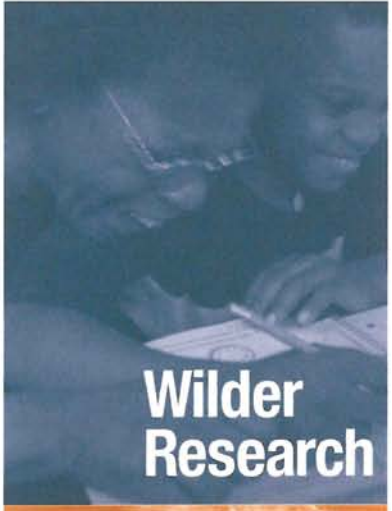

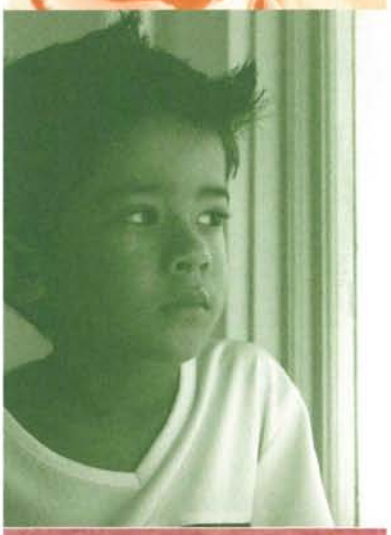

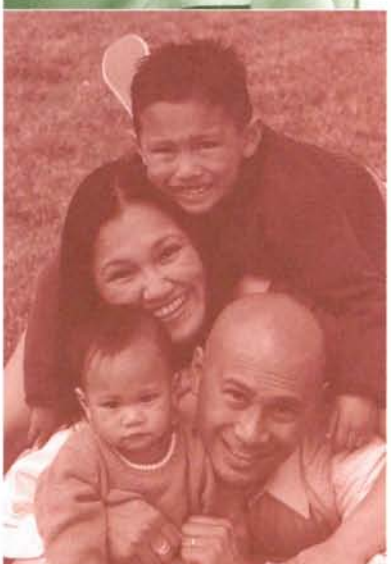

Project Early Kindergarten evaluation

Results through 2008-09 of a Saint Paul Public Schools initiative

SEPTEMBER 2009

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September 2009

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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 2009, 29 district elementary schools, 10 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.

PEK is funded primarily by Saint Paul Public Schools and The McKnight Foundation, which provided an initial three-year grant in 2004 and renewed funding in 2007. PEK extends the program to child care settings through a partnership with Resources for Child Caring. The Minnesota Early Learning Foundation also had contributed funds to the child care portion of the program.

Rigorous evaluation

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 those of peers who did not participate in PEK.

School results

As of fall 2009, data are available for three cohorts of PEK school children. On average, these students experienced the following initial changes:

- In the year before kindergarten, all three groups of children who completed PEK in its first three years of operation made faster progress than their peers nationally in vocabulary and early reading and writing skills. The second group of children to complete PEK (Cohort 2) also made accelerated progress in early math, while the first and third groups to complete PEK (Cohorts 1 and 3) made expected progress.
- 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.
- All three cohorts of PEK children also showed advantages compared to their kindergarten classmates, with differences tending 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 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 Cohort 1 and 2 children seemed to gain from PEK appeared to lessen somewhat on average, although 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 experiences.
- Principals, teachers, and parents provided very positive feedback about PEK.

Child care results

Having started a year later, PEK's child care component is at an earlier stage. As of fall 2009, data are available for 4-year-olds who participated in the child care component's first and second cohorts. At this point, results are more suggestive than conclusive. On average, 4-year-olds in child care Cohorts 1 and 2 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.
- However, 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.
- Overall, child care center directors, center teachers, and family child care home providers gave positive feedback about their experiences with PEK and also offered some suggestions for further program development.

Issues to consider

A core component of PEK is the inclusion of an ongoing evaluation that can be used to inform programming. Based on results available to date, following are several issues that can be taken into consideration in future planning for PEK school and child care sites.

A complete list of issues for consideration and "lessons learned" to date from the evaluation are provided in Wilder Research's full report.

- The success of PEK in increasing the skills of participants results in skill differences between them and their classmates when they reach kindergarten. To ensure that all children are able to achieve substantial advances in kindergarten, it seems important that kindergarten instruction be differentiated to varying skill levels. 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.
- Particular attention may need to be paid to the socials skills and problem behaviors of children at child care sites. Teachers received training on Positive Behavior Support at the beginning of the 2008-09 school year. PEK staff can consider whether child care teachers could benefit from more training in this area.
- PEK child care results are limited at this point, suggesting some program impact on children but also suggesting room for improvement. We anticipate more reliable results in 2009-10 when the larger third cohort of child care children begin kindergarten. Cohort 3 children are assessed both in the fall of their pre-kindergarten year and fall of their kindergarten year, permitting better analysis of program impact than in the first two 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.

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 2009, a total of 29 district elementary schools implement the PEK framework.

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.). This community component of PEK is considered a pilot. 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 include 7 child care centers

that are new to PEK at that time, 1 continuing center, and 13 new family child care homes. As of fall 2009, all 8 child care centers and 10 of the 13 family child care homes are still offering PEK. In addition, three new family child care homes will join the second cohort of providers in 2009-10.

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. For children attending at school sites, researchers use a quasi-experimental research design to assess impacts on children's academic success. The study also follows school-based children into their early elementary years to see if program effects are sustained through early elementary school. 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 are also conducted at child care sites with 4-year-old children. As with school cohorts, the third cohort of child care participants are assessed in the fall of their PEK year to facilitate measures of change between fall of PEK and fall of kindergarten. A complete description of research methods is provided in the Evaluation section of the report.

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 had contributed funds to the child care portion of the program in the 2007-08 and 2008-09 school years.

In addition, PEK-Early Reading First, which operates under a federal grant, provides funds at two of the 28 PEK schools and two other child care centers. Wilder Research conducts a separate evaluation of PEK - Early Reading First program. Reports on the program's first and second years are on Wilder Research's website (see Mohr, Gozali-Lee, & Mueller, 2008a and Gozali-Lee, Broton, & Mueller, 2008). A report on the third year of PEK - Early Reading First will be prepared in fall 2009.

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 2009, 29 elementary schools, with 35 classrooms and over 1,300 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;
- Class sizes are capped at 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 19 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, 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.

Contents of the report

This report comes at the conclusion of the fifth year of PEK. Following an initial planning year (2004-05), PEK has served children through the school component for four years (2005-06 to 2008-09) and through the community child care component for three years (2006-07 to 2008-09). This report summarizes the program's implementation and outcomes results to date, through the 2008-09 school year. As shown in Figure 1, at this point Wilder Research outcomes data are available for children attending the first four years of PEK at school sites and the first three years of PEK at child care sites. This is an interim report, and future years' data will be provided in subsequent reports.

1. Summary of outcomes data provided in this report

	Progress during PEK	Fall of kindergarten results compared to peers	Fall of 1st grade results compared to peers
School-based Cohort 1 (PEK 2005-06)	✓	✓	✓
School-based Cohort 2 (PEK 2006-07)	✓	✓	✓
School-based Cohort 3 (PEK 2007-08)	✓	✓	N/A[c]
Community-based Cohort 1 (PEK 2006-07)	✓[a]	✓[b]	N/A[d]
Community-based Cohort 2 (PEK 2007-08)	✓[a]	✓[b]	N/A[d]
Community-based Cohort 3 (PEK 2008-09)	✓[a]	N/A[c]	N/A[d]

[a] *Results of Individual Growth and Development Indicators administered to 4-year-olds by PEK staff are presented. For child care Cohort 3 only, the PPVT III and WJ III are also administered in fall of PEK (fall 2008) to children who will attend kindergarten the following fall.*

[b] *Results reflect 4-year-olds who attended community-based PEK in 2006-07 (Cohort1) and in 2007-08 (Cohort 2).*

[c] *These data will be available following assessments conducted in fall 2009.*

[d] *These data are not being collected.*

The report begins by describing PEK goals and components, followed by a section on evaluation methods. The main body of the report then summarizes evaluation results to date. Results are separated into two sections: one on the school component and one on the community child care component. Both sections summarize student outcomes as well as implementation results. 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. The report concludes with an Appendix of figures providing supplemental information. 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.

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 following 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, 2007b).

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, five school coaches for pre-kindergarten and kindergarten classrooms, national literacy consultants, a "master coach" consultant, and a 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 supports 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 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 for furthering the connections between pre-kindergarten and kindergarten classrooms, 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. At PEK schools, more intensive training was also offered to kindergarten teachers at Dayton's Bluff, Wellstone, American Indian, and World Cultures during the 2008-09 school year. 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. In 2009-10, coaching and training workshops will be offered to all kindergarten teachers on a voluntary basis.

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 role is new for child care centers as of fall 2008, and is intended to equip center directors 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. Since fall 2007, program administrators, principals, and child care center

directors have also conducted "Progress Monitoring Walks" to check fidelity of program implementation.

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. Additionally, starting in fall 2008, the PEK teachers at school sites began using some subtests of the Phonological Awareness Literacy Screening (PALS), the instrument used in the district's K-3. As with their K-12 counterparts, PEK teachers use information gathered through the ongoing assessments to inform their instruction.

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. They also aim 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 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.

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) measure early skills in reading, writing, and math. 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). Figure 2 provides the study's assessment schedule over the five-year period from 2005-06 to 2009-10. More detailed information about the school and child care portions of the study are provided following the figure.

2. 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]	None	Third grade[d]
Classmates[a]	None	Kindergarten	First grade	None[c]	None	Third grade[d]
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] *MCA-IIs in reading and math plus SSRS.*

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, illustrated in Figure A1.

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, as funding permits. The same assessments of academic and behavioral progress described earlier will be used in these early primary grades, with the exception of third grade when the *Minnesota Comprehensive Assessments–Series II* will be 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 any public (including charter) or private school in Saint Paul. 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 schools in Saint Paul.

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 all four 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). Beginning in the 2008-09 school year, teachers also use some subtests of the Phonological Awareness Literacy Screening (PALS). 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 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.

Progress summary: School-based PEK

This section provides results available to date for the 10 original PEK schools. The section begins by profiling children who attended PEK schools during the program's first three years, 2005-06 (Cohort 1), 2006-07 (Cohort 2), and 2007-08 (Cohort 3). Their progress during PEK is then discussed, based on Wilder Research's assessments. Academic and social outcomes are then provided for the three cohorts based on Wilder Research's assessments. After summarizing student outcomes, this section briefly describes program implementation through 2007-08. As evaluation follows former PEK children who are in kindergarten and first grade in 2008-09, evaluation in this area includes principals' and kindergarten teachers' perceptions on the impacts of PEK in their schools and on the connections between PEK and kindergarten classrooms. The section concludes with a list of issues for consideration that can be used to inform ongoing program planning efforts.

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

- Overview of results
- Characteristics of children (Cohorts 1-3)
- Progress while in PEK (Cohorts 1-3)
- Kindergarten readiness compared to similar children (Cohorts 1-3)
- Kindergarten readiness compared to classmates (Cohorts 1-3)
- Differences in first grade compared to classmates (Cohorts 1 and 2)
- Implementation efforts (Cohorts 1-3)
- Issues for consideration

Overview

Results show promising progress for children attending PEK schools in 2005-06 (Cohort 1), 2006-07 (Cohort 2), and 2007-08 (Cohort 3). All cohort children 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. Data gathered over the next few years will help researchers make stronger claims about the program's initial and longer-term impacts.

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 their peers 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.

- 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.

- 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 tended to be larger based on results of the three cohorts in vocabulary and early writing skills, and the first two cohorts in vocabulary and early writing and math 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.

Characteristics of children

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 3 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.

3. 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**

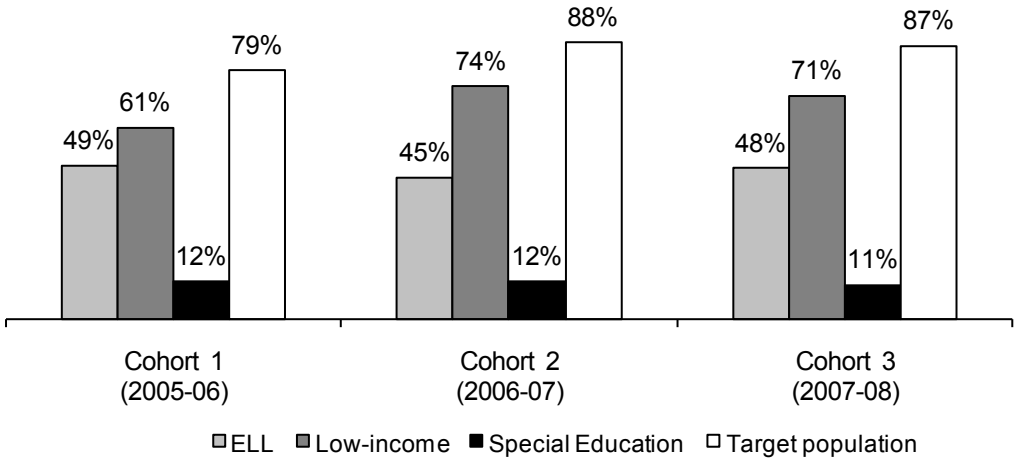
Note: *A total of 360 children can be served by the 10 PEK schools. Wilder Research defines each cohort as children who were assessed as part of the study in fall of their PEK year. As explained in the text, this definition includes most but not all children who have participated in the program. Numbers 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 in the Appendix 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%). Figure 4 depicts the representation of PEK's target populations in the first three cohorts.

4. 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 the Appendix. The demographic information reported is based on the information provided by the district in kindergarten. As noted in Figures A3-A5, 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.

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 5 shows the number of PEK and comparison group children who were assessed in fall 2008. At that time, Wilder Research conducted assessments with 878 children who attended PEK school sites in Cohorts 2 and 3, and their comparison groups. Based on the numbers in Figure 3, we were able to assess 71 percent of the original Cohort 2 children when they were in first grade, and 75 percent of the original Cohort 3 children when they were in kindergarten. Cohort 1 children were not assessed in the fall 2008.

5. PEK school component. Fall 2008 study groups

Study groups	Number assessed
Cohort 1 (PEK 2005-06)	None[e]
Cohort 1 comparison[a]	None[e]
Cohort 2 (PEK 2006-07)[d]	232
Cohort 2 comparison[b]	181
Cohort 3 (PEK 2007-08)	235
Cohort 3 comparison[c]	230
Total	**878**

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

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

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

[d] *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).*

[e] *Cohort 1 and comparison classmates were not assessed in fall 2008. Their progress will be reported again following spring 2010 assessments.*

We compared the fall of PEK (baseline) demographics of these children to those of children who remained in the study to see if they differed in important ways. For the second and third cohorts, those assessed in fall 2008 appeared to resemble the original cohort.

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.

Progress while in PEK

For each cohort, progress during their PEK year is measured by comparing their fall of PEK (baseline) test scores with their fall of kindergarten test scores. Comparisons are made based on the Peabody and Woodcock-Johnson academic assessments conducted by Wilder Research. Because children develop rapidly at this age, we looked at how their progress compared to how much children of this age would be expected to progress based on national norms.

Academic progress compared to national peers

Figure 6 depicts PEK students' progress during the pre-kindergarten year, shown separately for each of the three cohorts. 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 one's peers nationally. PEK school-based students made substantial gains in academic skills during their PEK year. Compared to their peers nationally, students in all three cohorts made accelerated progress in vocabulary, early reading, and early writing. In other words, on average they made faster progress over the course of the year in these areas than did their peers nationally. Progress in early math skills differed by cohort. Whereas students in Cohorts 1 and 3 made normative progress in math during their PEK year, Cohort 2 students made accelerated progress in this area compared to their peers nationally. Still, progress in math lagged behind progress seen in the other three academic areas (Figure A6; Mueller, 2008). It should be noted that math was not a focus during the program's first two years of implementation. The program implemented the *Everyday Mathematics* curriculum in the fall of Cohort 3's PEK year (2007). Nevertheless, on average Cohort 3 students did not make accelerated progress in math during their PEK year (average score increased somewhat, but the difference was not statistically significant).

Despite their substantial gains in academic skills, on average former PEK students were somewhat below national norms in vocabulary and early math skills in fall of their kindergarten year. This does not seem surprising given the program's large ELL population and that math was not a focus during the program's first two years. On the other hand, PEK students were slightly above national norms in early reading and writing skills in the fall of their kindergarten year, on average.

