Other	-	-	4	4%
Total	27	100%	110	100%

A9. PEK community component. Demographic characteristics of PEK community-based Cohort 1 (2006-07) (continued)

	Home		Center	
	N	Percent	N	Percent
Received Special Education services				
Yes	2	8%	3	3%
No	23	92%	99	97%
Total	25	100%	102	100%
In target population[b]				
Yes	14	54%	94	91%
No	12	46%	9	9%
Total	26	100%	103	100%

[a] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[b] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A10. PEK community component. Demographic characteristics of PEK community-based Cohort 2 (2007-08)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2007				
3	17	49%	42	53%
4[a]	18	51%	37	47%
Total	35	100%	79	100%
Gender				
Male	17	49%	42	57%
Female	18	51%	32	43%
Total	35	100%	74	100%
Free/reduced-price lunch eligibility				
Eligible	9	27%	56	92%
Ineligible[b]	24	73%	5	8%
Total	33	100%	61	100%
Ethnicity				
American Indian	-	-	2	3%
Asian	2	6%	4	6%
Latino	7	20%	6	8%
Black	7	20%	47	64%
White	19	54%	14	19%
Total	35	100%	73	100%
Home language				
English	32	91%	67	92%
Hmong	-	-	3	4%
Spanish	3	9%	3	4%
Total	35	100%	73	100%
Received Special Education services				
Yes	2	6%	-	-
No	30	94%	60	100%
Total	32	100%	60	100%

A10. PEK community component. Demographic characteristics of PEK community-based Cohort 2 (2007-08) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	14	40%	58	73%
No	21	60%	21	27%
Total	35	100%	79	100%

[a] *One child who was 5 years old as of September 1, 2007, is included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A11. PEK community component. Demographic characteristics of PEK community-based Cohort 3 (2008-09)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2008				
3	16	44%	68	46%
4[a]	20	56%	79	54%
Total	36	100%	147	100%
Gender				
Male	22	61%	71	48%
Female	14	39%	76	52%
Total	36	100%	147	100%
Free/reduced-price lunch eligibility				
Eligible	17	53%	97	69%
Ineligible[b]	15	47%	44	31%
Total	32	100%	141	100%
Ethnicity				
American Indian	2	6%	3	2%
Asian	1	3%	2	1%
Latino	1	3%	19	13%
Black	14	42%	79	54%
White	15	45%	43	29%
Total	33	100%	146	100%
Home language				
English	29	81%	137	94%
Russian	4	11%	-	-
Spanish	1	3%	7	5%
Other	2	6%	2	1%
Total	36	100%	146	100%
Received Special Education services				
Yes	2	6%	5	3%
No	32	94%	140	97%
Total	34	100%	145	100%

A11. PEK community component. Demographic characteristics of PEK community-based Cohort 3 (2008-09) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	23	72%	102	73%
No	9	28%	38	27%
Total	32	100%	140	100%

[a] *One child who was 5 years old as of September 1, 2008, is included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A12. PEK community component. Demographic characteristics of PEK community-based Cohort 4 (2009-10)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2009				
3	25	57%	100	48%
4[a]	19	43%	108	52%
Total	44	100%	208	100%
Gender				
Male	22	52%	105	51%
Female	20	48%	100	49%
Total	42	100%	205	100%
Free/reduced-price lunch eligibility				
Eligible	19	58%	139	70%
Ineligible[b]	14	42%	60	30%
Total	33	100%	199	100%
Ethnicity				
American Indian	-	-	6	3%
Asian	1	3%	3	1%
Latino	-	-	27	13%
Black	27	68%	107	53%
White	12	30%	60	30%
Total	40	100%	203	100%
Home language				
English	39	93%	185	94%
Russian	3	7%	-	-
Spanish	-	-	9	5%
Other	-	-	3	2%
Total	42	100%	197	100%
Received Special Education services				
Yes	3	7%	14	7%
No	39	93%	191	93%
Total	42	100%	205	100%

A12. PEK community component. Demographic characteristics of PEK community-based Cohort 4 (2009-10) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	22	67%	145	73%
No	11	33%	53	27%
Total	33	100%	198	100%

[a] *Three children who were 5 years old as of September 1, 2009, are included in the 4-year-old group.*

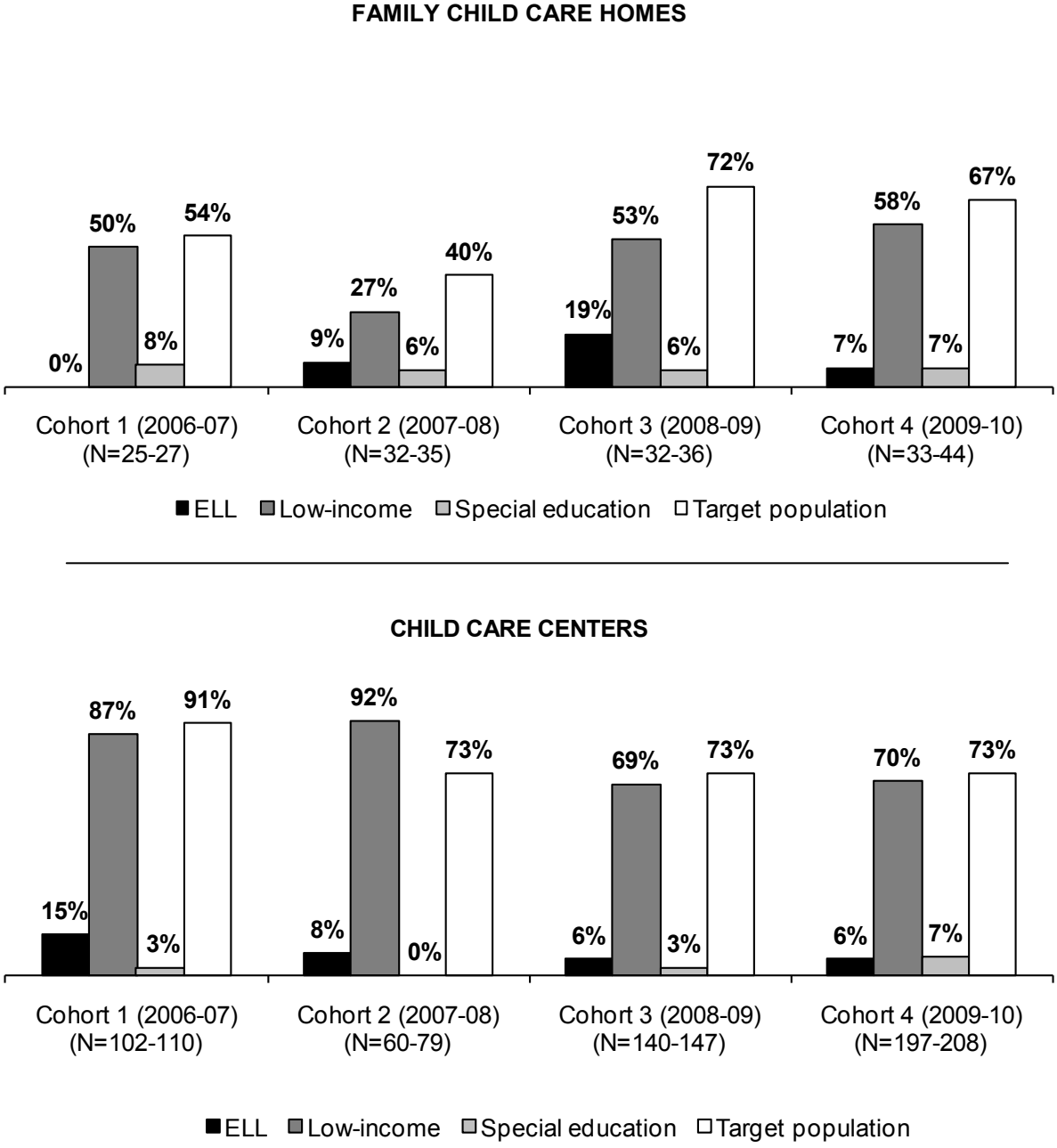
[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

Figure A13 shows the percentages of PEK child care children in the program's target populations during the first four years in child care settings.