It is also worth noting that the overall average gains made during the PEK year have increased with each successive cohort. In other words, the second cohort of PEK children made stronger gains than the first cohort, and the third cohort of PEK children made stronger gains than both of the previous cohorts. In addition, students' scores in fall of kindergarten have been slightly higher each year, indicating a higher level of kindergarten readiness for each successive cohort. At the same time, it should be noted that the average number of days between the fall of kindergarten and fall of preschool testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3. This should be taken into account when comparing results across the cohorts because children who had a longer gap between testing may have progressed more in part because they had more time to develop.

Academic progress in age-equivalency terms

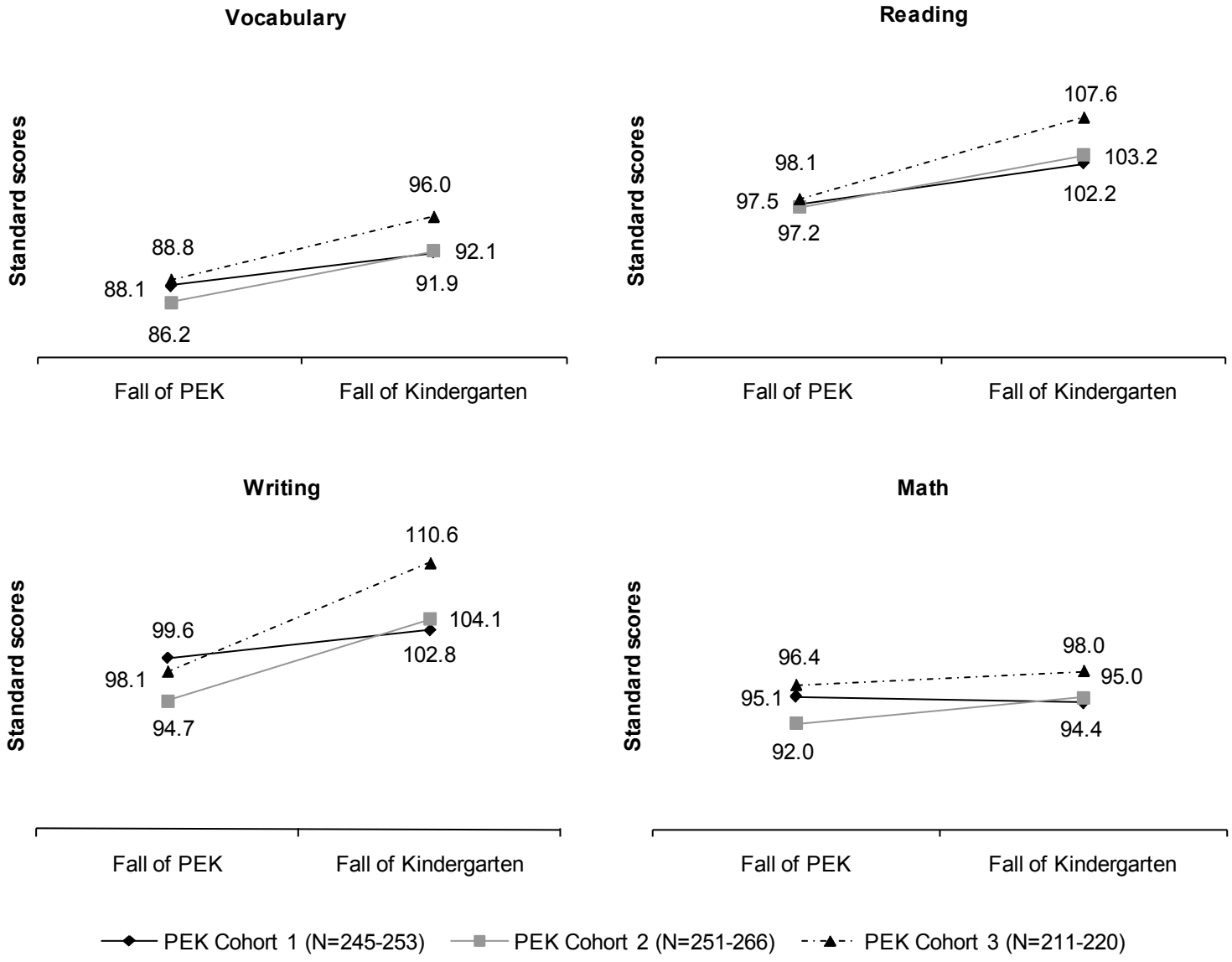
Translating results into age-equivalency scores provides another meaningful way of looking at these changes. In vocabulary, Cohort 3 children were estimated to be at 3 years 6 months in the fall of PEK on average, and at 5 years 6 months in the fall of kindergarten on average, for a 24-month gain. This compares to an average vocabulary gain of 18 months for Cohort 2 children and 15 months for Cohort 1 children. In early reading skills, Cohort 3 children were estimated to have experienced a 19-month gain during their pre-kindergarten year on average, compared to a 16-month gain for Cohort 2 and a 14-month gain for Cohort 1. Similarly, children in Cohort 3 made larger average gains in early writing (22 months) compared to children in Cohorts 1 and 2 (17 months). It should be noted, though, that age-equivalency scores are a less exact measure than standard scores, which are used in other analyses presented here. For this reason, in age-equivalency terms it appears that Cohort 2 children made the same size gains as Cohort 1 children in early writing (17 months) and math (12 months), even though Cohort 2 children had larger gains in these areas using standard scores. In addition, it appears that children in Cohort 3 made larger gains in math compared to children in Cohort 2 (16 vs. 12 months), when the standard score results show the opposite (Figure A7; Mueller, 2008). Again, it should also be noted that the average number of days between the testing periods has varied somewhat across the cohorts.

Variations in academic progress among demographic groups

PEK students' progress during the pre-kindergarten year was examined within the specific demographic groups targeted by the program (Mueller & Gozali-Lee, 2007; Mueller, 2008). The results show that, on average, ELL students made significantly larger gains than non-ELL students in some areas, including vocabulary for Cohorts 1 and 3, math for Cohorts 1 and 2, and reading for Cohort 1 only. Students in Special Education made significantly less progress than other students in reading for Cohorts 1

and 3 and in writing for Cohort 1 only. In contrast, students in Special Education made significantly larger gains than other students in math for Cohort 2. Results for Cohort 1 indicate that students who were eligible for free or reduced-price lunch made significantly larger gains than students who were ineligible in the areas of vocabulary and reading. However, results for Cohorts 2 and 3 showed no significant differences on this income measure in any of the four areas. Lastly, the results suggest some significant differences based on race/ethnicity, although the findings are not very consistent across the cohorts and measures. The most consistent finding is that Asian students made significantly larger gains than some other racial/ethnic groups, most frequently Caucasian students. This result was found for Cohorts 1 and 3 in the areas of vocabulary and math, and for Cohort 1 only in the area of reading (Figures A8-A11 for Cohort 3 and Mueller, 2008 for Cohorts 1 and 2).

6. PEK school component. Changes in academic test standard scores from pre-kindergarten to kindergarten: PEK Cohort 1 (fall 2005 to fall 2006), Cohort 2 (fall 2006 to fall 2007), and Cohort 3 (fall 2007 to fall 2008)



Note: *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 one's peers nationally. One-year changes in standard scores were statistically significant for each group in each subject, with the exception of Cohort 1 and Cohort 3 children in math (see Figure A6).*

Kindergarten readiness compared to similar children

Kindergarten readiness is assessed in two ways: 1) by comparing PEK children to similar children who applied and were selected for PEK but who have not yet participated, and 2) by comparing PEK children to their kindergarten classmates. This section discusses kindergarten readiness compared to similar children selected for PEK. The comparison is based on the Peabody and Woodcock-Johnson academic assessments conducted by Wilder Research.

Using the "birthday cutoff" method (see Figure A1), children who just finished PEK are compared to children who are just beginning the program. An advantage of this analysis is that it minimizes the selection bias that could occur if there were differences between families who chose PEK for their children and families who did not. Children who just finished PEK constitute the "treatment" group, and children who are just beginning PEK constitute the "no-treatment" comparison group. Again, because children in the two groups are different ages, a statistical model is used to estimate the difference in scores between the two groups right at the program's September 1 birthday cutoff date for enrollment. At this point, the two groups are essentially the same age, but one has participated in PEK and the other has not. To date, the birthday cutoff analysis has been conducted twice: once when Cohort 1 was beginning kindergarten (treatment group) and Cohort 2 was just beginning PEK (no-treatment group), and once when Cohort 2 was beginning kindergarten (treatment group) and Cohort 3 was beginning PEK (no-treatment group).

We made adjustments in the analyses to account for any differences between the two cohorts being compared in their demographic characteristics and when in the fall each child was tested. We also made tentative adjustments for differences in baseline scores between the cohorts being compared. Even though we made adjustments, it is important to note that we have some reservations about the birthday cutoff method based on the differences in baseline (fall of PEK) test scores between treatment and comparison groups. These differences suggest that assumptions about the equivalency of the two groups when they started PEK did not hold in some cases, and it is possible that our adjustments may not have entirely corrected for the impact on results (Mueller, 2008).

Cohort 1 entering kindergarten compared to Cohort 2 entering PEK

Based on the birthday cutoff analysis, when PEK school-based Cohort 1 children started kindergarten they were considerably ahead of same-age children who had chosen but not yet received PEK. Again, this is based on statistical estimates of differences between Cohort 1 and Cohort 2 at the program's September 1 birthday cutoff date, where they were essentially the same age. Cohort 1 had completed PEK, and Cohort 2 was just beginning

the program. There were statistically significant differences in vocabulary, reading, writing, and math test scores at the birthday cutoff date in favor of children who had attended PEK. The size of the PEK impact on scores is estimated to be between medium and large for vocabulary and reading, and large for writing and math (Figure A12). However, the size of the program's impact on writing and math might be overestimated due to significant differences between Cohorts 1 and 2 in their pretest (fall of preschool) writing and math scores that raise concerns about the equivalency of cohorts at the cutoff. Our previous reports included an adjustment for these differences, which estimated that the impact of PEK might be medium to large rather than large. We are currently exploring better statistical methods for adjusting for these differences to minimize any potential bias.

In age-equivalency terms, this analysis found a difference of 12 months between the two groups in their vocabulary scores. This means that children who attended PEK were estimated to be 12 months ahead of where they would have been without attending the program. Children who attended PEK were estimated to be eight months ahead in reading, 12 months ahead in writing, and 10 months ahead in math compared to where they would have been without participating in PEK (Figure A13; Mueller & Gozali-Lee, 2007). However, differences between the cohorts at baseline suggest that the writing and math results may be overestimated. Previous reports included rough estimates adjusting for the differences at baseline, which suggest that the children who attended PEK were ahead by nine months in writing and by six months in math. We are currently developing a more appropriate statistical adjustment. As has been seen in some other analyses of PEK results, a look at the impact within individual demographic groups suggests that Cohort 1 White students benefited less from the program than other students (Mueller & Gozali-Lee, 2007).

Cohort 2 entering kindergarten compared to Cohort 3 entering PEK

A year later, we conducted the birthday cutoff analysis when Cohort 2 was entering kindergarten and Cohort 3 was entering PEK. In this case, Cohort 2 served as the "treatment" group and Cohort 3 as the "no-treatment" comparison group. Again, we used a statistical model to estimate differences between the two groups at the program's birthday cutoff point, where the groups were essentially the same age.

As with the initial analyses based on Cohorts 1 and 2, results again indicated that children who had participated in PEK had substantially more advanced skills in vocabulary, reading, and writing compared to same-age children who had chosen but not received the program, as evidenced by statistically significant differences in test scores at the birthday cutoff date. The size of the PEK impact was estimated to be between medium and large in these areas. On the other hand, the math advantage observed for Cohort 1 was not observed for Cohort 2, as there was not a statistically significant difference in math test

score at the birthday cutoff date (Figure A12). However, the writing and math results are likely to be underestimated due to significant differences between Cohorts 2 and 3 in their pretest (fall of preschool) writing and math scores. Our previous reports included an adjustment for these differences, which estimated that the impact of PEK might be large (rather than medium to large) for writing, and small (rather than insignificant) for math. Because incoming PEK cohorts differed in their baseline test scores, comparing the birthday cutoff results for Cohorts 1 and 2 may be misleading. As noted above, we are currently exploring better statistical adjustments to minimize any potential bias resulting from the differences at baseline.

In age-equivalency terms, PEK children were estimated to have a 10-month advantage in vocabulary, a 6-month advantage in early reading skills, a 9-month advantage in early writing skills, and a 3-month advantage in early math skills (Figure A14; Mueller, 2008). Differences between the cohorts in baseline scores suggest that the writing and math results may be underestimated. A crude adjustment for these differences suggests that PEK children may have experienced a 12-month advantage in writing and a 4-month advantage in math. However, we are currently developing a more appropriate statistical adjustment to account for the differences at baseline.

Comparisons to other programs

The birthday cutoff method has been used in several studies of state-funded preschool programs around the country to determine program effects on children's test scores when they reached kindergarten. Using these studies, we are able to compare PEK's results with those of state-funded preschool programs in eight other states. Overall, the estimated effect tended to be larger for PEK on the Peabody Picture Vocabulary Test, and no consistent trend on the Woodcock-Johnson subtests, based on the two birthday cutoff analyses conducted thus far (Figures A12 & A15; Mueller & Gozali-Lee, 2007). However, there are limitations to these comparisons that should be kept in mind. As previously mentioned, we originally made adjustments where there were differences in baseline test scores of PEK cohorts being compared, and it is possible that our adjustments did not entirely correct for the impact on results. Other studies' limitations in this area are unknown because baseline assessments were not available for both cohorts. Additionally, the proportion of English Language Learners in our study may account for some of the difference in results, and we will continue to examine the implications of the large ELL population as the study progresses. There could also be other meaningful differences between the programs.

Kindergarten readiness compared to classmates

When they reach kindergarten, former PEK students are also compared to their kindergarten classmates. Former PEK school students are followed as long as they attend kindergarten in Saint Paul, even if they attend kindergarten at a school other than the 10 original PEK schools. The classmate comparison group is defined as kindergarten classmates of former PEK children at the 10 original PEK schools. Some classmates have had prior preschool or child care center experience, and some have not. We compare former PEK students to each of these two classmate comparison groups: those with prior preschool or child care center experience and those without. Kindergarten readiness compared to classmates 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.

Analyses presented here incorporate adjustments for differences among the groups in their demographic characteristics and when in the fall children were tested. It is important to note that former PEK children may also differ from their kindergarten classmates in other important ways. For example, families who apply for PEK may differ in motivation, knowledge, or other important factors from those who do not. In that sense, the birthday cutoff analysis offers advantages. Still, we feel that comparing former PEK students to their kindergarten classmates provides insights into how PEK compares to other experiences children may have before kindergarten.

Academic assessments

In fall of their kindergarten year, children who had participated in PEK scored higher on average in each of the four academic areas than kindergarten classmates who had other preschool or child care center experience. Classmates without prior preschool or child care center experience scored lowest of the three groups on average in each area. The academic advantage for PEK children compared to their kindergarten classmates with prior preschool or child care center experience was significant in vocabulary only for Cohort 1 children, while children in Cohorts 2 and 3 experienced a significant advantage in all four academic areas. Compared to classmates without prior preschool experience, PEK children in all three cohorts experienced significant advantages on average in all four academic areas, including vocabulary, reading, writing, and math (Figures A16-A18).

Comparing PEK children to classmates who had preschool experience, the effect sizes tend to be in or near the small to medium range. The size of PEK's effects are generally larger, tending to be in or near the medium to large range, when PEK children are compared to classmates who did not attend preschool or a child care center (Figure A19). These results suggest that PEK provides benefits beyond those received by most

kindergarten children in their pre-kindergarten experiences. In addition, the results suggest that the size of PEK's effect has grown with each successive cohort.

Despite the significant advantages for children who attended PEK, their test scores in fall of kindergarten were nonetheless below the national average for vocabulary and math. On the other hand, their scores in reading and writing were above the national average.

Age-equivalency results

Translating scores into age-equivalency terms provides another meaningful way to examine these results, although it should be noted again that age-equivalency scores are a less exact measure.

PEK children were estimated to have an advantage over classmates with other preschool or child care experiences in vocabulary, ranging from a three-month advantage for Cohort 1, to a six-month advantage for Cohort 2 and an eight-month advantage for Cohort 3. Compared to classmates without prior preschool experience, the PEK advantage in vocabulary was estimated to be of 5 months for Cohort 1, 9 months for Cohort 2, and 11 months for Cohort 3.

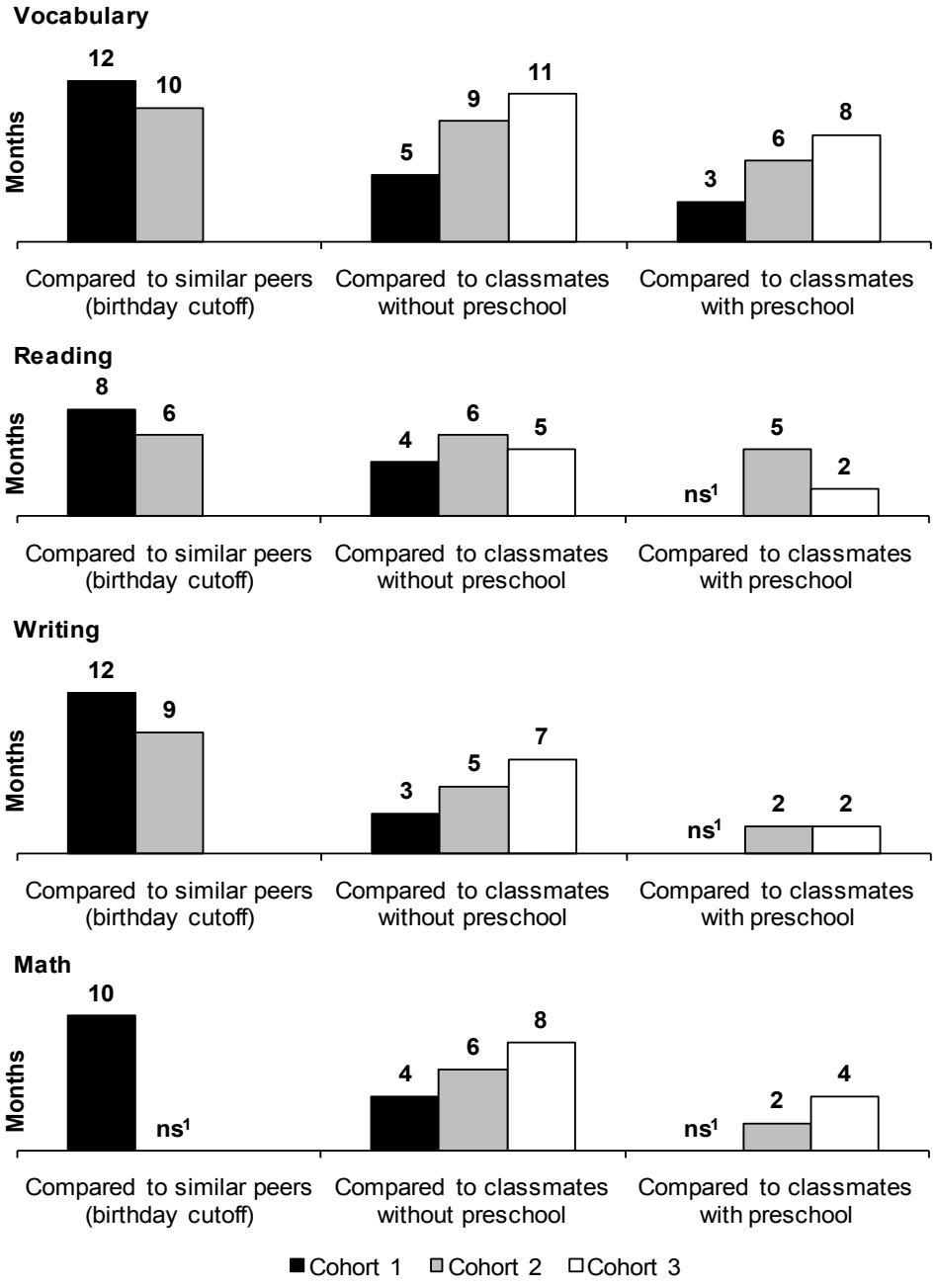
In reading, PEK children in Cohort 1 had similar scores on average compared to their classmates with prior preschool experience, while PEK children in Cohorts 2 and 3 were estimated to have an advantage. This advantage amounted to five months for Cohort 2 and two months for Cohort 3. When compared to classmates without prior preschool experience, all three PEK cohorts had an advantage in reading. This advantage was estimated to be of four months for Cohort 1, six months for Cohort 2, and five months for Cohort 3.

While PEK children in Cohort 1 appeared to have similar writing skills compared to their classmates with prior preschool experience, PEK children in Cohorts 2 and 3 were estimated to have a two-month advantage over these peers on average. Compared to classmates without prior preschool experience, PEK children were estimated to have an advantage in writing ranging from three to five to seven months for children in Cohorts 1, 2, and 3, respectively.

In math, PEK children in Cohort 1 had similar skills compared to their classmates with prior preschool experience, while Cohort 2 had a two-month advantage and Cohort 3 had a four-month advantage, on average. The PEK advantage in math over classmates without prior preschool experience ranged from four months for Cohort 1 to six months for Cohort 2 and eight months for Cohort 3 (Figure A20).

The following figure shows the advantages of PEK in age-equivalency terms compared to the three comparison groups we have discussed: 1) the birthday cutoff comparison group discussed in the previous section, 2) kindergarten classmates without prior preschool or child care center experience, and 3) kindergarten classmates with prior preschool or child care center experience. As shown in the figure, there tends to be a pattern of stronger advantages over kindergarten classmates for Cohort 2 compared to Cohort 1, and stronger advantages for Cohort 3 than for both of the previous cohorts. Results of the birthday cutoff analysis appear stronger for Cohort 1 than Cohort 2 in general, but again may reflect the impact of differences in baseline test scores in writing and math that may overestimate the results for Cohort 1 and underestimate the results for Cohort 2. As mentioned, we are currently developing a statistical adjustment to correct for these differences.

7. PEK school component. Difference in age-equivalency scores in kindergarten: PEK students compared to peer groups



Note: *This figure presents the differences in months between the average age-equivalency scores of PEK Cohorts 1, 2, and 3 and their peer groups upon kindergarten entry, shown only for differences that were statistically significant based on the standard score results. The birthday cutoff analysis (first set of columns) was done for Cohorts 1 and 2 only. Positive numbers indicate that the PEK age-equivalency score was higher by that number of months than the peer group age-equivalency score. In other words, children who attended PEK were estimated to be that many months ahead of children in the peer group upon kindergarten entry on average. 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.*

Teacher ratings

Using the Social Skills Rating System, teachers rated former PEK children and their kindergarten classmates on their social skills, problem behaviors, and academic competence in fall of their kindergarten year. The analyses presented here incorporate adjustments for differences among the PEK and classmate comparison groups in their demographic characteristics. In the area of social skills, former PEK students received more positive ratings on average compared to the two kindergarten classmate groups, those with and those without preschool experience, which had similar scores in all three cohorts. This same pattern was observed in teachers' ratings of children's problem behaviors for Cohorts 2 and 3, while the groups were similar for Cohort 1. In the area of academic competence, former PEK students received the highest ratings on average, followed by kindergarten classmates with prior preschool or child care center experience, and then by classmates without prior preschool or child care center experience.

Although PEK children generally had the most positive ratings, the advantages for children in Cohort 1 over their kindergarten classmates with preschool experience were not statistically significant. In contrast, when compared to classmates without preschool experience, children in Cohort 1 did experience a significant advantage on average in the areas of social skills and academic competence, but not in problem behaviors. Results were stronger for former PEK children in Cohorts 2 and 3. These children had more positive teacher ratings on average in each of the three areas than both of the classmate groups, those with and those without prior preschool or child care center experience. In all three areas, differences between PEK children in Cohorts 2 and 3 and the two classmate groups were statistically significant (Figures 8 and A21-A23).

Compared to national norms, PEK children in all three cohorts exhibited stronger social skills and fewer problem behaviors on average. On the other hand, teachers' ratings of their academic competence were below national norms on average.

8. PEK school component. Teachers' ratings in kindergarten: PEK students vs. kindergarten classmates

Assessment Social Skills Rating System	PEK Cohort 1 compared to kindergarten classmates[a] With preschool/ child care center	 Without preschool/ child care center
Total Social Skills[b]	No difference	Higher for PEK
Problem Behaviors[c]	No difference	No difference
Academic Competence[d]	No difference	Higher for PEK
	PEK Cohort 2 compared to kindergarten classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	Higher for PEK	Higher for PEK
Problem Behaviors[c]	Lower for PEK	Lower for PEK
Academic Competence[d]	Higher for PEK	Higher for PEK
	PEK Cohort 3 compared to kindergarten classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	Higher for PEK	Higher for PEK
Problem Behaviors[c]	Lower for PEK	Lower for PEK
Academic Competence[d]	Higher for PEK	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.*

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

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

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

Differences in first grade compared to classmates

Former PEK participants in Cohorts 1 and 2 were compared to their first-grade classmates using the same assessments used in earlier years, the Peabody and Woodcock-Johnson academic assessments and the Social Skills Rating System. The classmate comparison group consists of PEK children's kindergarten classmates in the 10 PEK schools. 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.

Academic assessments

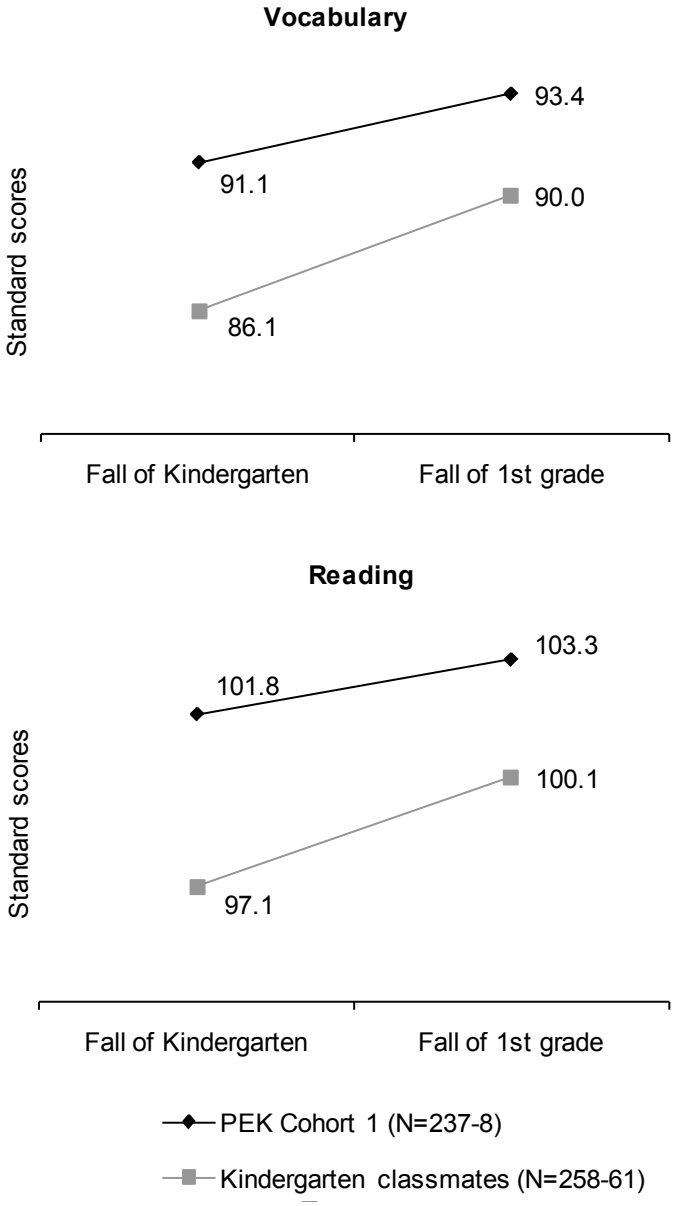
Progress between kindergarten and first grade

Between fall of kindergarten and fall of first grade, former PEK students in Cohorts 1 and 2 made faster progress than their peers nationally on all four academic assessments, measuring vocabulary and early reading, writing, and math skills. While gains in all four areas were statistically significant for PEK Cohort 1, students in PEK Cohort 2 made significant gains in reading and math only, and not in vocabulary and writing.

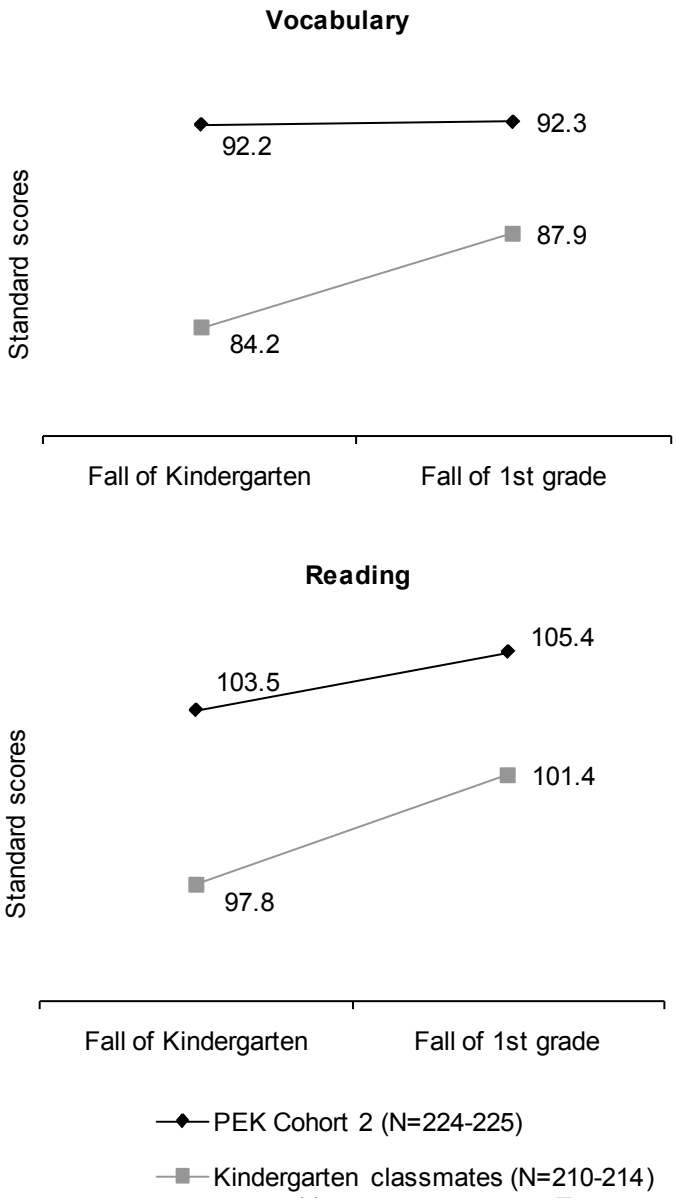
Although PEK students made accelerated progress compared to their peers nationally, their classmate comparison groups made even more accelerated progress on each of the four academic measures during the kindergarten year, on average. In addition, their gains were statistically significant in all four academic areas. As shown in Figure 9, classmates' larger gains narrowed the gaps that were seen between former PEK students and their classmates in fall of kindergarten. Still, former PEK students continued to score higher on average than their classmates in all four academic areas in fall of first grade (Figures A24-A25). It should be noted that former PEK students' progress was compared to the total classmate comparison group, including both those with and those without prior preschool or child care center experience.