A13. PEK community component. Representation of PEK target populations, 2006-07 to 2009-10



Note: PEK targets children who are English Language Learners (ELL), from low-income families, or need Special Education services. "Target population" reflects the percentage of children who are in any of these three groups.

Comparison group demographics

When they reach kindergarten, the first two cohorts of PEK child care participants are compared to children who participated in the PEK school component as well as children in the school component's comparison group. As in the school component, the comparison group is broken down into those with prior preschool or child care center experience and those without. In both Cohorts 1 and 2, we found that PEK child care children differed somewhat demographically from their kindergarten comparison groups, which included PEK school-based children and the comparison group with preschool experience and the one without it. First, the proportions of ELL children in these three groups of kindergarten classmates across the two cohorts (44-53%) were much higher than in child care Cohort 1 (23%) and Cohort 2 (3%). Second, these groups had higher proportions of Asian children (22-38%) than child care Cohort 1 (6%) and Cohort 2 (3%). As with analyses in the school component, in cases where former PEK child care children differed from comparison group children based on demographic characteristics or when in the fall they were tested, we statistically adjusted for those differences in our analysis (see Mueller, 2008).

Changes over time

Also as in the school component, it is possible for child care children's demographic characteristics to change over time. For example, some parents may not initially know whether their children need Special Education services. As another example, some parents may not initially know that their child is eligible for free or reduced-price lunch, may not apply until their child enters school, or may experience a change in their eligibility.

Changes due to attrition

Following PEK, Wilder Research assesses participants in the community-based portion if they attend kindergarten in Saint Paul. As in the school component, children attending kindergarten outside of Saint Paul are not reflected in the results. In fall 2007, we were able to assess 47 (65%) of the 4-year-olds who had participated in PEK at child care sites during 2006-07 (Cohort 1) and were beginning kindergarten in fall 2007. In fall 2008, 34 (62%) of the 4-year-olds who had participated in PEK at child care sites during 2007-08 (Cohort 2) were assessed. In fall 2009, assessments were conducted with 77 (78%) of the 4-year-olds who had participated in community-based PEK during 2008-09 (Cohort 3).

Attendance

For children participating in PEK child care Cohort 1, attendance data are available from September 1, 2006, through August 31, 2007 (Figure A14). For child care Cohort 2, attendance data are available from September 1, 2007, through April 30, 2008 (Figure A15). The initial group of child care providers participating in the program ended their contracts with PEK in spring 2008, and complete attendance data were not available for

the remainder of the year. Attendance data for Cohort 3 children who began with the second cohort of providers are available from September 1, 2008, through August 31, 2009 (Figure A16). For child care Cohort 4, attendance data are available from September 1, 2009, through June 30, 2010 (Figure A17).

For Cohort 1, the number of days children attended varied widely, in part because some of the family child care homes did not participate in PEK during the entire period. From September 2006 through August 2007, 4-year-olds attended an average of 163 days at family child care homes with a range of 111-235 days, and attended an average of 165 days at child care centers with a range of 38-248 days. Eight (14%) of the center children attended 100 or fewer days. Three-year-olds' attendance was slightly higher during that time on average, with an average of 182 days at homes and 168 days at centers (Figure A14).

Again, for Cohort 2 attendance data are available for only September 2007 through April 2008. During these eight months, 4-year-olds attended an average of 134 days at homes with a range of 70-158 days, and an average of 122 days at centers with a range of 20-164 days. Four of these home children (22%) and nine of these center children (24%) attended 100 or fewer days. Three-year-olds attended an average of 125 days at homes and 114 days at centers during this time (Figure A15).

The attendance rate for Cohort 3 children is generally higher than the previous two cohorts. From September 2008 through August 2009, 4-year-olds attended an average of 181 days at family child care homes with a range of 132 to 216 days, and attended an average of 192 days at child care centers with a range of 78 to 249 days. Three-year-olds attended an average of 159 days at homes and 198 days at centers (Figure A16).

For Cohort 4, attendance of 4-year-olds from September 2009 through June 2010 ranged from 61 to 214 days at family child care homes, and from 12 to 205 days at child care centers. The average number of days that 4-year-olds attended was 153 at homes and 149 at centers. Three-year-olds' attendance was slightly lower during that time, averaging 139 days at homes and 132 days at centers (Figure A17).

A14. PEK community component. PEK community-based Cohort 1 children's attendance (September 1, 2006, to August 31, 2007)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	-	-	-	-
60-80	-	-	3	6%
81-100	-	-	6	12%
101-120	-	-	3	6%
121-140	2	15%	4	8%
141-160	1	8%	5	10%
161-180	2	15%	6	12%
181-200	3	23%	7	13%
201-220	4	31%	6	12%
More than 220 days	1	8%	12	23%
Total	13	100%	52	100%
Average	182		168	
Median	184		178	
Range	121-239		65-241	
Age 4				
Fewer than 60 days	-	-	2	3%
60-80	-	-	1	2%
81-100	-	-	5	9%
101-120	1	7%	2	3%
121-140	2	14%	3	5%
141-160	4	29%	11	19%
161-180	3	21%	12	21%
181-200	1	7%	9	16%
201-220	2	14%	4	7%
More than 220 days	1	7%	9	16%
Total	14	100	58	100%
Average	163		165	
Median	161		175	
Range	111-235		38-248	

Note: *The number of days offered by family child care homes varied widely, with some homes not participating in PEK during this entire period. The range was 129 to 252 days between September 1, 2006, and August 31, 2007. For child care centers, it was 250 to 253 days.*

A15. PEK community component. PEK community-based Cohort 2 children's attendance (September 1, 2007, to April 30, 2008)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	2	12%	3	7%
60-80	-	-	6	14%
81-100	2	12%	11	26%
101-120	1	6%	2	5%
121-140	3	18%	3	7%
141-160	9	53%	12	29%
161-180	-	-	5	12%
181-200	-	-	-	-
201-220	-	-	-	-
More than 220 days	-	-	-	-
Total	17	100%	42	100%
Average	125		114	
Median	141		116	
Range	40-159		37-165	
Age 4				
Fewer than 60 days	-	-	4	11%
60-80	2	11%	4	11%
81-100	2	11%	1	3%
101-120	-	-	4	11%
121-140	3	17%	5	14%
141-160	11	61%	17	46%
161-180	-	-	2	5%
181-200	-	-	-	-
201-220	-	-	-	-
More than 220 days	-	-	-	-
Total	18	100%	37	100%
Average	134		122	
Median	151		144	
Range	70-158		20-164	

Notes: *In 2007-08, attendance was recorded for both centers and homes from September 1, 2007 through April 30, 2008. Some of the family child care programs did not offer PEK during this entire period, however. The number of months offered by family child care homes ranged from six to eight months during this period.*

A16. PEK community component. PEK community-based Cohort 3 children's attendance (September 1, 2008, to August 31, 2009)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
60-80	1	6%	-	-
81-100	1	6%	-	-
101-120	-	-	2	3%
121-140	3	19%	6	9%
141-160	2	12%	4	6%
161-180	4	25%	11	16%
181-200	2	12%	7	10%
201-220	2	12%	12	185
More than 220 days	1	6%	26	38%
Total	16	100%	68	100%
Average	159		198	
Median	168		206	
Range	72-225		107-249	
Age 4				
60-80	-	-	1	1%
81-100	-	-	3	4%
101-120	-	-	2	3%
121-140	1	5%	3	4%
141-160	3	15%	6	8%
161-180	4	20%	14	18%
181-200	9	45%	13	16%
201-220	3	15%	15	19%
More than 220 days	-		22	28%
Total	20	100%	79	100%
Average	181		192	
Median	185		197	
Range	132-216		78-249	

Note: *The range in the number of days offered at family child care homes was 171 to 251 days between September 1, 2008, and August 31, 2009, with the exception of one child care home that offered 87 days. For child care centers, it was 247 to 253 days.*

A17. PEK community component. PEK community-based Cohort 4 children's attendance (September 1, 2009, to June 30, 2010)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	4	17%	10	10%
60-80	-	-	3	3%
81-100	1	4%	8	8%
101-120	2	9%	22	22%
121-140	3	13%	13	13%
141-160	3	13%	11	11%
161-180	2	9%	14	14%
181-200	6	26%	15	15%
201-220	2	9%	4	4%
More than 220 days	-	-	-	-
Total	23	100%	100	100%
Average	139		132	
Median	159		130	
Range	23-214		12-203	
Age 4				
Fewer than 60 days	-	-	10	10%
60-80	1	6%	4	4%
81-100	-	-	5	5%
101-120	4	22%	7	7%
121-140	2	11%	9	9%
141-160	1	6%	14	13%
161-180	5	28%	23	22%
181-200	3	17%	25	24%
201-220	2	11%	8	8%
More than 220 days	-	-	-	-
Total	18	100%	105	100%
Average	153		149	
Median	167		163	
Range	61-214		12-205	

Note: *The range in the number of days offered at family child care homes was 171 to 251 days between September 1, 2009, and June 30, 2010, with the exception of one child care home that offered 87 days. For child care centers, it was 247 to 253 days. Two family child care homes that reported incomplete data are excluded from these results.*

Evaluation

PEK participates in a rigorous evaluation. The program views evaluation as an important sustainability strategy in that, ultimately, the evaluation will provide evidence of whether the model warrants continuation and replication. The evaluation includes two components: an implementation evaluation and an outcomes evaluation. Wilder Research holds primary responsibility for the evaluation, with support and assistance from Saint Paul Public Schools' Department of Research, Evaluation and Assessment.

Program implementation

The implementation evaluation addresses the overarching question, Does PEK provide a high-quality preschool program that is aligned with the Project for Academic Excellence and integrated into the school system? The implementation evaluation also assesses the degree to which PEK is serving the target population of high-need students, as well as parent involvement and school-family linkages.

Researchers gather information on the children served and the extent to which schools and child care settings are implementing the program. Information is gathered from surveys and focus groups conducted by Wilder Research, records data provided by the district and PEK staff, and observations conducted and reports prepared by the program's evaluator from Saint Paul Public Schools and staff of the University of Minnesota's Center for Early Education and Development. Principal and PEK teacher surveys provide information on principals' perceptions of PEK implementation and teachers' interactions with parents. The kindergarten teacher survey gives information on their connections with PEK and its teachers. Parent surveys provide information on their involvement in their children's learning and school activities, their satisfaction with PEK, and children's prior educational experiences and family background. Focus groups with child care teachers and directors provide feedback on their experiences with the program. To gather information about how the program is implemented in each setting, outside observers use structured questionnaires. Additionally, school and program records provide information about student enrollment, demographics, and attendance at PEK.

Program outcomes

Wilder Research's evaluation focuses on the program's outcomes. It answers the key question, Does a high-quality preschool program aligned with the Project for Academic Excellence improve students' educational outcomes? To answer this, evaluators need to know the following:

- Are children better prepared for kindergarten because they participated in PEK?

- Do they perform better in elementary school (kindergarten through third grade)?
- What are the benefits for children, families, and teachers of having pre-K programs integrated with schools?
- Is it cost-effective?

Wilder Research addresses these questions through a quasi-experimental research design. Children are tested over time and in developmentally appropriate ways to see how they progress academically and socially, and whether program effects are sustained through early grade school. The study compares a treatment group of children who received PEK services with a comparison group who did not. Experimental research, involving random assignment to treatment and control groups, can be difficult to attain in education research. This quasi-experimental approach presents a rigorous alternative. While the study will not be able to prove absolutely that PEK causes specific outcomes, researchers will be able to draw reasonable inferences about the changes that can be attributed to the program.

The study's design and its use of nationally validated assessment instruments also allow researchers to compare PEK results with results from other public school-related preschool programs around the country. The *Peabody Picture Vocabulary Test III* (PPVT III) measures receptive vocabulary, and three subtests of the *Woodcock-Johnson III Tests of Achievement* (WJ III) – Letter-Word Identification, Spelling, and Applied Problems – measure early skills in reading, writing, and math, respectively. Wilder Research staff administer these tests one-on-one with children at the school sites each fall, and beginning in 2008-09, with children at child care sites. Teachers also complete assessments of individual students in the fall. They assess students' social skills, problem behaviors, and academic competence on the *Social Skills Rating System* (SSRS).

The following section describes the samples included in the norming or standardization studies of these assessments. Assessment results (age-standardized scores) based on these nationally representative samples are used as a reference point for understanding how well PEK students are performing and progressing.

Standardization of child assessments

This section explains the samples included in the standardization studies of the Peabody, Woodcock Johnson, and Social Skills Rating System. The information is reported for the age groups relevant to our study. This information comes from the assessment manuals (Dunn & Dunn, 1997; Woodcock, McGrew, & Mather, 2001; Gresham & Elliott, 1990).

Peabody

The standardization of the Peabody Picture Vocabulary Test-III (Dunn & Dunn, 1997) was conducted during 1995 and 1996. The standardization sample was selected to match proportionately the U.S. census data from the March 1994 Current Population Survey. A total of 2,725 persons were included in the sample (ages 2½ to 90+). Because of the rapid changes in vocabulary development in children between the ages of 2½ and 6, samples were divided into six-month age intervals for these early years. For ages 7 through 9, when vocabulary development follows a more moderate but steady growth pattern, whole-year intervals were used. For each of the age intervals, 100 children were included, with about an equal number of boys and girls. The PPVT III sample was generally representative of the U.S. population. The sample came from the Northeast, North Central, South, and West geographic regions of the US. For 2-9 year olds, the sample includes 21-22 percent African-American, 13-14 percent Hispanic, 59-61 percent White, and 5 percent other racial/ethnic groups.

Woodcock Johnson

Normative data for the Woodcock Johnson Tests of Achievement-III (Woodcock, McGrew, & Mather, 2001) were gathered from 8,818 subjects in over 100 geographically diverse U.S. communities. The preschool sample (ages 2 to 5) included 1,143 children, and the K-12 sample included 4,783 children. According to the manual, the norming sample was selected to be representative, within practical limits, of the U.S. populations from age 24 months to age 90 years and older according to the 2000 census projections. For preschool and grades K-12, subjects were randomly selected within a stratified sampling design that controlled for specific community and subject variables: regions (Northeast, Midwest, South, and West); community size (central city, larger community, and smaller community); sex; race (White, Black, American Indian, Asian and Pacific Islander); Hispanic (Hispanic, non-Hispanic); type of school (public, private, and home); and father's and mother's education levels. The population for preschool and K-12 during the norming time was composed of White (78-79%); Black (16-17%); American Indian (1%); and Asian and Pacific Islander (5%). About half of the population was male (51%) and female (49%).

Social Skills Ratings System

The Social Skills Rating System (Gresham & Elliott, 1990) was standardized on a national sample of 4,170 children using their self-ratings as well as the ratings of children made by 1,027 parents and 259 teachers collected in spring 1988. The 259 teachers made 1,335 ratings of children, including 1,021 elementary and 314 secondary school children. In all, 6,933 ratings of social skills were made by teachers, parents, and students.

Overall, about 27 percent of the standardization sample consisted of minority students, while about 31 percent of the U.S. population was from racial or ethnic minorities according to the 1990 census projections. The sample was selected from four U.S. regions: Northeast, North Central, South, and West regions, including a total of 18 states. Central cities, suburban or small town, and rural communities were represented in the sample.

Age-standardized scores

For some analyses, results are reported as age-standardized scores, which have a mean of 100 and a standard deviation of 15 in the national normative sample. This enables us to gauge the level of PEK children's academic skills with reference to a nationally representative sample of children. The national norms serve as useful reference points, in part because a key goal of the program is to close the achievement gap. However, PEK children, as a group, differ demographically from the national normative samples. For this reason, the national norms are used only as reference points and are not used to estimate the impact of PEK. Instead, local comparison groups, developed for the study, are used for estimating the program's impact.

Age-equivalent scores

In some cases, results are reported as age-equivalent scores reported in years and months. The age-equivalent scores are not as mathematically precise as the age-standardized scores, but they are helpful in interpreting what the results mean (i.e., equating academic skill levels to chronological age).

Assessment schedule

Figure A18 shows the study's assessment schedule over the five-year period from 2005-06 to 2009-10.