9. PEK school component. Changes in academic test standard scores from kindergarten to first grade: PEK Cohort 1 vs. kindergarten classmates* (fall 2006 to fall 2007) and PEK Cohort 2 vs. kindergarten classmates* (fall 2007 to fall 2008)

Cohort 1 vs. Kindergarten classmates

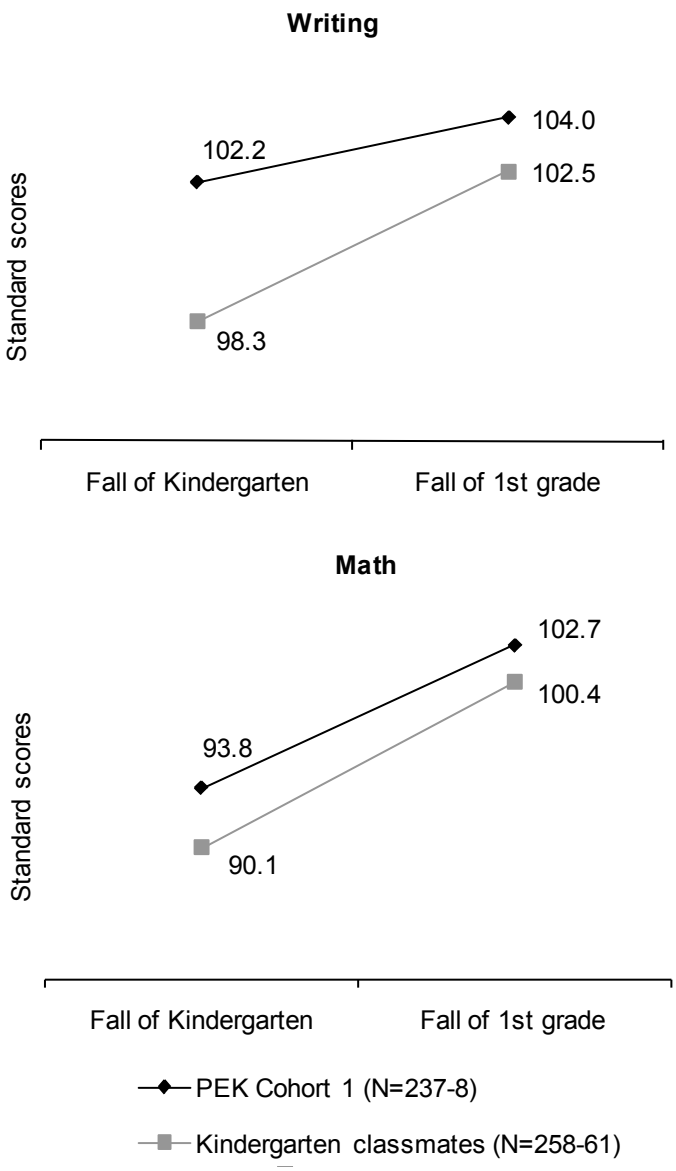


Cohort 2 vs. Kindergarten classmates

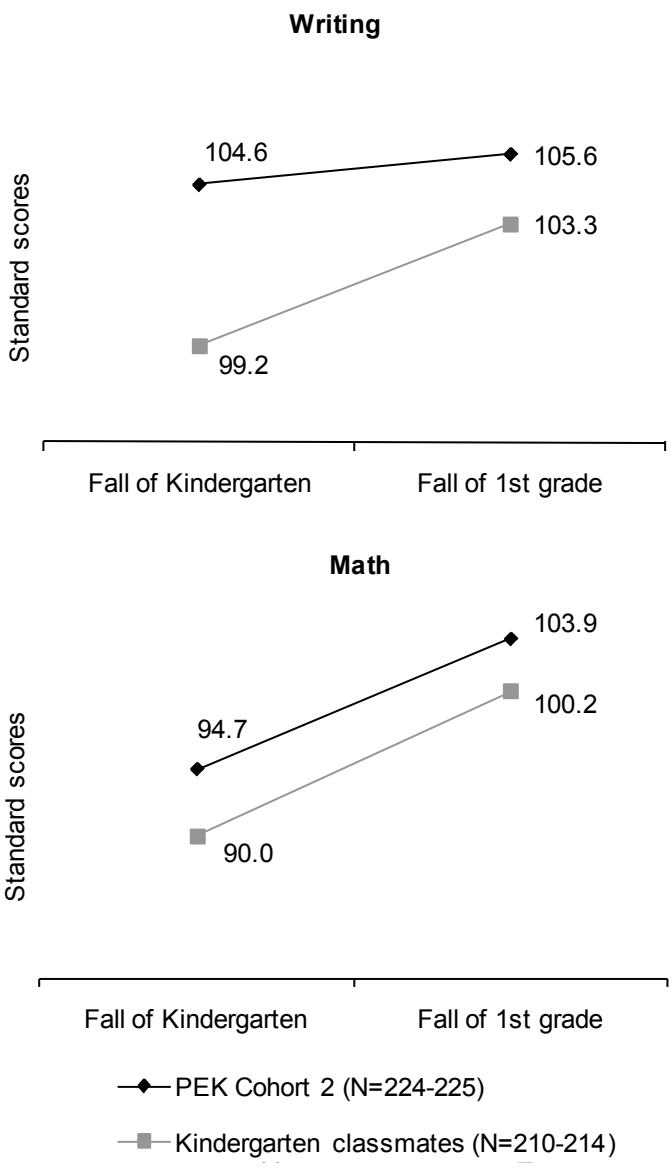


9. PEK school component. Changes in academic test standard scores from kindergarten to first grade: PEK Cohort 1 vs. kindergarten classmates* (fall 2006 to fall 2007) and PEK Cohort 2 vs. kindergarten classmates* (fall 2007 to fall 2008) (continued)

Cohort 1 vs. Kindergarten classmates



Cohort 2 vs. Kindergarten classmates



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 one's peers. One-year changes in standard scores were statistically significant for each group in each subject (see Figures A24-A25).*

** The classmate comparison group was defined as kindergarten classmates of former PEK student 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.*

The difference in progress between the two groups can also be viewed in terms of age-equivalency scores. In the fall of kindergarten, the average age-equivalency vocabulary score for PEK Cohort 1 children was 4 years 11 months. It increased to 6 years 1 month in the fall of first grade, for a gain of 14 months. The comparable age-equivalency scores for PEK Cohort 2 children were 5 years 0 months and 6 years 2 months, again representing a 14-month gain in vocabulary during the kindergarten year. Nonetheless, the classmate comparison groups made even larger gains in vocabulary on average, amounting to 15 months for classmates of Cohort 1 and 18 months for classmates of Cohort 2. Likewise, the number of months gained is higher for the classmate comparison groups than for the PEK students in the areas of reading, writing, and math. Still, the two PEK cohorts and their respective classmate comparison groups made faster progress than their peers nationally on each of the measures, and all the groups made exceptionally fast progress in early math skills (Figures A26-A27).

PEK's impact in first grade

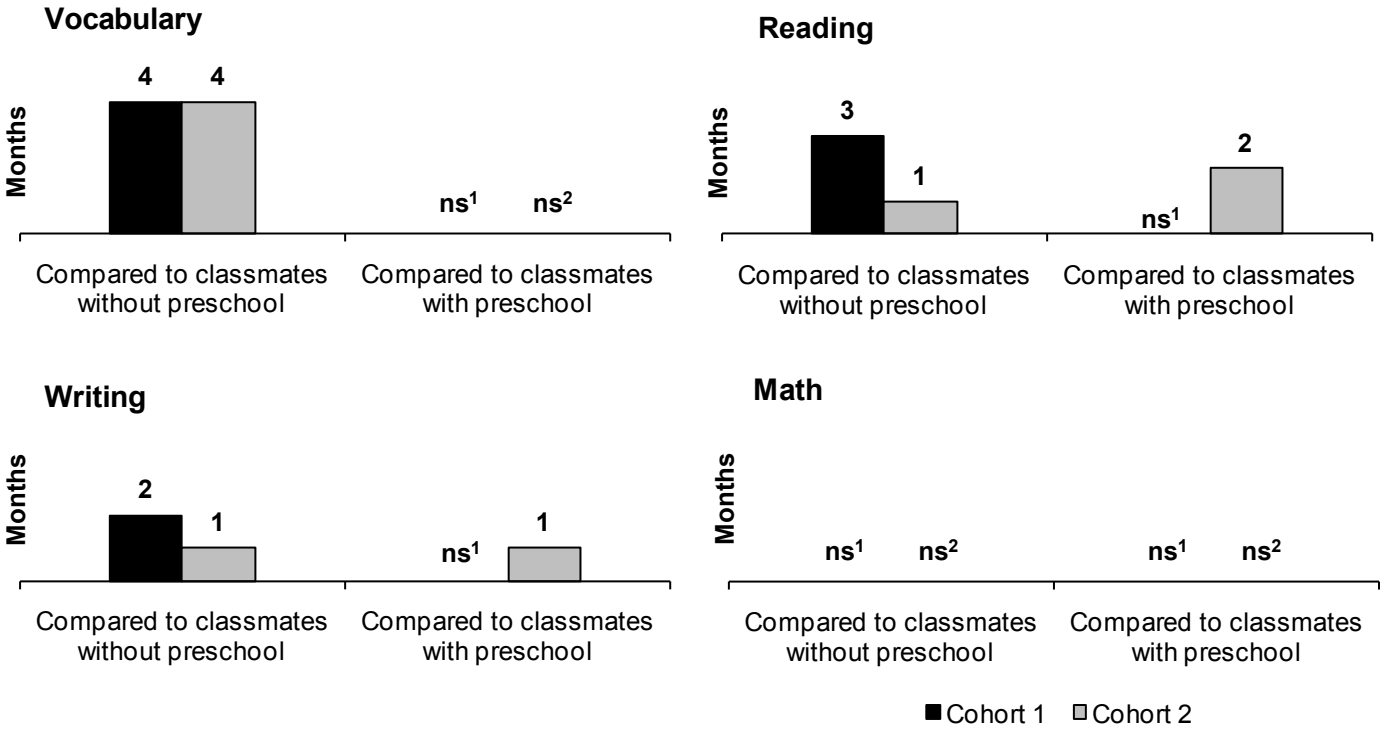
To estimate the potential ongoing impact of PEK, we compared PEK Cohort 1 and Cohort 2 students' fall of first grade test results with those of students in their respective classmate comparison groups. As was done in kindergarten, we separated the classmate groups into those with other preschool or child care center experience prior to kindergarten and those without. 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 suggest that the academic advantages that Cohort 1 and Cohort 2 gained from attending PEK had lessened somewhat from fall of kindergarten to fall of first grade.

In fall of first grade, we continued to see advantages over classmates who did *not* have other preschool or child care center experience prior to kindergarten. Cohort 1 and Cohort 2 students scored higher on average than their respective classmate comparison groups on three of the four measures. The exception was early math skills (Figures A28-A29). As shown in Figure 10, Cohort 1 and Cohort 2 students were an estimated four months ahead of their classmates in vocabulary. In reading, Cohort 1 had a three-month advantage and Cohort 2 had a one-month advantage over their classmates. In addition, former PEK students were estimated to have an advantage in writing of two months for Cohort 1 and one month for Cohort 2. Math scores were not significantly different (Figures 10 and A30).

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 measures in fall of first grade. Results were stronger for students in PEK Cohort 2, who maintained significant advantages over their classmates with preschool experience in

the areas of reading and writing. These advantages amounted to two months in reading and one month in writing. On the other hand, by fall of first grade, Cohort 2 students no longer had significant advantages over classmates with preschool experience in the areas of vocabulary and math (Figures A28-A29).

10. PEK school component. Difference in age-equivalency scores in first grade: PEK Cohorts 1 and 2 compared to their classmates*



Note: *This figure presents the differences in months between the age-equivalency scores of PEK Cohorts 1 and 2 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

As was done in kindergarten, teachers used the Social Skills Rating System to rate former PEK children and their classmates on their social skills, problem behaviors, and academic competence in fall of first grade. The analyses presented here incorporate adjustments for demographic differences among the PEK and classmate comparison groups. As was observed in the academic assessment results, the social skills results also suggest that PEK children's advantages were reduced by fall of first grade.

As previously described, in the fall of kindergarten, former PEK children in Cohorts 1 and 2 received significantly higher teacher ratings in social skills on average compared to their classmates without preschool or child care center experiences before kindergarten. PEK Cohort 2 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.

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 Cohort 2 was 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.

In academic competence, PEK students in Cohorts 1 and 2 had an advantage in fall of kindergarten over their respective classmate comparison groups with no preschool experience. In addition, Cohort 2 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 experience. For PEK Cohort 2, the advantage over classmates with preschool experience was maintained, while the advantage over classmates without experience was no longer evident (Figures 11 and A31-A32).

11. PEK school component. Teachers' ratings in first grade: PEK students vs. kindergarten classmates

Assessment Social Skills Rating System	PEK Cohort 1 compared to kindergarten classmates[a] With preschool/ child care center	 Without preschool/ child care center
Total Social Skills[b]	No difference	No difference
Problem Behaviors[c]	No difference	No difference
Academic Competence[d]	No difference	Higher for PEK
	PEK Cohort 2 compared to kindergarten classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	No difference	No difference
Problem Behaviors[c]	Lower for PEK	No difference
Academic Competence[d]	Higher for PEK	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] *Higher scores indicate higher social skills.*

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

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

Implementation efforts

This section explores the extent to which PEK's school component has been implemented as intended. Implementation results provide insights into factors that may have contributed to the changes seen in Cohort 1, 2, and 3 school participants. The two paragraphs below briefly describe the implementation results through the end of the 2007-08 school year.

For the first three years (2005-06 through 2007-08), the implementation evaluation examined the extent to which PEK classrooms align with the district's Project for Academic Excellence and promote language and literacy development. Surveys with principals, teachers, and parents were also conducted to assess their satisfaction with PEK; teachers' communication with parents; and parent involvement in children's learning and school activities. Results through the 2007-08 school year indicated that program implementation had increased over time. By the end of the third year, all PEK classrooms were fully implementing at least a majority of the indicators in the Project for

Academic Excellence. PEK classrooms had achieved a high rate of implementation of the Early Childhood Workshop model. Classrooms also showed a high rate of implementation for most of the indicators related to classroom rituals and routines. Classrooms generally met indicators related to classroom environment, although in some areas there was room for moving beyond the basic expectations. The evaluation also specifically addressed the extent to which classrooms promote literacy and language development. To this end, independent observers conduct assessments each year using a research-based tool for preschool classrooms, the Early Language Literacy and Classroom Observation (ELLCO). Spring 2008 assessments found that overall, PEK classrooms created a strong "culture of literacy," and the impact of PEK's coaching was evident in teachers' practices.

Principals, teachers, and parents in 2007-08 reported high satisfaction with the PEK program. Principals spoke positively about the leadership and support provided by PEK staff. PEK teachers strongly agreed that their school better prepares children for kindergarten because of the school's participation in PEK. Most teachers also strongly agreed that participation in PEK professional development has had a large impact on their teaching practices. Parents rated their child's experience in PEK as "excellent" (70% of parents) and "very good" (29%). Nearly all parents reported that there is enough effort made to involve parents, and parents were very satisfied with PEK teachers' communication.

Detailed implementation reports were provided by the Saint Paul Public Schools program evaluator (Heinrich, 2007) and the independent consultant of Saint Paul Public Schools (Passe, 2008), and summarized in our previous reports (Mohr, Mueller, & Gozali-Lee, 2008b; Mueller & Gozali-Lee, 2007).

The 2008-09 evaluation follows former PEK children who were in first grade (Cohort 2) and in kindergarten (Cohort 3) during that year. Therefore, the implementation evaluation focuses on the integration between PEK and kindergarten classrooms and professional development offered to kindergarten teachers.

Implementation findings presented here are organized into the following topics:

- Principal and kindergarten teacher satisfaction
- Professional development
- School integration

Principal and kindergarten teacher satisfaction

Principal satisfaction

In spring 2009 Wilder Research conducted surveys with principals at the 10 original PEK schools. Five principals completed the survey on their own, and the other five principals completed the survey as a phone interview with Wilder Research staff. Two of the 10 principals reported that this was the first year that they were the principal at the school. Responding to a series of open-ended questions, the principals reported being satisfied with the PEK program. They appreciated having PEK in their schools. According to principals, PEK has noticeably improved students' readiness for kindergarten, and has pushed kindergarten classrooms to a higher level. Principals also appreciated building the connections with parents early on by having PEK in their schools.

Following are examples of principals' comments:

> [The most positive aspects of having PEK classrooms are] that the students are prepared for kindergarten, academically and socially, and [they] have an impact on the other students who haven't had the opportunity to be in PEK as role models, peer models. [The program resulted in] the kind of readers that are being developed, that are showing through observations and assessments. Student achievement is greatly increased at the kindergarten level and working on up. Also, the program gives the opportunity to develop the relationships with the parents at an early stage and to build on that.
>
> Our PEK students are our role models of the school! PEK really helps to prepare the students coming into the school, because they have been exposed to the rituals and routines of what the school is like.
>
> PEK provides students with a prior knowledge of the school environment before coming into kindergarten and getting students and families engaged early. We have a family outreach staff who gives orientations to parents surrounding the PEK and kindergarten curriculum, answering questions, such as "What can you do to help your child be more successful at school?" and "What can you expect [to occur in the classrooms]?"
>
> Kindergarten students who have entered our classes after a year in PEK are miles ahead of other students starting kindergarten. We are constantly amazed with their performance.
>
> The academic rigor that comes out of the program and the exceptional professional development that the teachers get from PEK are the positive aspects of the program. The most important thing is the success that we are seeing with the kids. The popularity of the program as a result of that success makes the parents very happy and excited!