A18. PEK assessment schedule, 2005-06 to 2009-10

Groups	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Spring 2010
SCHOOL COMPONENT						
Cohort 1:						
PEK students	PEK	Kindergarten	First grade	None[c]	Third grade[d]	Third grade[e]
Classmates[a]	None	Kindergarten	First grade	None[c]	Third grade[d]	Third grade[e]
Cohort 2:						
PEK students		PEK	Kindergarten	First grade	Second grade	None
Classmates[a]		None	Kindergarten	First grade	Second grade	None
Cohort 3:						
PEK students			PEK	Kindergarten	First grade	None
Classmates[a]			None	Kindergarten	First grade	None
COMMUNITY (CHILD CARE) COMPONENT						
Cohort 1		None[b]	Kindergarten	None	None	None
Cohort 2			None[b]	Kindergarten	None	None
Cohort 3				PEK[b]	Kindergarten	None
Cohort 4					PEK[b]	None

[a] *"Classmates" refers to the comparison group students who attended kindergarten at the 10 original PEK schools and who did not attend PEK at school or child care sites.*

[b] *Individual Growth and Development Indicators (IGDIs) are used in PEK child care. For child care Cohorts 3 and 4 only, the PPVT III and WJ III are also administered in fall of PEK (fall 2008 and fall 2009) to children who will attend kindergarten the following fall.*

[c] *Cohort 1 school students who participated during the program's initial year of implementation are not assessed in second grade.*

[d] *SSRS only.*

[e] *MCA-IIs in reading and math.*

Note: *Unless otherwise noted, this assessment schedule pertains to the WJ III, PPVT III, and SSRS. If funding permits, Cohorts 2 and 3 at PEK school sites will also be followed into third grade (2010-11 for Cohort 2 and 2011-12 for Cohort 3). Cohort 4 at child care sites will be followed into kindergarten in fall 2010.*

PEK school sites

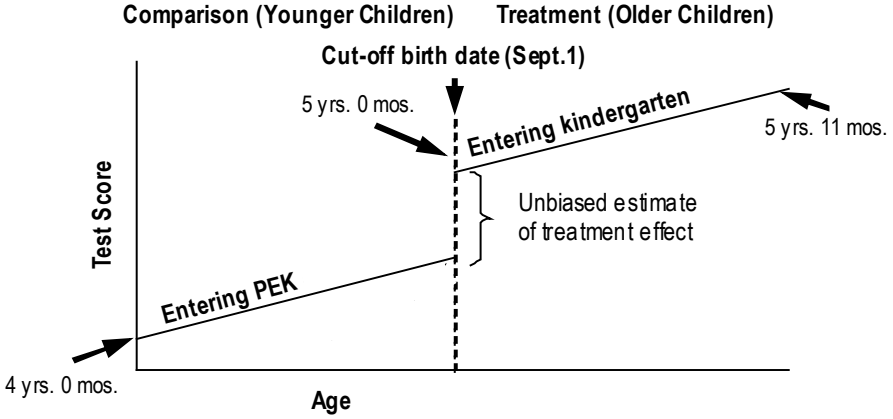
For children attending the 10 original PEK schools, the study assesses the following program outcomes: 1) the progress they make during PEK, and 2) the impact of PEK on their later academic performance. Progress during PEK is measured by comparing children's baseline (fall of PEK) test scores with their scores one year later, in the fall of kindergarten. To measure PEK's impact, the study compares PEK participants' academic and social skills to those of their peers over time, as described below.

Comparisons to peers

Using the assessments mentioned earlier, children attending PEK schools are compared to two different groups of peers. First, they are compared to similar children who applied and were accepted for PEK, but who have not yet attended the program. In this analysis, children who just finished PEK constitute the "treatment" group, and children who are just beginning PEK constitute the "no-treatment" comparison group. Because children develop rapidly at this age, Wilder Research uses a statistical model that estimates the difference between the two groups right at the program's September 1 birthday cutoff point. Near the cutoff point, children from both groups are essentially the same age but treatment-group children have completed the program and comparison-group children have not. This analysis provides a comparison of children with similar characteristics, and eliminates the selection bias that can occur if families who choose to enroll their children in the program differ in important ways from those who do not. This analysis is referred to as the "birthday cutoff" method (regression discontinuity design), illustrated in Figure A19.

A19. PEK school component. "Birthday cutoff" method illustration, assuming effective treatment

Note: *The PEK school component uses the "birthday cutoff" method. In this method, treatment and comparison groups are defined by whether a child's fourth birthday falls before or on/after September 1, the birthday cutoff date used to determine eligibility for PEK. For students attending PEK in 2005-06, the treatment group consists of children who enrolled in PEK in fall 2005 and whose fourth birthdays, therefore, fell before September 1, 2005 (Cohort 1). The comparison group consists of children who entered PEK a year later in fall 2006 and whose fourth birthdays fell on/after September 1, 2005, but before September 1, 2006 (Cohort 2). Upon kindergarten entry, the treatment group (Cohort 1 in this case) is compared to the comparison group which is just entering PEK (Cohort 2 in this case). The comparison is carried out using a regression-discontinuity research design in which two regression lines estimating test scores by age are developed, one for the treatment group and one for the comparison group. The regression-discontinuity approach assumes that a child who just made the age cutoff and a child who just missed it have similar characteristics, except that the former child has received the treatment (PEK) while the latter child has not. Given this assumption, the estimated test score difference at the cutoff date should provide an unbiased estimate of the treatment effect (Barnett et al., 2005; Gormley et al., 2005). For students attending PEK in 2006-07, the treatment group consists of Cohort 2 and the comparison group consists of Cohort 3.*



Second, once PEK children reach kindergarten, they are compared to their kindergarten classmates. These classmates may differ in some ways from PEK children. They have had a range of prior preschool and child care experiences, and some have had no formal preschool or child care experiences at all. This comparison reveals how developmental skills of PEK children compare to skills of kindergartners coming from a variety of backgrounds.

Comparisons over time

To see whether program effects last over time, PEK school children and their classmates are assessed in subsequent years as well. The study will continue to follow these two groups through third grade. The same assessments of academic and behavioral progress described

earlier are used in these early primary grades, with the exception of third grade when the *Minnesota Comprehensive Assessments–Series II* is used.

It should be noted that the classmate comparison group is defined as children who: a) are kindergarten classmates of former PEK children, and b) attend kindergarten at one of the 10 original PEK school sites. PEK children are followed in kindergarten as long as they remain in Saint Paul public schools. After kindergarten, both the former PEK school students and the comparison group are followed as they move through the primary grades as long as they remain in Saint Paul public schools.

PEK child care sites

In the child care component, the evaluation of program outcomes is similar to but not as extensive as the evaluation of the school-based component. Wilder Research assesses academic progress during the PEK year for children in child care Cohorts 3 and 4, assessing them in both the fall of PEK and the fall of kindergarten. Children in child care Cohorts 1 and 2 were assessed in kindergarten only. For child care cohorts, PEK's impact will be assessed in fall of kindergarten but not later years. In kindergarten, evaluators compare PEK child care participants' academic and social skills to those of their kindergarten classmates and those of students who attended the PEK school component. These comparisons are based on the same assessments used in the school component (i.e., the PPVT III, WJ III, and SSRS).

Other measures

In addition to the child assessments conducted as part of the evaluation, teachers also use formal tools to monitor individual children's progress over the course of the year. These tools include Work Sampling System assessments and Individual Growth and Development Indicators (IGDIs). Although not formally a part of the evaluation, the IGDI results are discussed briefly in the context of other student outcomes presented in this report. Finally, once sufficient data are available, Wilder Research's economists plan to conduct a cost-effectiveness analysis of the program. The analysis will be based on placing PEK findings in the context of other studies following participants over longer periods of time.

Statistical tests

We use a variety of statistical tests in the report, including Analysis of Covariance (ANCOVA) and *t*-tests to measure differences between groups. We use Analysis of Covariance to examine differences between groups, adjusting for differences in demographic characteristics and test date between groups. To examine year-to-year change within group, paired samples *t*-tests are used. In some cases, we use Repeated Measures Analysis of Covariance to examine the interactions between groups in their

year-to-year change, adjusting for the differences among groups in their characteristics. The specific statistical test used is indicated in the notes to each figure in the Appendix.

Statistical significance

In some cases, this report refers to differences between groups that are "significant." By significant, we mean that the difference is significant at the 0.05 level based on a statistical test. In other words, there is less than a 1 in 20 probability that the difference occurred by chance.

School-based PEK results

Progress between kindergarten and first grade

Academic assessments

A20. PEK school component. Academic test standard score one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2006)	1st grade (fall 2007)	Change[c]
PEK Cohort 1				
Peabody Picture Vocabulary Test III	238	91.1	93.4	+2.3**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	237	101.8	103.3	+1.5*
Spelling (writing)	238	102.2	104.0	+1.8**
Applied Problems (math)	237	93.8	102.7	+8.9***
Classmates				
Peabody Picture Vocabulary Test III	261	86.1	90.0	+3.9***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	259	97.1	100.1	+3.0***
Spelling (writing)	260	98.3	102.5	+4.2***
Applied Problems (math)	258	90.1	100.4	+10.3***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 1 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

* *p<.05*

** *p<.01*

*** *p<.001*

A21. PEK school component. Adjusted academic test standard score one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2006)	1st grade (fall 2007)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 1	232	90.9	93.3	+2.4	ns
Classmates	261	86.3	90.4	+4.1	
WJ-III Letter-Word Identification (reading)					
PEK Cohort 1	232	101.7	103.2	+1.5	ns
Classmates	259	97.4	100.4	+3.0	
WJ-III Spelling (writing)					
PEK Cohort 1	232	102.0	103.9	+1.9	*
Classmates	260	98.6	102.7	+4.1	
WJ-III Applied Problems (math)					
PEK Cohort 1	231	93.6	102.6	+9.0	ns
Classmates	258	90.3	100.5	+10.2	

Note: *The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 1 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 1 and the* classmate comparison group.

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 1 and the* classmate comparison group.

ns Not significant

* *p<.05*

A22. PEK school component. Academic test standard score one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2007)	1st grade (fall 2008)	Change[c]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	225	92.2	92.3	+0.2
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	224	103.5	105.4	+1.9**
Spelling (writing)	224	104.6	105.6	+1.0
Applied Problems (math)	224	94.7	103.9	+9.2***
Classmates				
Peabody Picture Vocabulary Test III	214	84.2	87.9	+3.8***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	97.8	101.4	+3.6***
Spelling (writing)	214	99.2	103.3	+4.0***
Applied Problems (math)	210	90.0	100.2	+10.2***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

* *p<.05*

** *p<.01*

*** *p<.001*

A23. PEK school component. Adjusted academic test standard score one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2007)	1st grade (fall 2008)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 2	223	91.5	91.9	+0.4	***
Classmates	212	84.9	88.6	+3.7	
WJ-III Letter-Word Identification (reading)					
PEK Cohort 2	222	103.4	105.6	+2.2	ns
Classmates	212	97.9	101.3	+3.4	
WJ-III Spelling (writing)					
PEK Cohort 2	222	104.7	105.8	+1.1	**
Classmates	212	99.0	103.1	+4.1	
WJ-III Applied Problems (math)					
PEK Cohort 2	222	94.6	104.1	+9.5	ns
Classmates	209	90.2	100.3	+10.1	

Note: *The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 2 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 2 and the* classmate comparison group.

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 2 and the* classmate comparison group.

ns Not significant

** *p<.01*

*** *p<.001*

A24. PEK school component. Academic test standard score one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2008)	Mean standard scores[b] 1st grade (fall 2009)	Change[c]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	215	94.3	92.5	-1.8**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	106.6	104.3	-2.3***
Spelling (writing)	214	109.8	104.4	-5.4***
Applied Problems (math)	214	96.6	103.9	+7.3***
Classmates				
Peabody Picture Vocabulary Test III	258	85.6	86.1	+0.5
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	257	99.8	99.4	-0.5
Spelling (writing)	256	103.0	98.8	-4.2***
Applied Problems (math)	255	88.5	98.1	+9.6***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 3 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

** *p<.01*

*** *p<.001*

A25. PEK school component. Adjusted academic test standard score one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2008)	1st grade (fall 2009)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 3	214	94.7	92.7	-2.0	**
Classmates	256	85.4	86.0	+0.6	
WJ-III Letter-Word Identification (reading)					
PEK Cohort 3	213	106.3	104.0	-2.3	*
Classmates	255	100.1	99.7	-0.4	
WJ-III Spelling (writing)					
PEK Cohort 3	213	109.6	104.2	-5.4	ns
Classmates	254	103.1	99.2	-3.9	
WJ-III Applied Problems (math)					
PEK Cohort 3	213	96.6	103.7	+7.1	**
Classmates	253	88.6	98.5	+9.9	

Note: *The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 3 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 3 and the* classmate comparison group.

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 3 and the* classmate comparison group.

ns Not significant

* *p<.05*

** *p<.01*

A26. PEK school component. Academic test age equivalency one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2006)	1st grade (fall 2007)	Change
PEK Cohort 1				
Peabody Picture Vocabulary Test III	238	4-11	6-01	+14 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	237	5-10	6-11	+13 months
Spelling (writing)	238	5-09	6-11	+14 months
Applied Problems (math)	237	5-03	6-08	+17 months
Classmates				
Peabody Picture Vocabulary Test III	261	4-07	5-10	+15 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	259	5-07	6-09	+14 months
Spelling (writing)	260	5-06	6-09	+15 months
Applied Problems (math)	258	4-11	6-08	+21 months

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 1 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

A27. PEK school component. Academic test age equivalency one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2007)	1st grade (fall 2008)	Change
PEK Cohort 2				
Peabody Picture Vocabulary Test III	225	5-00	6-02	+14 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	224	6-00	7-00	+12 months
Spelling (writing)	224	5-11	7-00	+13 months
Applied Problems (math)	224	5-03	6-11	+20 months
Classmates				
Peabody Picture Vocabulary Test III	214	4-03	5-09	+18 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	5-07	6-10	+15 months
Spelling (writing)	214	5-06	6-11	+17 months
Applied Problems (math)	210	4-11	6-08	+21 months

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

28. PEK school component. Academic test age equivalency one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2008)	1st grade (fall 2009)	Change[b]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	215	5-04	6-02	+10 months***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	215	6-02	7-00	+10 months***
Spelling (writing)	215	6-04	7-00	+8 months***
Applied Problems (math)	215	5-05	6-11	+18 months***
Classmates				
Peabody Picture Vocabulary Test III	258	4-07	5-07	+11 months***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	258	5-09	6-09	+12 months***
Spelling (writing)	258	5-11	6-09	+10 months***
Applied Problems (math)	257	4-10	6-05	+19 months***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 3 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Fall of first grade score minus fall of kindergarten score.*

*** *p<.001*

Differences in first grade compared to classmates

Academic assessments

A29. PEK school component (fall 2007). Academic test standard scores in first grade: PEK Cohort 1 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 1 (N=238)	With preschool/ child care center (N=121)	Without preschool/ child care center (N=140)
Peabody Picture Vocabulary Test III	Mean	93.4	91.6	88.7
	Adjusted mean[d]	93.3	91.0	89.3**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	103.2	101.2	98.9
	Adjusted mean[d]	102.8	102.2	98.7**
Spelling (writing)	Mean	104.0	103.9	101.2
	Adjusted mean[d]	103.7	104.8	100.9*
Applied Problems (math)	Mean	102.4	100.3	100.0
	Adjusted mean[d]	102.0	101.1	100.0

Note: *The analysis compares test scores of PEK Cohort 1 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

* *p<.05, compared to PEK Cohort 1.*

** *p<.01, compared to PEK Cohort 1.*

A30. PEK school component (fall 2008). Academic test standard scores in first grade: PEK Cohort 2 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 2 (N=230-232)	With preschool/ child care center (N=110)	Without preschool/ child care center (N=71)
Peabody Picture Vocabulary Test III	Mean	92.1	88.9	86.7
	Adjusted mean[d]	91.1	90.8	86.9*
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	105.4	99.2	103.5
	Adjusted mean[d]	105.3	100.5***	101.8*
Spelling (writing)	Mean	105.7	101.6	104.7
	Adjusted mean[d]	105.8	102.7*	102.8*
Applied Problems (math)	Mean	104.0	99.8	101.3
	Adjusted mean[d]	103.6	101.2	100.5