> It has made a tremendous difference in our students' ability to produce in the kindergarten and first-grade classrooms, and it brings in the parents at an early time to understand their crucial role in working with their children and dealing with their children's education.
>
> [The program has contributed to] increased enrollment [in my school] and the ability to know families when their children are younger.
>
> The program provides a positive start for kindergarten for so many students who otherwise would miss out. It also provides parent education to parents at an earlier stage than we would otherwise be able to do. We are able to demonstrate to teachers of K-6 how learning occurs at such an early stage with JOY and to demonstrate that rigor in an academic program does not have to equate with a disciplinarian approach in order to achieve academic success; rather, it has more to do with a systematic approach to how children learn at certain ages. The program helps establish relationships with families from an earlier stage and maintain those relationships for a longer time throughout the elementary school career of their children.

Principals also spoke favorably of the leadership and support provided by PEK and the Saint Paul Public Schools.

> I think the leadership of this program under the direction of the PEK assistant director is exceptional. I would like to see that her role be strengthened as we look to step up the rigor in our kindergarten and subsequently first-grade classrooms.
>
> Once again I can say without hesitation, PEK is one of the best things Saint Paul Public Schools has ever done in my time with the District (12 years). The program is superbly organized, continuously improving to meet the changing needs of all stakeholders. It is influencing the entire system from the lowest grade up. It is doing it in such a way that people are noticing and wanting to change rather than feeling that they have to change because someone is making them change.
>
> It is a wonderful program that meets the needs of students on a daily basis. It is wonderfully organized from a central administrative perspective, with the PEK assistant director and her team [coordinating the program]. The staff development has been top notch. And the vision for what is happening has been clearly articulated. …the communication that they send out is wonderful! They are always sending out updates and things to look for.

Asked specifically about what they would do if they could change some things about PEK in their school, principals most frequently described wanting to expand the program. They described wishing they had the resources to open an additional classroom, to have a bigger classroom space, or wanting longer classroom hours, for example.

While principals voiced support for PEK overall, a few of them also suggested ways the program could be strengthened. For example, one principal indicated that PEK classrooms in her school needs to have a staff member working with the ELL students. Another principal suggested flexibility in sharing the PEK staff with the kindergarten classrooms. She mentioned that, in her school, the PEK staff help with guided reading and instruction in kindergarten classrooms, while the kindergarten ELL staff work with the PEK children in active learning. One principal felt that she needs to encourage better connections between PEK and kindergarten teachers. Another principal said better alignment between PEK and kindergarten curriculum and practices is needed in her school. Additional parent information sessions and bussing to the neighborhood schools were also suggested by one principal.

Teacher satisfaction

In spring 2009 Wilder Research asked the kindergarten teachers in the 10 original PEK schools to complete a survey about their experiences with the program. Twenty-five of the 26 eligible teachers completed the survey, including 23 teachers who completed the survey on their own and 2 teachers who completed the survey as a phone interview with Wilder Research staff. One teacher was on leave when the survey was conducted and the substitute teacher was unfamiliar with the program. Results indicate that all teachers agreed, indicating "strongly agree" (92%) and "somewhat agree" (8%), 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 children who participated in Pre-K are coming to school knowing the basics of being in school. I believe this is very beneficial. They are also coming to kindergarten with stronger pre-literacy skills.
>
> [The children] come to school prepared and know what school is about. Their behavior and reading, writing, and math skills are higher than children who have not participated in the Pre-K experience.
>
> Students are more comfortable and confident about all aspects of school when they arrive. Most students who come from Pre-K have higher achievement and learn how to help other students.
>
> The students are better prepared academically and socially. The families are already accustomed to school routines and schedules.

> Because of the existence of the Pre-K program, my incoming students come well prepared for school. Learners coming from this program know the essential concepts necessary to begin kindergarten. Students from the Pre-K program enter my classroom knowing how to write their name, identify letters and numbers, hold a pencil, cut with scissors, etc. I see a wide learning gap between the children who attended the Pre-K program vs. those who did not.
>
> Pre-K has done a wonderful job getting kids ready to read. Many come in knowing their letters and concepts about print. Math skills are also stronger.

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. Fostering these linkages is an ongoing process, and the program continues to focus attention in this area.

School integration

Principals' perceptions

In the 2009 survey, principals were asked if they had seen improved connections between PEK and kindergarten classrooms in their school. The principals in the four schools that received intensive professional development from PEK (Dayton's Bluff, Wellstone, American Indian, and World Cultures) described seeing the program coach work closely with both the PEK and kindergarten teachers in Professional Learning Communities on a regular basis. Principals said that teachers work together to discuss instructional strategies and visit each other's classrooms.

Their comments follow:

> Absolutely! The PEK coach [name of person] works with the PEK and kindergarten teachers in Professional Learning Communities (PLC). They met regularly and addressed goals to improve instruction that was visible and has shown good results [for our students] in the district's reading assessment, PALS for kindergarten.
>
> Most definitely. Our PEK and kindergarten teachers have been meeting as Professional Learning Communities this year, which has included a video sharing of instructional practices at each meeting. Together these teachers have visited each other's classroom and shared ideas. I see a much stronger alignment with the instructional strategies and specifically in oral language development.

> I have observed a more defined vision and focus surrounding the program. I have also seen a stronger alignment surrounding what the 4-year-old program does in relation to preparing students for kindergarten. There has been more of an aggressive attempt to align instructionally and make those kinds of connections between PEK and kindergarten classrooms. The PEK staff are doing more and more each year. The program is becoming more and more defined.
>
> The PLC group has been meeting on a regular basis, and there is a lot of "aha" moments ("I can do it!" "I can see how that would go!"). My PEK teacher went to a kindergarten classroom and [observed] the things that they were doing. [However], one of the things that didn't happen this year is having my kindergarten classrooms to be more aligned with PEK. We need to get my kindergarten teachers to look into the PEK classrooms, because there is much more rigor in PEK.

To a lesser degree, other school principals also mentioned some connections between the PEK and kindergarten classrooms in their schools. Most often, they indicated their teachers received professional development from PEK and the district, and that all teachers participated in learning walks. A few principals also mentioned that the PEK and kindergarten teachers in their schools share information in Professional Learning Communities. However, one principal noted that the instructional models in those classrooms are different.

Asked about ideas for furthering the connections between PEK and the rest of the schools, many principals mentioned that they want to expand the Professional Learning Communities to include first grade classrooms, continue the joint professional development, and have learning walks throughout the school. One principal also wanted to have more time for teachers to collaborate and use the same assessments in kindergarten classrooms as in the PEK classrooms to measure student progress. Another principal said that she plans to have the PEK children who are reading above grade level participate in the Family Reading Everyday program alongside the kindergarten children in her school. However, a principal voiced her concern about challenges to differentiate and to offer the same supports in kindergarten as in the PEK classrooms because of the lower number of staff available in kindergarten.

Principals also described the importance of sharing information and providing support to each other in their role as the instructional leader of PEK at their schools.

Teachers' perceptions

The spring 2009 kindergarten teacher survey also included several questions asking teachers about the connections with PEK teachers and about differentiated instruction in their classrooms. Results in Figure A33 show that all kindergarten teachers agreed

(indicating "strongly agree" and "somewhat agree") that they work with PEK teachers in Professional Learning Communities, although more teachers from the four schools who received coaching from PEK responded strongly agree (75% vs. 54%) to the statement than teachers from the other schools. Almost all teachers also strongly (44%) or somewhat (52%) agreed that they have received training and support on how to differentiate instruction to meet the needs of their students.

While kindergarten teachers felt that 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 52 percent of the teachers indicating strongly agree and 32 percent somewhat agree. Slightly fewer teachers (76%), however, strongly and somewhat agreed that there is communication between them and PEK teachers during the kindergarten transition period about students' skills and needs by discussing their assessment results, for example.

Similarly, while almost all kindergarten teachers (96%) reported using the individual student data regularly to inform their teaching, fewer teachers (72%) reported using the student information provided by PEK teachers to help develop lessons, activities, and/or grouping strategies in the classrooms.

Asked specifically about observing each other's classrooms, fewer than half of the kindergarten teachers reported that they had observed the PEK classrooms (42%) and had their classrooms observed by the PEK teacher (44%). Compared to teachers from the other schools, more kindergarten teachers at Dayton's Bluff, Wellstone, American Indian, and World Cultures who received coaching from PEK reported that they had observed the PEK classrooms (70% vs. 21%) and had their classroom observed by the PEK teachers (73% vs. 21%).

The spring 2009 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 collaboration at their school. Their ideas included continuing to learn from the coach and working together with the PEK teachers in the Professional Learning Communities (PLCs), more communication, more consistent curricula, mutual observations, and shared training experiences. A few kindergarten teachers also wished to have more staff and resources in their classrooms. Examples of their comments follow:

I would love to see observation days built into the yearly schedule; days for the Pre-K teacher to observe in kindergarten and days for the kindergarten teachers to observe in Pre-K. As a kindergarten teacher, it would be helpful for me to see what is happening in the Pre-K classroom so that I can extend the instruction in my own classroom. I would also love to be trained in some of the original Pre-K methods. In other words, it would be nice to see more similarities between the Pre-K/Kindergarten programs. In order for this to happen, I believe the kindergarten classrooms would also need similar adult support (i.e., teaching assistants to assist students while small group instruction is taking place and coaches to help guide instruction).

I will continue having the team level meeting together like the PLC learning and setting goals. Also, [it would be important to] continue having the Pre-K coaching person to go around and observe our teaching and also give us feedback.

The classrooms are not in close proximity physically to each other. Informal communication doesn't happen easily, and formal collaboration has to be carefully planned for.

I would like to be able to keep more of the Pre-K families in our building for kindergarten.

[I would like to have] a chance to share or talk about what the Pre-K teachers are teaching, what kind of assessments they are using and just to hear names of kids who are doing well and who are struggling.

[I would like to have] more time and opportunity for Pre-K and K teachers to sit down when school starts and discuss students. We just don't have time. Maybe principals should allow time for that. We are always in group meetings that I don't find as beneficial as I would if I could talk with and spend time with the Pre-K teacher and discuss each student, even in that first week.

Sharing ideas about common themes and knowing what areas have been taught in PEK is needed, so that kindergarten teachers can review, re-teach and add. Teaching the same type of material can be helpful if everyone works together.

It would be better if the classroom was closer to the kindergarten classrooms and if we had more time to collaborate about what the students' needs are. Also, it would be wonderful to be able to observe each other.

We are continuing to learn together through coaching and a Pre-K-K PLC group.

It is important to allow time during staff development for the Pre-K and K teachers to collaborate instead of expecting them to do it on their own time. Set up Pre-K classrooms so that the teachers and students can interact throughout the school day.

> Kindergarten teachers need to be given the training that Pre-K teachers receive to better bridge the learning for students.
>
> I think Pre-K came in with their own agenda and curriculum and did not consider our curriculum. They started doing units of study that we had been doing for many years. I think some consideration should have been given to what was already in place. For further connection: Making sure we're not duplicating units, and making sure things are developmentally appropriate for both levels.

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 several issues that can be taken into consideration in future planning for PEK school sites. Some of the issues pertain to PEK staff and some pertain to the researchers studying PEK.

- *Continue to promote differentiating instruction*. The success of PEK in increasing the skills of participants can result in larger skill differences between them and their classmates when they reach kindergarten. These differences pose an instructional challenge for kindergarten teachers. For the program and district, they raise considerations about how to ensure that all children are able to build on their current skills and achieve substantial advances in kindergarten. It is possible that the narrowing of differences that we observed between PEK Cohorts 1 and 2 children and their classmates from kindergarten to first grade could reflect instruction being targeted to a lower skill level than that of former PEK students.

  District efforts to expand the PEK model to 4-year-old programs district-wide should help address the issue to some extent by increasing the proportion of children who enter Saint Paul schools with similar preparation. Still, there will continue to be diversity in preparatory experiences among children entering kindergarten. For example, most kindergarten teachers in the spring 2009 survey felt that the former PEK children are more prepared academically and socially to enter kindergarten than their classmates. This points to the need for kindergarten teachers to differentiate their instruction to the varying skill levels of the children in their class. This is important for PEK children so that they maintain and continue to build on the benefits that PEK provided, and is also important for children without strong academic preparation so they are taught at an appropriate level. Although research on the effectiveness of differentiated instruction is still at an early stage, the principles on which it is based have some grounding in research (Hall, 2002). The district began efforts in this area in 2008-09 as mentioned.

- *Collaboration with kindergarten teachers*. PEK has also 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 may also help kindergarten teachers prepare to differentiate their instruction. Fostering these linkages is an ongoing process, and the program can continue to focus attention in this area. The fall 2008 joint training between PEK and kindergarten teachers is one important milestone, as is the PEK coaching pilot for kindergarten teachers in four schools. Principals' and kindergarten teachers' enthusiasm for forging these linkages provide a strong basis for continuing to connect PEK teachers with kindergarten teachers and the larger school.

- *Using information provided by PEK teachers to guide instructions in kindergarten classrooms*. While most kindergarten teachers felt that there is sufficient communication between them and the PEK teacher at their school, information about students' needs and skills for the purpose of differentiation of instruction in kindergarten is not always discussed or used. More time to observe PEK classrooms, share teaching strategies with the PEK teachers, and discuss individual students' strengths and challenges are needed, according to kindergarten teachers. At the same time, kindergarten teachers also need to use of the information shared by PEK teachers to help develop lessons, activities, and grouping strategies in kindergarten classrooms.

- *Assessing impacts of the intensive coaching provided to some kindergarten teachers*. As mentioned above, kindergarten teachers in four schools received weekly one-on-one coaching from PEK during the 2008-09 school year. They also received intensive training on differentiated instruction. To assess whether this effort potentially impacts children's academic skills, we will compare changes in children's academic progress from fall of kindergarten to fall of first grade between those whose teachers received coaching and those whose teachers did not.

- *Using same assessments in Pre-kindergarten as in kindergarten classrooms.* In 2008-09, the PEK teachers began administering subtests of the Phonological Awareness Literacy Screening (PALS). The instrument is also being used in the district's kindergarten classrooms. Using the same assessments in PEK as in kindergarten classrooms may help teachers across the grade levels discuss and address individual children's strengths and challenges. Since the district gathers classroom information on alignment with the Project for Academic Excellence (PAE), it might be useful to review the results with both PEK and kindergarten teachers to address practices that can be strengthened at both grade levels, as well as to identify practices that have been successfully implemented in PEK classrooms and build on them in kindergarten classrooms.

- *Additional staff and supports*. One principal indicated that their PEK students would benefit from having a staff member working with the ELL students. Another principal voiced her concern over the challenges to differentiate instruction and to offer the same supports in kindergarten as in PEK classrooms because of the lower number of staff available in kindergarten. A third principal suggested flexibility in sharing staff across the grade levels. PEK staff may want to consider whether there are ways of providing more targeted support to ELL students in PEK and possibly explore whether there are opportunities to share staff across classrooms.

- *Building connections with parents.* Several principals mentioned that PEK helps the schools build connections with parents early on. PEK helps instill parent involvement in their children's education and its success which, in turn, contributes to parents wanting to enroll their child's in the elementary school. Program staff should be commended for their efforts to involve parents.

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 it 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 offer PEK. It should be noted that both child care center teachers and family child care home providers are referred to here as "teachers." As of fall 2009, all 8 child care centers and 10 family child care homes are still offering PEK. Three new homes will also join the second cohort of community child care providers.

This section begins by profiling children who participated during the program's first three years in child care settings, 2006-07 (Cohort 1), 2007-08 (Cohort 2), and 2008-09 (Cohort 3). Their progress during PEK is then discussed based on Individual Growth and Development Indicators (IGDIs) administered by PEK staff. Academic and social outcomes based on Wilder Research's assessments are then provided for the first cohort of child care children in fall 2007 and second cohort in fall 2008 when they reached kindergarten. Upon reaching kindergarten, these children were compared to children who had attended PEK at school sites as well as to the same comparison group of kindergarten classmates. After summarizing student results, this section describes the program's implementation in child care settings these first three years. The section concludes with a list of issues for consideration that can be used to inform future planning in the child care component.

Topics addressed in this section include the following:

- Overview of results
- Characteristics of children (Cohorts 1-3)
- Progress while in PEK (Cohorts 1-3)
- Kindergarten readiness compared to classmates (Cohorts 1 and 2)

- Implementation efforts (Cohorts 1-3)
- Issues for consideration

Overview

Interpreting child care results

In interpreting results for community-based PEK, there are a couple of issues that should be kept in mind. First, it is important to recognize that outcomes available to date for PEK child care children are more suggestive than conclusive. This is in part based on the small size of the PEK child care group. Additionally, there was a rather large difference between the child care group and the comparison groups in the proportion of ELL children. Even though we adjusted for demographic differences among the groups, it is possible that our adjustments did not entirely correct for the impact of these differences.