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

* *p<.05, compared to PEK Cohort 2.*

** *p<.01, compared to PEK Cohort 2.*

A31. PEK school component (fall 2009). Academic test standard scores in first grade: PEK Cohort 3 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 3 (N=237)	With preschool/ child care center (N=131-132)	Without preschool/ child care center (N=66)
Peabody Picture Vocabulary Test III	Mean	92.1	87.0	84.6
	Adjusted mean[d]	92.1	86.5***	85.7**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	104.2	101.5	97.7
	Adjusted mean[d]	104.1	102.4	96.6***
Spelling (writing)	Mean	104.5	99.9	98.0
	Adjusted mean[d]	104.3	100.6*	97.1**
Applied Problems (math)	Mean	103.3	99.2	96.5
	Adjusted mean[d]	103.1	99.8*	96.0**

Note: *The analysis compares test scores of PEK Cohort 3 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

* *p<.05, compared to PEK Cohort 3.*

** *p<.01, compared to PEK Cohort 3.*

*** *p<.001, compared to PEK Cohort 3.*

A32. PEK school component. Academic test age-equivalency scores in first grade: PEK students versus classmates[a]

	Mean adjusted[b] age-equivalency scores (years-months)		
		Classmate comparison group in 1st grade[c]	
Test	**PEK Cohort 1 (N=238)**	**With preschool/ child care center (N=121)**	**Without preschool/ child care center (N=140)**
Peabody Picture Vocabulary Test III	6-02	6-00	5-10**
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-11	6-10	6-08**
Spelling (writing)	6-11	6-11	6-09*
Applied Problems (math)	6-08	6-08	6-05
	PEK Cohort 2 (N=232)	**With preschool/ child care center (N=110)**	**Without preschool/ child care center (N=71)**
Peabody Picture Vocabulary Test III	6-00	6-00	5-08*
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-00	6-10***	6-11*
Spelling (writing)	7-00	6-11*	6-11*
Applied Problems (math)	6-11	6-08	6-08
	PEK Cohort 3 (N=237)	**With preschool/ child care center (N=131-132)**	**Without preschool/ child care center (N=66)**
Peabody Picture Vocabulary Test III	6-01	5-07***	5-06**
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-00	6-11	6-07***
Spelling (writing)	6-11	6-09*	6-07**
Applied Problems (math)	6-11	6-05*	6-02**

Note: *The analysis compares test scores of the PEK Cohorts with the scores of their respective classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

**p<.05, **p<.01, ***p<.001, compared to the respective PEK Cohort (based on results of the analysis comparing standard scores)*

A33. PEK school component. PEK academic test effect sizes in first grade: PEK students versus classmates

Test	Estimated size of PEK effects[a]	
Cohort 1	**Cohort 1 vs. preschool comparison group**	**Cohort 1 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	ns	0.26
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	ns	0.30
Spelling (writing)	ns	0.23
Applied Problems (math)	ns	ns
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	ns	0.28
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	0.37	0.26
Spelling (writing)	0.25	0.25
Applied Problems (math)	ns	ns
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	0.37	0.40
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	ns	0.57
Spelling (writing)	0.25	0.59
Applied Problems (math)	0.24	0.55

[a] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of the PEK cohort and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8. These results are based on adjustments for demographic (gender, age, race/ethnicity, free/reduced-price lunch eligibility, ELL status, and Special Education status) and test date differences of the groups being compared.*

[ns] *Not significant*

Teacher ratings

A34. PEK school component (fall 2007). Teachers' ratings in first grade: PEK Cohort 1 versus classmates[a]

Assessment		PEK Cohort 1	Mean standard scores[b] Classmate comparison group in 1st grade[c] With preschool/ child care center	Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	99.9	99.2	103.9
	Adjusted mean[d]	99.9	100.1	103.0
	Number assessed	210	108	117
Problem Behaviors	Mean	97.8	98.0	96.6
	Adjusted mean[d]	97.9	96.9	97.4
	Number assessed	211	109	117
Academic Competence	Mean	95.4	93.4	91.5
	Adjusted mean[d]	95.2	93.9	91.4**
	Number assessed	212	107	118

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 1 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *First-grade classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status.*

** *p<.01, compared to PEK Cohort 1.*

A35. PEK school component (fall 2008). Teachers' ratings in first grade: PEK Cohort 2 versus classmates[a]

Assessment		PEK Cohort 2	Mean standard scores[b] Classmate comparison group in 1st grade[c] With preschool/ child care center	Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	101.5	98.6	101.4
	Adjusted mean[d]	101.5	99.2	100.4
	Number assessed	206	94	57
Problem Behaviors	Mean	96.7	101.4	99.5
	Adjusted mean[d]	96.6	101.0*	100.5
	Number assessed	208	94	57
Academic Competence	Mean	95.3	90.8	92.7
	Adjusted mean[d]	95.4	91.2**	92.0
	Number assessed	211	94	58

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 2 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *First-grade classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status.*

* *p<.05, compared to PEK Cohort 2.*

** *p<.01, compared to PEK Cohort 2.*

A36. PEK school component (fall 2009). Teachers' ratings in first grade: PEK Cohort 3 versus classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	103.1	100.6	103.8
	Adjusted mean[c]	102.9	101.8	102.1
	Number assessed	177	99	49
Problem Behaviors[e]	Mean	96.7	100.3	95.3
	Adjusted mean[c]	97.0	98.9	96.8
	Number assessed	178	100	49
Academic Competence[f]	Mean	95.9	92.8	90.0
	Adjusted mean[c]	95.5	93.6	89.9**
	Number assessed	178	100	49

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 3 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. *Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

** *p<.01, compared to PEK Cohort 3.*

A37. PEK school component. PEK social skills effect sizes in first grade: PEK students versus classmates

Test	Estimated size of PEK effects[a]	
Cohort 1	**Cohort 1 vs. preschool comparison group**	**Cohort 1 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	ns	ns
Academic Competence	ns	0.28
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	0.29	ns
Academic Competence	0.33	ns
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	ns	ns
Academic Competence	ns	0.45

[a] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of the PEK cohort and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8. These results are based on adjustments for demographic (gender, age, race/ethnicity, free/reduced-price lunch eligibility, ELL status, and Special Education status) and test date differences of the groups being compared.*

ns Not significant

Progress between first and second grades

Academic assessments

A38. PEK school component. Academic test standard score one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean standard scores[b] 1st grade (fall 2008)	2nd grade (fall 2009)	Change[c]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	202	92.8	94.2	+1.4*
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	201	105.6	103.5	-2.0***
Spelling (writing)	200	106.0	102.3	-3.7***
Applied Problems (math)	200	104.3	104.4	+0.1
Classmates				
Peabody Picture Vocabulary Test III	181	87.9	89.0	+1.0
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	181	102.0	98.7	-3.3***
Spelling (writing)	181	103.7	100.2	-3.5***
Applied Problems (math)	181	100.4	101.1	+0.7

Note: *The analysis examines change from fall of first grade to fall of second grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of second grade score minus fall of first grade score.*

* *p<.05*

*** *p<.001*

A39. PEK school component. Adjusted academic test standard score one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] 1st grade (fall 2008)	2nd grade (fall 2009)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 2	200	92.1	93.6	+1.5	ns
Classmates	179	88.9	89.7	+0.8	
WJ-III Letter-Word Identification (reading)					
PEK Cohort 2	199	105.7	103.8	-1.9	ns
Classmates	179	102.0	98.6	-3.4	
WJ-III Spelling (writing)					
PEK Cohort 2	198	106.1	102.5	-3.6	ns
Classmates	179	103.6	100.1	-3.5	
WJ-III Applied Problems (math)					
PEK Cohort 2	198	104.1	104.3	+0.2	ns
Classmates	179	100.7	101.4	+0.7	

Note: *The analysis examines change from fall of first grade to fall of second grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 2 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between first grade and second grade differs significantly between PEK Cohort 2 and the* classmate comparison group.

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of first grade).*

[c] *Fall of second grade score minus fall of first grade score.*

[d] *Indicates whether the change between first and second grade differs significantly between PEK Cohort 2 and the* classmate comparison group.