Results should also be viewed in the context of the teacher turnover that is often seen in child care settings. Participating child care centers in the first two years experienced high teacher turnover. Additionally, several family child care home providers became ineligible for the program when changes in their enrollment brought them below the program's minimum enrollment requirements. Changes in family child care home providers also resulted from providers leaving the child care field, loosing their child care license, or choosing not to continue with PEK. When family child care homes exited the program, new providers were asked to take their place for the remainder of the initial cohort. A more stable group of teachers participate in the second cohort of community child care providers. As of September 2009, the second cohort of providers had been offering PEK for one year and most providers will continue with PEK in 2009-10.

Key findings

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.

Characteristics of children

In fall 2006, PEK extended the program to children at participating child care sites in Saint Paul. Figure 12 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), and 183 participated in 2008-09 (Cohort 3). 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.

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

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

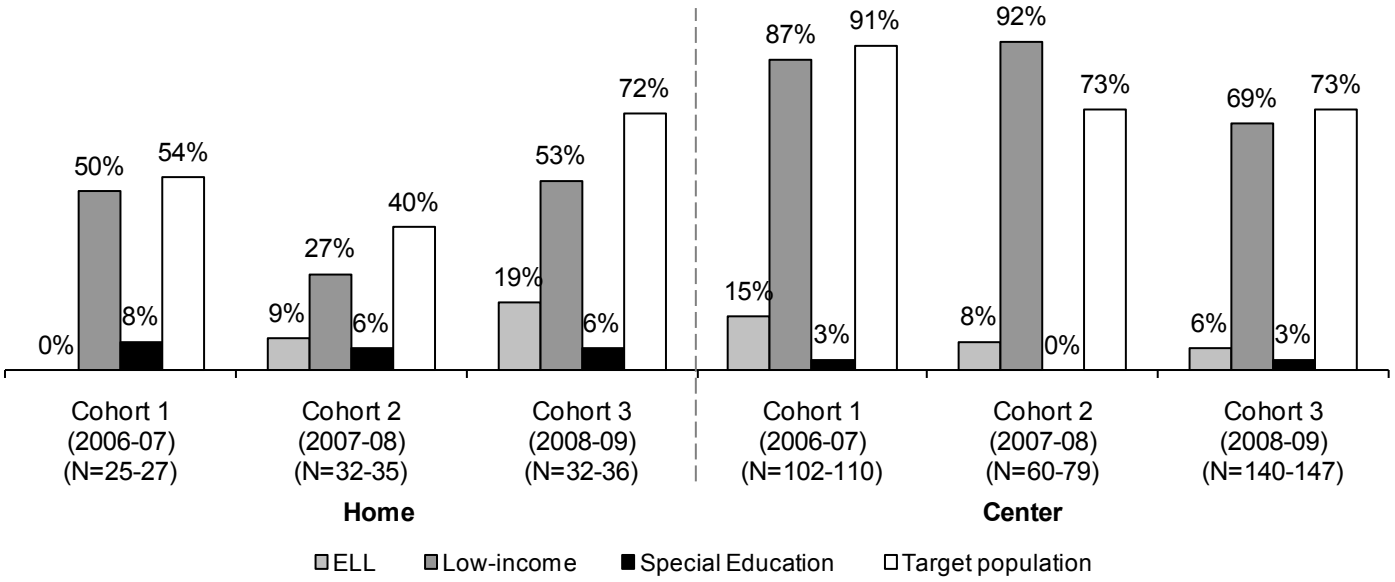
* *Some children who participated in Cohort 1 as 3-year-olds also participated in Cohort 2 as 4-year-olds. Similarly, some children (n=13) who participated in Cohort 2 as 3-year-olds also participated in Cohort 3 as 4-year-olds.*

Note: *Child care Cohorts 1, 2, and 3 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 three 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. 27-53%). 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 three years. Two to seven children received Special Education services each year (Figures A34-A36). Figure 13 shows the percentages of PEK child care children in the program's target populations during the first three years in child care settings.

13. PEK community component. Representation of PEK target populations, 2006-07 to 2008-09



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, 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 that 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 (Cohort1) and were beginning 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.

Attendance

For children participating in PEK child care Cohort 1, attendance data are available from September 1, 2006, through August 31, 2007 (Figure A37). For child care Cohort 2, attendance data are available from September 1, 2007, through April 30, 2008 (Figure A38). 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 A39).

The number of days children attended during the first two years 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 A37).

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 A38).

Rate of attendance 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 A39).

Progress while in PEK

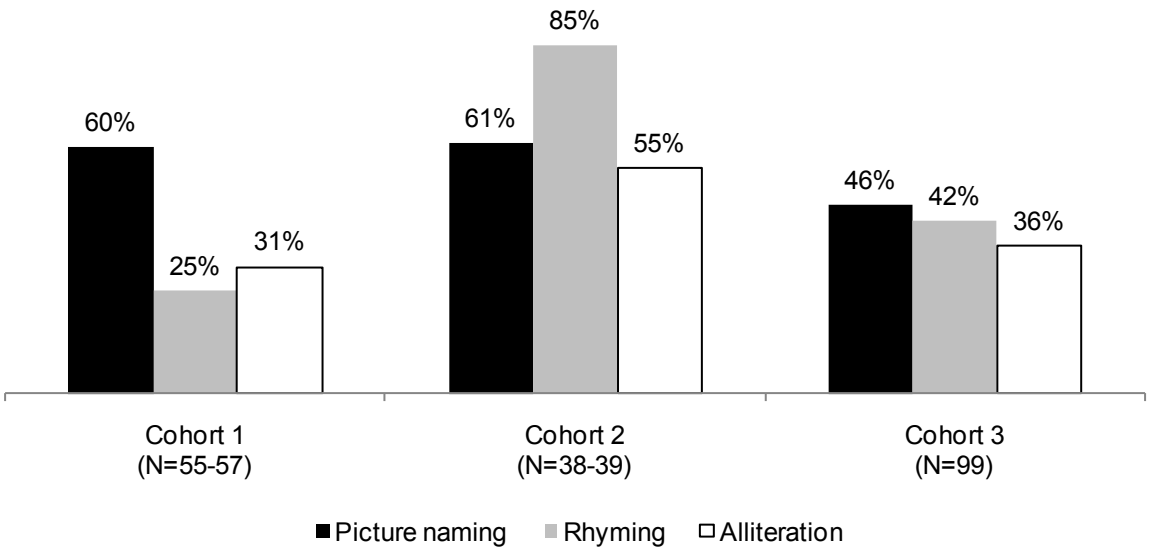
Teachers' assessments of early language and literacy development

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. PEK established target scores of 26 for picture naming, 12 for rhyming, and 8 for alliteration for the end of the pre-kindergarten year.

PEK child care staff administer IGDIs three times each year. During 2008-09, IGDIs was administered in October, January, and April. Results reported here reflect 4-year-olds who took the pre-test in October and post-test in April. Similar to the previous cohorts, Cohort 3 children improved on all three indicators. Similar to Cohort 2, the biggest improvement was in rhyming, while the biggest improvement for Cohort 1 was in picture naming. Cohort 2 children scored higher than Cohort 1 and 3 students at their post-test (Figure 14). Cohort 2 scores were also higher than Cohorts 1 and 3 at pre-test, and their average gains across the three indicators were slightly higher than that of Cohort 1 and 3 students. Thirty percent of Cohort 3 4-year-olds met the program's target for picture naming at pre-test, and 46 percent at post-test. For rhyming, 19 percent of 4-year-olds met the target at pre-test, and 42 percent at post-test. Sixteen percent of 4-year-olds met the target for alliteration at pre-test and 36 percent at post-test. Comparison between settings show that more children at homes than at center sites met the targets in picture naming (50% vs. 44%), rhyming (65% vs. 37%), and alliteration (60% vs. 30%) at post-

test. Results should be interpreted with caution, however, because the small number of children in each setting. Detailed results for Cohorts 1 and 2 are presented in our previous report (Mohr, Gozali-Lee, & Mueller, 2008b).

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



Kindergarten readiness compared to classmates

Academic assessments

When they reach kindergarten, children who participated in PEK at child care centers or family child care homes are compared to their kindergarten classmates using the same assessments used in the school component, the Peabody and Woodcock-Johnson academic assessments and the Social Skills Rating System. First, PEK child care participants are compared to the same classmate comparison group as is used in the school component. As in the school component, the classmate comparison group is broken down into those with other preschool or child care center experiences (other than PEK) and those without such experiences. Second, children who attended PEK at child care sites are compared to children who attended PEK at school sites. Again, we adjust for demographic and test date differences among the groups being compared. It should be noted that these results are more suggestive than conclusive due to the small size of the PEK child care groups and differences between the groups in the proportion of ELL children.

Comparisons to classmate comparison group

When they reached kindergarten, it appeared that children who were in PEK child care had an advantage on some measures compared to their kindergarten classmates who did not participate in PEK. However, the advantages were not very consistent across the two cohorts. The most consistent finding was for vocabulary, where PEK child care children in both Cohorts 1 and 2 scored significantly higher on average compared to classmates without prior preschool or child care center experience. PEK child care Cohort 1 also scored significantly higher in vocabulary than their classmates with preschool experience. In the area of early reading, PEK child care Cohort 1 children scored significantly higher on average than the group without preschool or child care center experience but not the group with such experience. Children in PEK child care Cohort 2 did not appear to have an advantage in early reading over either of the kindergarten classmate comparison groups. On the other hand, PEK child care Cohort 2 did have significant advantages on average over their classmates without preschool experience, but not over their classmates with experience, in the areas of early writing and math skills. However, these advantages were not observed for PEK child care Cohort 1 children, who did not significantly differ from their classmates in these areas (Figures A40-A41).

Comparisons to school-based PEK

PEK child care Cohort 1 was also compared to PEK school-based Cohort 2 when both groups reached kindergarten in fall 2007. Likewise, PEK child care Cohort 2 was compared to PEK school-based Cohort 3 when both groups reached kindergarten in fall 2008. Children who attended PEK at school sites scored somewhat higher on average in reading and math, but none of the differences were statistically significant. In addition, children who attended school-based PEK scored somewhat, though not significantly, higher on average in writing compared to child care Cohort 1 but not compared to child care Cohort 2. Average vocabulary scores were about the same across the child care and school-based cohorts (Figures A42-A43).

Teacher ratings

The same types of analysis involving the same groups were conducted for teacher ratings of social skills, problem behaviors, and academic competence when PEK child care Cohorts 1 and 2 reached kindergarten. Again, we adjusted for differences in student characteristics across the groups.

Comparisons to classmate comparison group

In the area of academic competence, children in PEK child care Cohorts 1 and 2 were rated significantly higher on average than their respective classmate comparison groups without

prior preschool or child care center experience, but not significantly differently from classmates with such experience. No significant differences were found between PEK child care Cohorts 1 and 2 and their respective classmate groups in social skills. In the area of problem behaviors, PEK child care Cohort 1 children were rated higher (meaning *more* problem behaviors) on average than both classmate groups, and the difference was significant with the group with prior preschool or child care center experience. More detailed analyses involving problem behavior subscales indicated that PEK child care Cohort 1 children tended to exhibit more externalizing problem behaviors and hyperactivity than classmates with other preschool or child care center experiences. On the other hand, there were no significant differences in problem behaviors between PEK child care Cohort 2 and either of the classmate comparison groups (Figures A44-A47).

Comparisons to school-based PEK

As on the academic assessments, children who participated in PEK at school sites appeared to have some advantages over children who participated in PEK at child care sites in their social skills and problem behaviors. In fall of kindergarten, teachers rated school-based Cohort 2 students significantly higher than child care Cohort 1 in social skills. Specifically, analysis of the social skills subscales found that school-based Cohort 2 had higher ratings for cooperation and self-control. However, the social skills advantage for school-based PEK was not observed the following year in the comparison of child care Cohort 2 and school-based Cohort 3. On the other hand, school-based PEK had an advantage over both of the child care cohorts in terms of behavior. In fall of kindergarten, teachers rated the school-based PEK cohorts significantly lower on average in problem behaviors compared to their respective child care cohorts. More specifically, analysis of the problem behavior subscales indicated that the school-based cohorts had significantly fewer externalizing and hyperactivity problems than the child care cohorts. No significant differences were found between school-based PEK and child care PEK in the area of academic competence (Figures A48-A51).

Implementation efforts

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 third year of operation in child care settings, 2008-09. Findings presented here are organized into the following topics:

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

- Teacher and director satisfaction
- Professional development
- Implementation of teaching strategies
- Teachers' parent education efforts
- Parent involvement

Alignment with the Project for Academic Excellence

In summer 2009, an outside observer completed the third-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, 2009). 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 2009 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. In the area of routines, the report found that "teachers were fairly consistent about putting a particular routine into place but were less consistent in implementing all of the components" (Hawley, 2009).

PEK child care sites attained strong fidelity with the following indicators related to classroom routines: 1) morning meeting; 2) read aloud; 3) "ease into the day" routines; 4) use of shared reading; and 5) routines associated with the "regroup to revisit" portion of the day. 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 active learning time, as well as in the extent to which teachers differentiated small groups and the number of children included in small groups. Sites also varied in their use of interactive writing; their use of transitions, their interactions with parents, and their intentional use of conversation to promote vocabulary (Hawley, 2009).

The report describes how the program's training and expectations can affect the classroom outcomes:

> For this cohort, coaches seem to have firm ideas about which interactions to teach, model, and support with resources. The more explicit the expectations for how a routine should be conducted, the higher the implementation fidelity. Areas that had less training (interactive writing, for example) exhibited more variability in how the routine was implemented (Hawley, 2009).

The CEED report also describes child care providers' perceptions of the importance of PEK coaching: "Nearly every participant, when asked 'what makes the biggest difference?' responded with a comment about their relationship with the PEK coach" (Hawley, 2009). Further, the report noted that coaching was intentionally tied to other aspects of professional development:

> PEK's combination of training, coaching, written resource, accountability builds consistency and clear expectations. In 2009, PEK continued to refine its multi-tiered approach that included clearer goals and congruence throughout professional development strategies and resources. For instance, coaching visits reinforced content that was recently covered in the training sessions. Written resources build a shared reference of definitions, descriptions, and expectations throughout the learning community (Hawley, 2009).

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 fall 2008 and spring 2009 observations was prepared by CEED (Hawley, 2009). Overall, PEK sites were found to be strong in their support for language and literacy. The spring 2009 classroom observations indicate that growth occurred across all areas that the ELLCO measures, from the availability of books and writing materials to intentional implementation of routines and curriculum that support early literacy. Growth in all areas is also evident in the CHELLO measures for family child care homes, especially in the availability of writing materials throughout the classroom environments, activities that promote writing skills, and usefulness of data to monitor children's progress (Figures A52-A53).

While sites were strong in their supports for language and literacy overall, there were also variations among sites. A few areas for improvement were recommended. The observer noted that measures of teacher-child interactions at centers and homes that are more general in nature, such as classroom climate and behavior management, did not improve as much as the other areas. The observer also noted that a lower increase in oral language facilitation at child care centers was somewhat unexpected, particularly since the

professional development places strong emphasis in this area and that the previous cohort of participants showed the highest increase in this area. In fact, the observer saw family child care homes teachers more often use advanced vocabulary, explain words to children so that they understood, and ask questions that led children to use higher order thinking and language skills than center teachers. The observer also felt that center teachers needed to make more intentional teaching that connects the literacy-rich environment and children's activities by inviting children to more actively participate in writing centers and book reading, for example. Finally, she noted that more family child care providers than center teachers used IGDIs to monitor children's progress and communicate to parents (Hawley, 2009).

Summarizing the ELLCO, CHELLO, and Project for Academic Excellence observations, the CEED report concludes as follows:

> In 2009, pre-post ELLCO and CHELLO measures, implementation observations, and teacher reports indicate many positive changes have occurred over the past year. Child care centers have participated in professional development, made changes in their environments, and implemented new teaching strategies and interactions. Center directors are key partners in teacher support and PEK implementation. Family child care providers have gained knowledge and added many early literacy practices, including environmental print, writing experiences, and components of Early Childhood Workshop. Resources for Child Caring staff used lessons learned from PEK to build school readiness capacity in child care settings outside of St. Paul through training and coaching with the support of the PEK master coach. While the level of implementation varies, data indicated growth and change, particularly in areas where professional development goals and resources were most explicit. PEK offers support for teachers, programs, communities, and systems to build consistent early learning experiences for children across St. Paul and beyond (Hawley, 2009).