[ns] *Not significant*

A40. PEK school component. Academic test age equivalency one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) 1st grade (fall 2008)	2nd grade (fall 2009)	Change[b]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	202	6-02	7-03	+13 months***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	201	7-01	7-11	+10 months***
Spelling (writing)	200	7-00	7-10	+10 months***
Applied Problems (math)	200	6-09	7-09	+12 months***
Classmates				
Peabody Picture Vocabulary Test III	181	5-09	6-08	+12 months***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	181	6-10	7-07	+9 months***
Spelling (writing)	181	6-10	7-08	+10 months***
Applied Problems (math)	181	6-06	7-06	+12 months***

Note: *The analysis examines change from fall of first grade to fall of second grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Fall of second grade score minus fall of first grade score.*

*** *p<.001*

Differences in second grade compared to classmates

Academic assessments

A41. PEK school component (fall 2009). Academic test standard scores in second grade: PEK Cohort 2 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 2nd grade[c]	
		PEK Cohort 2 (N=220-221)	With preschool/ child care center (N=92)	Without preschool/ child care center (N=68)
Peabody Picture Vocabulary Test III	Mean	94.2	89.7	89.1
	Adjusted mean[d]	92.8	91.5	91.0
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	103.0	95.8	100.6
	Adjusted mean[d]	102.4	97.6[e]**	100.0
Spelling (writing)	Mean	102.2	98.1	101.9
	Adjusted mean[d]	101.6	100.2	101.0
Applied Problems (math)	Mean	104.2	100.0	101.5
	Adjusted mean[d]	103.4	101.9	101.2

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[e] *The effect size is 0.36. Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 2 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

** *p<.01, compared to PEK Cohort 2.*

A42. PEK school component (fall 2009). Academic test age-equivalency scores in second grade: PEK Cohort 2 versus classmates[a]

Test	Mean adjusted[b] age-equivalency scores (years-months)		
		Classmate comparison group in 2nd grade[c]	
	PEK Cohort 2 (N=220-221)	With preschool/ child care center (N=92)	Without preschool/ child care center (N=68)
Peabody Picture Vocabulary Test III	7-02	7-00	6-11
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-10	7-07**	7-08
Spelling (writing)	7-08	7-08	7-08
Applied Problems (math)	7-09	7-09	7-06

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

** *p<.01 compared to PEK Cohort 2 (based on results of the analysis comparing standard scores)*

Teacher ratings

A43. PEK school component (fall 2009). Teachers' ratings in second grade: PEK Cohort 2 versus classmates

Assessment		PEK Cohort 2	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	102.4	100.0	102.3
	Adjusted mean[c]	101.9	100.6	103.0
	Number assessed	163	67	58
Problem Behaviors[e]	Mean	97.3	98.1	96.2
	Adjusted mean[c]	97.7	97.5	95.8
	Number assessed	165	67	58
Academic Competence[f]	Mean	94.6	90.6	93.8
	Adjusted mean[c]	94.3	91.0	94.2
	Number assessed	165	68	58

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 2 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

Differences in third grade compared to classmates

Academic assessments

A44. PEK school component (spring 2010). MCA-II scale scores in third grade: PEK Cohort 1 versus classmates[a]

Test		Mean scale scores[b]: PEK Cohort 1 (N=199)	Classmate comparison group in 3rd grade[c]: With preschool/ child care center (N=89-90)	Classmate comparison group in 3rd grade[c]: Without preschool/ child care center (N=62)
Minnesota Comprehensive Assessment II				
Reading	Mean	353.8	348.0	347.0
	Adjusted mean[d]	352.6	349.4	349.0
Math	Mean	354.7	354.3	351.4
	Adjusted mean[d]	354.0	355.5	351.8

Note: *The analysis compares test scores of PEK Cohort 1 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups. Adjusted means in both reading and math did not differ significantly among the groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *The range of possible scale scores for third grade is 301-399.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

Teacher ratings

A45. PEK school component (spring 2010). Teachers' ratings in third grade: PEK Cohort 1 versus classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	99.3	99.5	102.4
	Adjusted mean[c]	98.6	101.9	101.4
	Number assessed	150	66	49
Problem Behaviors[e]	Mean	101.7	103.9	98.4
	Adjusted mean[c]	102.3	101.3	100.1
	Number assessed	151	66	49
Academic Competence[f]	Mean	93.8	92.5	91.2
	Adjusted mean[c]	93.2	94.1	91.0
	Number assessed	150	65	49

Note: *The analysis compares ratings of PEK Cohort 1 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups. Adjusted means did not differ significantly among the groups for social skills, problem behaviors, and academic competence.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. *Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

Attendance

A46. PEK school component (2010). Attendance: PEK Cohort 1 versus classmates

		Percentage of days attended	
		Classmates[a]	
	PEK Cohort 1 (N=185)	With preschool/ child care center (N=81)	Without preschool/ child care center (N=63)
Mean	96.2%	95.2%	95.0%
Adjusted mean[b]	96.1%	95.5%	94.9%

Note: *Includes students who were enrolled in the district for at least 160 days during the 2009-10 school year. The analysis compares attendance of PEK Cohort 1 with attendance of the classmate comparison groups using Analysis of Covariance, adjusting for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children had better attendance than each of the two classmate groups. Adjusted means did not differ significantly among the groups.*

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. *Classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[b] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

A47. Kindergarten teacher ratings on connections with PEK (n=22-24), spring 2010

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
I have received training and support on how to effectively differentiate instruction to meet the needs of a diverse student population.	4%	4%	29%	63%
During the kindergarten transition period, the pre-kindergarten teacher and I communicated about my students' skills and needs (e.g., using the pre-kindergarten assessment results).	9%	22%	30%	39%
I used student information given by the pre-kindergarten teacher to help develop lessons, activities, and/or grouping strategies for my students this year.	13%	29%	38%	21%
There is sufficient communication between the pre-kindergarten teacher and me.	-	13%	39%	48%
I observed the pre-kindergarten classroom this year.	48%	35%	13%	4%
The pre-kindergarten teacher observed my classroom this year.	55%	27%	18%	-
Kindergarten teachers at my school regularly use individual student assessment data to inform and tailor teaching in the classrooms.	-	-	17%	83%

Community-based PEK results

A48. PEK community-based component. Academic test standard score one-year change, fall 2008 (pre-kindergarten) to fall 2009 (kindergarten): Cohort 3 community-based

Test	Number assessed	Mean standard scores[a] Pre-Kindergarten (fall 2008)	Kindergarten (fall 2009)	Change[b]
PEK Cohort 3 community based				
Peabody Picture Vocabulary Test III	76	101.4	99.6	-1.8
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	76	111.9	108.7	-3.2*
Spelling (writing)	74	108.6	111.0	+2.4*
Applied Problems (math)	74	104.5	98.8	-5.7***

Note: *The analysis examines change from fall of pre-kindergarten to fall of kindergarten using paired samples t-tests.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[b] *Fall of kindergarten score minus fall of pre-kindergarten score.*

* *p<.05*

*** *p<.001*

A49. PEK community component (fall 2009). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 3

Assessment	N	Mean standard scores[a]
Social Skills Rating System		
Total Social Skills	51	102.0
Problem Behaviors	51	100.4
Academic Competence	52	99.0

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

A50. PEK community component: Language and literacy supports in Cohort 3 child care centers, summer 2009 to spring 2010

ELLCO indicator and possible points for each indicator	2009 Average score (n=10)[a]	2010 Average score (n=10)[a]	Change in average score and percent out of possible points	
Literacy Environment Checklist (Book Subscale; Writing Subscale) (41)	33.1	34.3	+1.2	(+3%)
Book Subscale (20)	18.0	17.9	-0.1	(-<1%)
Book area (3)	2.8	2.7	-0.1	(-3%)
Book selection (8)	7.8	7.9	+0.1	(+1%)
Book use (9)	7.4	7.3	-0.1	(-1%)
Writing Subscale (21)	15.1	16.4	+1.3	(+6%)
Writing materials (8)	7.7	7.6	-0.1	(-3%)
Writing around the room (13)	7.4	8.8	+1.4	(+11%)
Classroom Observation (General Classroom Environment Subscale; Language, Literacy, & Curriculum Subscale) (70)	56.8	59.9	+3.1	(+4%)
General Classroom Environment Subscale (30)	23.9	23.8	-0.1	(-<1%)
Organization of the classroom (5)	4.7	4.9	+0.2	(+4%)
Contents of the classroom (5)	4.2	4.4	+0.2	(+4%)
Presence/use of technology (5)	2.4	1.7	-0.7	(-14%)
Opportunities for child choice and initiative (5)	4.7	4.9	+0.2	(+4%)
Classroom management strategies (5)	3.8	3.6	-0.2	(-4%)
Classroom climate (5)	4.0	4.3	+0.3	(+6%)
Language, Literacy, & Curriculum Subscale (40)	32.9	36.1	+3.2	(+8%)
Oral language facilitation (5)	3.5	4.5	+1.0	(+2%)
Presence of books (5)	4.8	4.8	0.0	(0%)
Approaches to book reading (5)	5.0	4.9	-0.1	(-2%)
Approaches to children's writing (5)	4.7	4.5	-0.2	(-4%)
Approaches to curriculum integration (5)	4.2	4.8	+0.6	(+12%)
Recognizing diversity in the classroom (5)	3.5	4.1	+0.6	(+12%)
Facilitating home support for literacy (5)	3.7	4.1	+0.4	(+8%)
Approaches to assessment (5)	3.6	4.5	+0.9	(+18%)
Literacy Activities Rating Scale (12)	9.7	9.3	-0.4	(-3%)

Source: *Classroom observations conducted by Center for Early Education and Development, University of Minnesota.*

[a] *Only classrooms (same teachers) with pre and post assessments are included. The pre assessments were conducted in June-July 2009 and post assessments in April-May 2010.*

A51. PEK community component: Language and literacy supports in Cohort 3 child care homes, spring/fall 2009 to spring 2010

CHELLO indicator and possible points for each indicator	2009 Average score N=13	2010 Average score N=13	Change in average score and percent out of possible points	
Literacy Environment Checklist (26)	18.8	23.5	+4.6	(18%)
Book Area (5)	3.8	4.8	+1.0	(20%)
Book Use (9)	7.2	8.4	+1.2	(13%)
Writing Materials (6)	4.2	5.5	+1.3	(22%)
Toys (3)	2.3	2.8	+0.5	(17%)
Technology (3)	1.3	1.9	+0.6	(20%)
Group/Family Observation: Physical Environment (15)	11.9	13.8	+1.9	(13%)
Organization of the Environment (5)	4.0	4.7	+0.7	(14%)
Materials in the Environment (5)	4.0	4.7	+0.7	(14%)
Daily Schedule (5)	4.0	4.5	+0.5	(10%)
Group/Family Observation: Support for Learning(15)	12.0	13.3	+1.3	(9%)
Adult Affect (5)	4.1	4.7	+0.6	(12%)
Adult-Child Language Interaction (5)	4.2	4.5	+0.3	(6%)
Adult Control Behaviors (5)	3.8	4.2	+0.4	(8%)
Group/Family Observation: Adult Teaching Strategies (35)	24.9	31.7	+6.8	(19%)
Vocabulary Building (5)	3.5	4.2	+0.7	(14%)
Responsive Strategies (5)	3.6	4.6	+1.0	(20%)
Use of Print (5)	3.4	4.5	+1.1	(22%)
Storybook/Storytelling activities (5)	4.3	4.8	+0.5	(10%)
Writing/Drawing activities (5)	3.7	4.6	+0.9	(18%)
Monitoring children's progress (5)	2.7	4.2	+1.5	(30%)
Family support and interaction (5)	3.8	4.8	+1.0	(20%)

Source: *Classroom observations conducted by Center for Early Education and Development, University of Minnesota.*

[a] *Only classrooms (same teachers) with pre and post assessments are included. The pre assessments were conducted in April-May 2009 for eight child care homes and in October-November 2009 for five child care homes new to PEK, and the post assessments were conducted in May-June 2010.*

References

Barnett, W. S., Lamy, C., & Jung, K. (2005). *The effects of state prekindergarten programs on young children's school readiness in five states.* The National Institute for Early Education Research, Rutgers University, December.

Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test-Third Edition (PPVT-3)*. Circle Pines, MN: AGS Publishing.

Early Childhood Research Institute on Measuring Growth and Development (ECRIMGD, 1998). Research and development of individual growth and development indicators for children between birth and age eight (Tech. Rep. No. 4), Minneapolis, MN: Center for Early Education and Development, University of Minnesota. Retrieved September 20, 2008, from http://ggg.umn.edu/techreports/ecri_report4.html

Get It! Got It! Go! website, n.d. Background information and assessment procedures and materials. Retrieved September 20, 2008, from http://ggg.umn.edu/get/procedures_and_materials/index.html

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

Gozali-Lee, E., Broton, K., & Mueller, D. (2008). *Project Early Kindergarten-Early Reading First: Evaluation report on the second year of a Saint Paul Public Schools initiative.* Saint Paul, MN: Wilder Research. Available on the Wilder Research website at http://www.wilderresearch.org

Gozali-Lee, E., Mohr, C., & Mueller, D. (2010). *Project Early Kindergarten – Early Reading First: Evaluation report on the fourth year of a Saint Paul Public Schools initiative.* Saint Paul, MN: Wilder Research.

Gozali-Lee, E., & Mueller, D. (2009). *Project Early Kindergarten – Early Reading First: Evaluation report on the third year of a Saint Paul Public Schools initiative.* Saint Paul, MN: Wilder Research. Available on the Wilder Research website at http://www.wilderresearch.org

Gresham, F. M., & Elliott, S. N. (1990). *Social Skills Rating System*. Circle Pines, MN: American Guidance Service, Inc.

Hawley, V. (2010). *Saint Paul Public Schools Project Early Kindergarten Child Care ELLCO/CHELLO implementation observation report.* University of Minnesota, Center for Early Education and Development, July.

Minnesota Early Learning Foundation (MELF) (2008). *Minnesota Early Learning Foundation annual report April 2008*. Saint Paul, MN: Minnesota Early Learning Foundation. Retrieved May 5, 2008, from http://www.melf.us

Mohr, C., Gozali-Lee, E., & Mueller, D. (2008a). *Project Early Kindergarten-Early Reading First: Evaluation report on the first year of a Saint Paul Public Schools initiative.* Saint Paul, MN: Wilder Research. Available on the Wilder Research website at http://www.wilderresearch.org

Mohr, C., Gozali-Lee, E., & Mueller, D. (2008b). *Project Early Kindergarten evaluation update: General overview of results through 2007-08 of a Saint Paul Public Schools initiative.* Saint Paul, MN: Wilder Research. Available on the Wilder Research website at http://www.wilderresearch.org

Mueller, D. (2008). *Project Early Kindergarten student outcomes: Fourth-year evaluation report.* Saint Paul, MN: Wilder Research.

Resources for Child Caring (n.d.). About us. Retrieved May 2, 2008, from http://www.resourcesforchildcare.org

Saint Paul Public Schools (n.d.). *A comprehensive reform model ensuring high achievement for all students: Saint Paul's Project for Academic Excellence.* Saint Paul, MN: Saint Paul Public Schools. Retrieved May 9, 2008, from http://thecenter.spps.org/sites/1137e325-a981-4515-9273-14618ab0dec0/uploads/PAE-web.pdf

Saint Paul Public Schools (2007). *Project for Academic Excellence pre-kindergarten implementation: Level two, August 2007*. Program implementation manual. Saint Paul, MN: Saint Paul Public Schools.

Saint Paul Public Schools, Office of Instructional Services (2005). *Saint Paul's Project for Academic Excellence: Implementation summary 2005.* Retrieved May 9, 2008, from http://www.thecenter.spps.org/pae.html

Schultz, J. L., Gozali-Lee, E., & Mueller, M. (2009). *Project Early Kindergarten evaluation: Results through 2008-09 of a Saint Paul Public Schools initiative*. Saint Paul, MN: Wilder Research. Available on the Wilder Research website at http://www.wilderresearch.org

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson tests of achievement*. Itasca, IL: Riverside Publishing.