Teacher and director satisfaction

Overall satisfaction with PEK

In July 2009 Wilder Research facilitated focus groups for child care teachers and child care center directors participating in PEK's child care component. Feedback gathered through the focus groups was intended to inform the program's work with the second year of Cohort 2 child care providers beginning in fall 2009. At the end of their focus group session, participants were asked to complete a self-administered questionnaire. Participants included 19 child care center teachers and assistant teachers, 13 family child care home providers and assistant providers, and 9 child care center directors and assistant directors. These respondents included 61 percent of center teachers and assistant teachers, 72 percent of family child care home providers and assistant providers,

and 90 percent of center directors and assistant directors with the program at that time. A limitation of the focus groups is that a number of the participating teachers and directors had been with PEK for a relatively short period of time and therefore had not been exposed to the program during its full implementation in child care settings.

Key findings and recommendations emerging from the discussions and survey results are described in detail in a separate report available from Wilder Research (Broton & Gozali-Lee, 2009). Providers were generally positive about their experience with the program and had favorable perceptions of the program's effectiveness. Teachers and center directors perceived strong academic gains in children participating in PEK, and felt that children were behaving better and more engaged in learning. Teachers said they were better able to prepare children for school as a result of participating in PEK. Some participants indicated they wanted to continue PEK practices and stay connected to the program even after their formal contract with PEK ended. Following are examples of participants' feedback:

> PEK has made such a difference in the children, teachers, and center. Success has been so phenomenal.
> -child care center director
>
> It makes you continue to think about your teaching. They [PEK staff] keep giving you ideas – it's good, it's great.
> -child care center teacher
>
> The children are excited to come to daycare and they want to be here because they are learning something every day, and the program is so much more structured and organized. Children are eager to learn.
> -family child care home provider
>
> I'm happy, kids are happy, parents are happy. It's a very good program.
> -child care center teacher
>
> The program has taught me how to build my daycare up. I can offer a quality program and be competitive with other daycares.
> -family child care home provider

Suggestions for additional support

Teachers and directors participating in the focus groups also discussed areas where PEK might be able to provide additional support. Key suggestions are summarized here. Additional suggestions that pertain to the program's professional development are summarized in the following section on professional development.

Center teachers indicated they would like more resources and books, and additional themes and activities. Center teachers are given the complete *Doors to Discovery*

curriculum to implement, in addition to the PEK child care implementation manual which covers the Early Childhood Workshop classroom framework. These teachers seemed very favorable about the curriculum, but also indicated it would be nice to have additional themes to choose from and, because children can go through them very quickly, additional activities. In addition to literacy, some teachers would like to have science, arts, and music activities, for example. Lessons and activities specifically for special needs children were also requested. Center teachers and directors mentioned the need for additional preparation time for lessons, out-of-pocket expenses, and extra paperwork as challenges to implementing PEK.

Some family child care home providers indicated they would like additional opportunities to gain ideas from other teachers, and some would like additional adaptations for working in a home environment. Program staff have provided monthly training specifically for family child care providers and worked extensively with providers to accommodate needs associated with working in a home environment. Still, some providers continue to struggle with implementing certain aspects of the program.

Professional development

Overall satisfaction with professional development

Overall, teachers and center directors participating in the summer focus groups found PEK's professional development to be very helpful. In the self-administered questionnaires completed at the end of the focus groups, eight center directors in attendance strongly agreed and one somewhat agreed that participation in PEK professional development had a large impact on practices at their child care center. Similarly, most child care center teacher strongly agreed that participation in PEK professional development had a large impact on their teaching practices, with the rest somewhat agreeing. All responding family child care home providers indicated agreement with the statement, with all strongly agreeing (Figure A54).

Teachers also provided positive feedback about PEK's professional development in the focus group discussions. Most teachers commented favorably on both the training and coaching. For example, two teachers commented as follow:

> The trainings were very informative and so good that I did not want to leave.
> -family child care providers
>
> My coach helped me with lesson plans. She had me cut down the detail on my lessons. It makes sense.
> -child care center teacher

During 2008-09, child care directors were asked to be the instructional leaders for the implementation of PEK at their centers. Directors attended six months of training prior to their teachers attending PEK training to equip them with a solid overview of the program. In the focus group, directors expressed that through PEK participation, they have changed the way they interact with their teachers. Instead of a sole supervisory role, directors indicated that they are now asking purposeful questions about the classroom environment and specific activities. As instructional leaders, the directors stated that they are more active in the classroom. Additionally, some directors indicated that they are more aware of what their teachers are going through and are better able to explain the PEK program to parents. Examples of directors' comments regarding their instructional role are included below.

> I think I have better questions now for the teachers. I can ask why they put things where – I can ask the purpose of things.
> -child care center director
>
> They're teaching with a purpose, and we're directing with a purpose. We have a more active role in the classroom, not just a supervisor role.
> -child care center director

Implementation of teaching strategies

Another theme that emerged from the spring focus groups was that center teachers and family child care home providers viewed PEK as having positively impacted their teaching and their ability to prepare children for kindergarten. In the self-administered questionnaires completed at the end of the focus group sessions, all nine directors strongly agreed that their center better prepares children for school because of their participation in PEK. Almost all of the family child care providers strongly agreed that they better prepare children for school because of PEK, while nearly two-thirds of center teachers strongly agreed and about one-third somewhat agreed with the statement. Just one participant somewhat disagreed with the statement (Figure A55).

In the focus groups, teachers indicated that the program has improved their focus, purpose, and organizational skills, and given them useful strategies to incorporate into the classroom. Teachers stated that they like how PEK makes them continue to think about their teaching and consider additional ways to become a more effective teacher. Directors echoed these comments and stated that their teachers feel more empowered from the new information and skills they learned from PEK. Examples of teachers' comments are included below.

> Before participating in PEK, I was trying to teach and do everything in one day. Now, I have learned to break things down and teach a little at a time so that children learn and understand. It has made me more organized and structured and less stressed out.
> -family child care home provider
>
> PEK has made me a stronger teacher.
> -child care center teacher
>
> The curriculum has taught us to be more organized, more structured, and has given us the resources and tools needed to teach the children.
> -family child care providers

Teachers' parent education efforts

In March and April 2009 Wilder Research conducted telephone interviews with parents of 3- and 4-year-old children participating in PEK at child care centers and family child care homes. To be interviewed, parents' children had to have been enrolled for at least two months from September 2008 to March 2009. Parents of 134 children participated in the interviews, including 33 children who attended family child care homes and 101 children who attended child care centers. They represented 73 percent of all children attending during 2008-09.

Almost all interviewed parents said they had heard or were familiar with the fact that their provider was working with PEK (100% of parents with children at homes and 95% of parents with children at centers). Parents were also asked whether they had received and used a variety of information. Asked about the "Talk, Read, Write" and "Help Your Child Learn to Read" monthly handouts, most parents of children at family child care homes said they received the information (91-94% for each handout). Somewhat smaller proportions of center parents said they received these handouts (76-80%). These responses were slightly higher than the previous year when 80-83 percent of parents with children at homes and 61-69 percent at centers reported they received the handouts. In addition to literacy skills, the spring 2009 survey asked parents whether they had received "Help Your Child Learn Math" handouts. Compared to reading and writing, fewer parents at both homes and centers reported they received the math handouts (57% at homes and 64% at centers).

For both centers and homes, most parents said they received health information (72-86%) and information on how to register for kindergarten (80-81%). Somewhat smaller proportions of parents reported receiving information on community resources (63-73%). In each of these cases, parents who received the information typically said they used it.

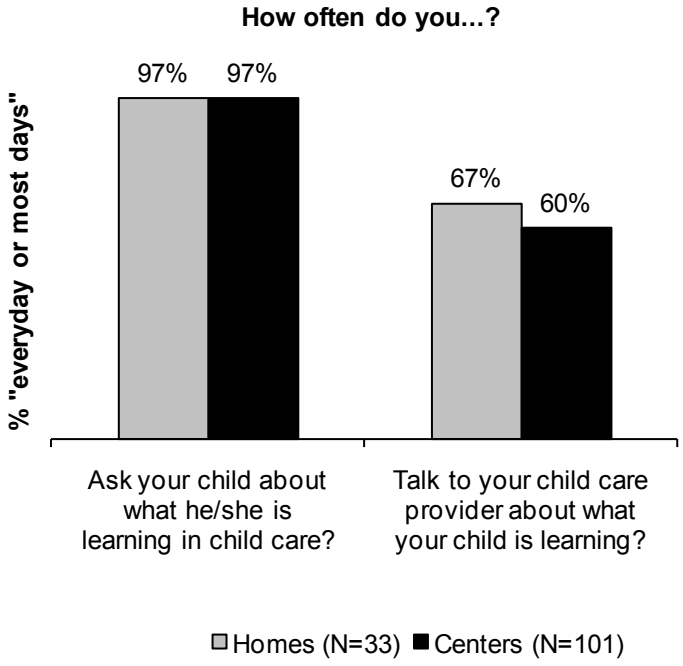
Asked about what community services they would like to know more about, almost all parents (85% of all parents) said they would like information on free or inexpensive places for families with young children to go. Between 28 and 43 percent of all parents said they would like more information on health care for children and families, Coats for Kids, Operation Joy, free tax services, family counseling, and job training for adults.

Parent involvement

The spring 2009 parent interview also included questions about parents' involvement in their children's learning. In general, parents indicated they were involved in their children's learning in a variety of ways, and responses were fairly similar across centers and homes, and with the previous year's parent responses. Almost all parents (92%) reported that they read to or look at books with their child everyday or most days, and the remaining said they do so once a week (5%) and once in a while (3%). Most parents reported that they teach their child new words everyday or most days (84%), 11 percent said they do so once a week, and 4 percent once in a while. Asked about their support for their child's writing, most parents said they help their child write letters or words everyday or most days (74%) or once a week (19%), and almost all said they provide their child with writing materials everyday or most days (88%). Asked how frequently they take their child to the library, half of parents (50%) indicated once in a while, 34 percent indicated daily or weekly, and the remaining 16 percent said they never do.

Parents were also asked about their communication about what their child is learning in child care. Almost all parents said they ask their child about what their child is learning at child care everyday or most days (97% of home and center parents). However, smaller proportions said they talk to their child care provider about what their child is learning everyday or most days (67% and 60%, respectively) (Figure 15).

15. Parents' communication about what their children are learning



Parents were also asked whether they would be interested in attending workshops on a variety of topics related to supporting their children's learning. The most popular was Family Fun Nights, with 72 percent of parents saying they were interested. About half of parents said they were interested in attending workshops on helping children learn to read (56%), preparing their child for kindergarten (53%), and helping children learn to write (53%), as well as workshops providing information about Saint Paul Public Schools (48%). For most parents (85%), evening was the best time for parent workshops.

Parents with children entering kindergarten in the fall were asked questions about their child's preparedness. Almost all (93%) said the child care center or family child care home helped prepare their child for kindergarten. Most said their child was registered for kindergarten (89%), and that their child had Early Childhood Screening or had a screening scheduled (95%). Rates were fairly similar across centers and homes. Additionally, most parents whose children were registered reported that their child would attend a Saint Paul public school (72%), and that they and their child had visited the school their child would attend (89%).

Issues for consideration

The PEK child care component is at an earlier stage of development than the school component, having started a year after initial implementation at school sites. Based on the findings presented in this report, following are several 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 issues pertain to PEK staff and some pertain to the researchers studying PEK.

- *Enhancing the community component study.* At this point, Wilder Research results are available for only the first two cohorts of children participating in the child care component of PEK. These results seem promising in some areas and also suggest that there is room for improvement. However, due to the small number of children in Cohorts 1 and 2, their results are more suggestive than conclusive. We anticipate more reliable results in 2009-10 when Cohort 3 child care children begin kindergarten. Cohort 3 is larger than the previous cohorts and the children are assessed in both fall of their PEK year and fall of kindergarten year. The larger sample size and multiple assessments for Cohort 3 should provide more definitive results. Additionally, PEK staff are using what they have learned from working with the first cohort of providers and made program changes for the second cohort of providers. It will be important for the study to examine whether results for children improve over time.

- *Social skills and problem behaviors.* Particular attention may need to be paid to improving the socials skills and reducing the problem behaviors of children participating in PEK child care programs. When they reached kindergarten, PEK child care Cohort 1 children tended to exhibit more externalizing problem behaviors and hyperactivity than children who attended PEK at school sites and classmates with other preschool or child care center experiences. Cohort 1 children who attended PEK schools also tended to exhibit more cooperation and self-control. Similarly, Cohort 2 child care children exhibited more problem behaviors than children who attended PEK at school sites. Although these differences may in part reflect differences in child and family characteristics among the groups, PEK staff can consider whether child care teachers could benefit from any additional training on how to foster social skills in children. When data on additional children become available in the future, it may also be instructive for researchers to explore whether there are any differences in social skills between children who participated in PEK at home vs. center child care environments, given differences between the two environments in the number of children who are together, the number of same-age peers, and other characteristics.

- *Additional training, resources, and supports*. Feedback from the second cohort of teachers in summer 2009 focus groups indicated that teachers need more guidance on how to connect the PEK instructional concepts to their practices in the classrooms. It should be noted that 2008-09 was the first year the second cohort of providers participating in PEK. It may be important for PEK coaches to review with teachers the implementation manual from time to time so that teachers are comfortable with using the manual to guide them through the lessons and activities. It also seems important for PEK to provide teachers with a solid overview of the program, describing the goals, concepts, and proven benefits of the program to get greater buy-in from teachers.

  Additional resources, such as books and materials, were requested. Teachers also want additional themes and activities. Opportunities to connect with other providers and learn from each other were suggested by family child care home providers. Directors may need help in creating a better system to handle extra paper work, such as collecting attendance data.

- *Parent outreach.* Parents of children at PEK child care sites reported receiving a variety of information from the program, and reported being involved in their child's learning in a number of ways. The program has worked over time to refine and expand its parent outreach efforts. The following suggestions based on feedback from the parent phone interviews may be helpful in this ongoing process:

  - *Parent-teacher communication*. Encourage home and center providers to initiate conversations with parents about what their child is learning in PEK.

  - *Monthly handouts*. Work with centers to ensure parents receive the monthly handouts. Consider asking center teachers to verbally alert parents to the handouts.

  - *Family activities*. Provide parents with additional information on free or inexpensive places for families with young children. One idea is to provide information on library programs, given that a majority of parents said they take their child to the library only once in a while or less. PEK may also want to consider adding "Family Fun Nights," since most parents said they would be interested in attending those.

  - *Parent workshops*. Consider offering evening parent workshops that provide information on preparing children for kindergarten, helping children learn to write, helping children learn to read, and the Saint Paul Public Schools.

  - *Kindergarten registration*. About 80 percent of parents said they had received information on how to register for kindergarten. By the time of the spring phone

interviews, most but not all parents with children entering kindergarten in the fall had registered their child for kindergarten and had taken their child for Early Childhood Screening. In order to reach all parents, PEK may want to provide information on kindergarten registration at multiple times during the year, or offer a workshop on the topic as suggested above.

- *Supporting language and literacy*. Creating environments that are strong in their intentional promotion of literacy is a process, and basic expectations will need to be emphasized before higher-level supports can be addressed. From the observations conducted by CEED in 2008-09, we know that at the basic level, teachers may need help with improving classroom climate and managing behavior. Once these basic components are in place, teachers may need help connecting active learning centers to lesson themes and encouraging children to make use of book and writing areas.

  Due to variations among sites in their supports for language and literacy, it will be important to use site-level data to target support to the needs of individual sites. During 2008-09 observations, the observer noted that family child care homes providers more often used advanced vocabulary, explained words to children so that they understood, and asked questions that led children to use higher order thinking and language skills than center teachers did. The observer also felt that center teachers need to do more intentional teaching that connects the literacy-rich environment and children's activities by inviting children to more actively participate in writing centers and book reading, for example. Finally, she noted that more family child care providers than center teachers used IGDIs to monitor children's progress and communicate to parents (Hawley, 2009).

- *Understanding PEK's impact at home vs. center sites*. Child care centers and family child care homes differ from each other in important ways. This study has the potential to contribute useful information about whether differences in these environments seem to affect children's outcomes. When the first two cohorts of PEK child care children reached kindergarten, there were not sufficient data available for researchers to analyze the results of the two groups separately. However, in the future we will be able to combine data from multiple cohorts of child care children to examine the results of children attending home vs. center child care settings.

- *Understanding PEK's impact on parents' choices*. As researchers learn more about the results of various settings offering PEK, it may also be instructive to explore how the availability of PEK affects parents' choices. For example, how many PEK children at school, child care center, and family child care home sites would not otherwise have participated in a preschool program? Do some families with children at home sites choose not to enroll their child in another preschool program because

their provider participates in PEK? Answers to these questions can be explored through the addition of questions to the spring parent surveys and interviews, and may yield instructive insights as additional data on the various settings become available.

- *Positive program changes*. PEK should be commended for its efforts to collaborate with the community child care partners by offering professional development that is rigorous and adaptable to homes and centers environments. Program staff listen to the feedback from child care providers. Because homes and centers have different needs, the program began offering separate training sessions for each setting in 2008-09. To maintain stability in teaching practices and address teacher turnover issue, training workshops are extended to assistant teachers and directors. Program staff are probably in the best position to determine whether more can be done to accommodate needs while maintaining program integrity.

Lessons learned

The Minnesota Early Learning Foundation (MELF) is in the process of gathering information on the effectiveness of various early childhood education strategies. Ultimately, the foundation intends to make policy recommendations in 2011. The following excerpt from MELF's 2008 annual report articulates these plans:

> MELF's mission is to recommend cost-effective strategies for preparing children to succeed in school. We are aggressively pursuing this mission by compiling a body of knowledge about what works best and most cost-effectively in promoting learning readiness among children of low-income families, and families facing other challenges. We are weighing the effectiveness of various program models, supporting the empowerment of parents, and determining the valid short and longer-term outcomes and indicators. MELF is taking a 'systems look' at the early childhood learning and education field in Minnesota (MELF, 2008, p. 1).

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. Five years after receiving initial program funding and four 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 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. Between kindergarten and first grade, differences between former PEK students and their classmates narrowed on average. 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.

- *Questions about program dosage*. Children participating in PEK's school-based program attend half days five days a week. In contrast, PEK's child care component and the PEK-Early Reading First program offer full days of programming. Wilder Research's evaluations of all three may provide a unique opportunity to explore how the number of hours a child attends (i.e., program dosage) seems to affect academic and social outcomes. In the future, results from PEK's child care component may provide insights in this area. Depending on funding, Wilder Research may also consider comparing results of PEK-Early Reading First students with those of PEK students in the future.

- *Gauging program cost-effectiveness*. Ultimately, we 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 some subtests of Phonological Awareness Literacy Screening (in schools) 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 few years, data gathered through the study will be used to modify and expand this list.

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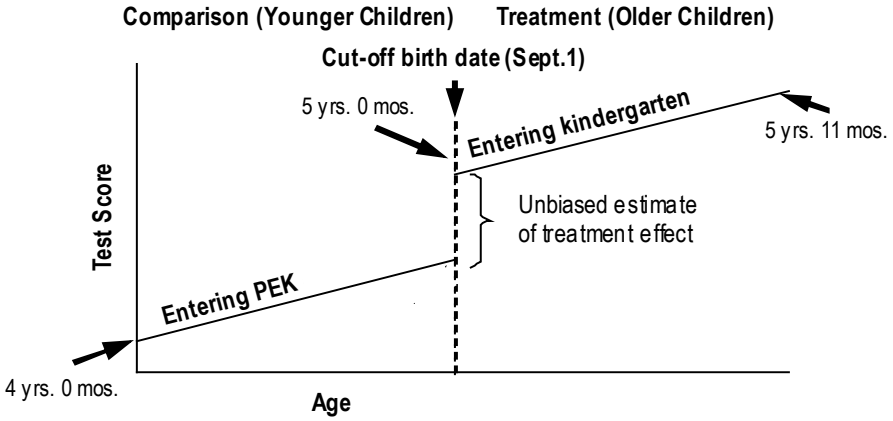
Appendix

School-based PEK

Community-based PEK

School-based PEK

A1. PEK school component. "Birthday cutoff" method illustration, assuming effective treatment



Regression lines:

- Estimated relationship between age and test score for each cohort
- The gap between the lines at the "cut-off birth date" is the estimated treatment effect (impact of PEK)

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.*

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.*

A3. 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.*

A4. 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.*

A5. 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)	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.*

A6. PEK school component. Academic test standard score change for PEK students from fall of PEK to fall of kindergarten

Test	Number assessed	Mean standard scores[a] PEK (fall 2005)	Kindergarten (fall 2006)	Change[b]
Cohort 1				
Peabody Picture Vocabulary Test III	253	88.1	91.9	+3.8***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	250	97.5	102.2	+4.7***
Spelling (writing)	251	99.6	102.8	+3.2***
Applied Problems (math)	245	95.1	94.4	-0.7
Cohort 2		**PEK (fall 2006)**	**Kindergarten (fall 2007)**	**Change[b]**
Peabody Picture Vocabulary Test III	266	86.2	92.1	+5.9***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	263	97.2	103.2	+6.0***
Spelling (writing)	265	94.7	104.1	+9.4***
Applied Problems (math)	251	92.0	95.0	+3.0***
Cohort 3		**PEK (fall 2007)**	**Kindergarten (fall 2008)**	**Change[b]**
Peabody Picture Vocabulary Test III	220	88.8	96.0	+7.2***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	217	98.1	107.6	+9.4***
Spelling (writing)	219	98.1	110.6	+12.6***
Applied Problems (math)	211	96.4	98.0	+1.7

Note: *The average number of days between the fall of preschool and fall of kindergarten testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3.*

[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 one's peers.*

[b] *Fall of kindergarten score minus fall of PEK score.*

*** *p<.001*

A7. PEK school component. Academic test age-equivalency change for PEK students from fall of PEK to fall of kindergarten

Test	Number assessed	Mean age-equivalency scores (years-months) PEK (fall 2005)	Kindergarten (fall 2006)	Change
Cohort 1				
Peabody Picture Vocabulary Test III	253	3-09	5-00	+15 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	250	4-08	5-10	+14 months
Spelling (writing)	251	4-06	5-11	+17 months
Applied Problems (math)	245	4-03	5-03	+12 months
Cohort 2		**PEK (fall 2006)**	**Kindergarten (fall 2007)**	**Change**
Peabody Picture Vocabulary Test III	266	3-06	5-00	+18 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	263	4-08	6-00	+16 months
Spelling (writing)	265	4-06	5-11	+17 months
Applied Problems (math)	251	4-03	5-03	+12 months
Cohort 3		**PEK (fall 2007)**	**Kindergarten (fall 2008)**	**Change**
Peabody Picture Vocabulary Test III	220	3-06	5-06	+24 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	217	4-08	6-03	+19 months
Spelling (writing)	219	4-06	6-04	+22 months
Applied Problems (math)	211	4-03	5-07	+16 months

Note: *The average number of days between the fall of preschool and fall of kindergarten testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3.*

A8. Change in Peabody standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race[b]	American Indian	11	96.73 (12.69)	97.00 (10.46)	+0.27
	Asian	66	77.11 (21.96)	89.58 (13.82)	+12.47
	Hispanic	31	90.61 (12.65)	95.48 (17.71)	+4.87
	African American	79	90.63 (13.24)	97.08 (9.73)	+6.44
	Caucasian	33	103.24 (15.02)	106.36 (11.68)	+3.12
ELL status[c]	Yes	103	80.41 (19.75)	90.92 (14.88)	+10.51
	No	117	96.13 (13.86)	100.45 (10.78)	+4.32
Eligible for free or reduced-price lunch	Yes	122	86.59 (18.85)	95.04 (12.07)	+8.45
	No	98	91.48 (17.96)	97.17 (15.46)	+5.69
Special education status	Yes	24	89.38 (18.32)	96.79 (9.72)	+7.42
	No	196	88.69 (18.66)	95.89 (14.12)	+7.20

Note: Includes only students with fall 2007 and fall 2008 assessments.

[a] *2008 standard score minus 2007 standard score.*

[b] *Significant differences in change scores between Asians and American Indians ($p<.05$), Asians and Hispanics ($p<.05$), Asians and African Americans ($p<.05$), and Asians and Caucasians ($p<.01$).*

[c] *Significant difference in change scores between ELL and non-ELL students ($p<.001$).*

A9. Change in Letter-Word Identification standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race	American Indian	11	93.55 (11.77)	99.64 (11.55)	+6.09
	Asian	65	96.89 (15.36)	109.11 (9.75)	+12.22
	Hispanic	30	93.10 (11.04)	106.50 (12.67)	+13.40
	African American	78	100.18 (16.50)	106.65 (13.05)	+6.47
	Caucasian	33	101.91 (15.15)	110.39 (11.87)	+8.48
ELL status	Yes	100	99.40 (16.45)	110.26 (11.69)	+10.86
	No	117	97.07 (14.12)	105.29 (11.76)	+8.22
Eligible for free or reduced- price lunch	Yes	121	98.72 (15.31)	106.70 (13.47)	+7.98
	No	96	97.42 (15.22)	108.69 (9.70)	+11.27
Special education status [b]	Yes	24	100.13 (15.02)	104.63 (12.05)	+4.50
	No	193	97.90 (15.30)	107.95 (11.93)	+10.05

***Note**: Includes only students with fall 2007 and fall 2008 assessments.*

[a] *2008 standard score minus 2007 standard score.*

[b] *Significant difference in change scores between students with special needs and other students (p<.05).*

A10. Change in Spelling standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race	American Indian	11	94.91 (11.93)	104.45 (9.05)	+9.55
	Asian	66	99.62 (13.65)	111.76 (11.34)	+12.14
	Hispanic	30	99.77 (9.45)	109.83 (11.78)	+10.07
	African American	79	96.65 (14.49)	109.87 (11.74)	+13.23
	Caucasian	33	97.79 (14.61)	112.88 (13.30)	+15.09
ELL status	Yes	102	101.36 (13.10)	112.71 (11.99)	+11.34
	No	117	95.17 (13.27)	108.79 (11.37)	+13.62
Eligible for free or reduced- price lunch	Yes	122	97.55 (14.51)	110.45 (12.72)	+12.90
	No	97	98.69 (12.21)	110.82 (10.60)	+12.13
Special education status	Yes	24	93.96 (15.53)	105.25 (12.64)	+11.29
	No	195	98.65 (13.21)	111.28 (11.56)	+12.72

Note: *Includes only students with fall 2007 and fall 2008 assessments.*

[a] *2008 standard score minus 2007 standard score.*

A11. Change in Applied Problems standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race[b]	American Indian	11	94.36 (15.83)	95.09 (13.66)	+0.73
	Asian	60	91.78 (18.35)	97.10 (10.25)	+5.32
	Hispanic	30	95.77 (15.18)	97.97 (10.37)	+2.20
	African American	78	96.79 (10.86)	97.22 (9.20)	+0.42
	Caucasian	32	105.22 (15.06)	102.81 (11.56)	-2.41
ELL status	Yes	96	94.06 (17.48)	97.31 (10.44)	+3.25
	No	115	98.30 (12.92)	98.63 (10.39)	+0.32
Eligible for free or reduced- price lunch	Yes	117	94.82 (15.67)	96.71 (10.04)	+1.89
	No	94	98.31 (14.63)	99.67 (10.69)	+1.36
Special education status	Yes	22	92.41 (19.73)	93.86 (14.20)	+1.45
	No	189	96.84 (14.67)	98.51 (9.81)	+1.68

Note: *Includes only students with fall 2007 and fall 2008 assessments.*

[a] *2008 standard score minus 2007 standard score.*

[b] *Significant differences in change scores between Asians and Caucasians ($p<.05$).*

A12. PEK school component. PEK effect sizes[a] using birthday cutoff method compared to other studies

Assessment instrument	PEK 2005-06[b]	PEK 2006-07[c]	PreK in five states; Barnett et al., 2005	PreK in Tulsa, Oklahoma; Gormley et al., 2005	PreK in Arkansas; Hustedt et al., 2007	PreK in New Mexico; Hustedt et al. 2007	PreK in New Mexico; Hustedt et al. 2008
Peabody Picture Vocabulary Test	.69	.58	.26	-	.36	.36	.25
W-J Letter-Word Identification (reading)	.75	.71	-	.79	-	-	-
W-J Spelling (writing)	.96 (.69[d])	.77 (1.02[e])	-	.64	-	-	-
W-J Applied Problems (math)	.88 (.67[d])	.06[f] (.35[e])	.28	.38	.24	.39	.50

Note: *Caution is needed in interpreting Cohort 1 and Cohort 2 results as they may be misleading due to baseline test score differences in the cohorts compared using the birthday cutoff method. These differences at baseline tend to inflate the effect sizes for Cohort 1 and diminish the effect sizes for Cohort 2 for most of the measures. A crude adjustment has been made to compensate for these differences in some cases (as indicated above) where they were statistically significant. We are currently developing a more appropriate statistical adjustment. Additionally, it is important to note that PEK effect sizes were calculated based on the standard deviation for the pooled treatment and comparison group, whereas effect sizes in the other studies were calculated based on the standard deviation for the comparison group only.*

[a] *Small effect = 0.2, medium effect = 0.5, large effect = 0.8. Effect sizes are calculated using Cohen's d (1988).*

[b] *The effect of PEK is based on the comparison between Cohort 1 and Cohort 2 in fall 2006 (see Mueller & Gozali-Lee, 2007).*

[c] *The effect of PEK is based on the comparison between Cohort 2 and Cohort 3 in fall 2007.*

[d] *Effect size adjusted for differences between Cohorts 1 and 2 at baseline (fall of PEK year).*

[e] *Effect size adjusted for differences between Cohorts 2 and 3 at baseline (fall of PEK year).*

[f] *No statistically significant difference at the birthday cutoff.*

A13. PEK school component (fall 2006). Academic test age-equivalency scores[a] at the birthday cutoff point (estimate of the effect of PEK on Cohort 1 students based on birthday cutoff method)

Assessment instrument	Just missed birthday cutoff (Cohort 2)	Just made cutoff (Cohort 1)	Difference
Peabody Picture Vocabulary Test	3 – 09	4 – 09	12 months
W-J Letter-Word Identification (reading)	4 – 11	5 – 07	8 months
W-J Spelling (writing)	4 – 06	5 – 06	12 months (9 months[b])
W-J Applied Problems (math)	4 – 03	5 – 01	10 months (6 months[b])

Note: *The expected age equivalency score is 5 years, 0 months at the birthday cutoff based on national norms.*

[a] *In years and months.*

[b] *Adjusted for differences between Cohorts 1 and 2 at baseline (fall of PEK year).*

A14. PEK school component (fall 2007). Academic test age-equivalency scores[a] at the birthday cutoff point (estimate of the effect of PEK on Cohort 2 students based on birthday cutoff method)

Assessment instrument	Just missed birthday cutoff (Cohort 3)	Just made cutoff (Cohort 2)	Difference
Peabody Picture Vocabulary Test	3-11	4-09	10 months
W-J Letter-Word Identification (reading)	5-01	5-07	6 months
W-J Spelling (writing)	4-09	5-06	9 months (12 months[b])
W-J Applied Problems (math)	4-08	4-11	3 months[c] (4 months[b])

Note: *The expected age equivalency score is 5 years, 0 months at the birthday cutoff based on national norms.*

[a] *In years and months.*

[b] *Adjusted for differences between Cohorts 2 and 3 at baseline (fall of PEK year).*

[c] *This difference is not statistically significant based on the regression discontinuity (birthday cutoff) analysis.*

A15. PEK school component. Studies that use the birthday cutoff method (continues on following page)

A. Program features	PEK 2005-06 and 2006-07	Barnett et al., 2005	Gormley et al., 2005	Hustedt et al., 2007	Hustedt et al., 2007 and 2008
Location(s)	Saint Paul, Minnesota	Michigan, New Jersey, Oklahoma, South Carolina, West Virginia	Tulsa, Oklahoma	Arkansas	New Mexico
Funding	school district funding plus private grant	state-funded	state-funded	state-funded	state-funded
Sites	public schools	public schools and private centers	public schools	public schools and private centers	public schools and private centers
Provider education	All are licensed teachers with four-year college degrees plus preschool certification	Nearly all are teachers with four-year college degrees with an early childhood specialization	All teachers have four-year college degrees plus certification in early childhood education	Nearly all (94%) are teachers with at least a four-year college degree	Lead teachers at each site must have four-year college degrees and certification in early childhood education within 5 years of becoming PreK site. In spring 2006, 71% of lead teachers responding to a survey reported having a bachelor's degree
Length of day	half-day	Varies	Varies	-	-
Teacher[a]/child ratio	1:10	1:8 to 1:10	1:10 or less	-	1:10
Maximum class size	20	15 to 20	20	-	20
Target low-income or at-risk	Yes	Varies	No	Yes	Yes

A15. PEK school component. Studies that use the birthday cutoff method (continued)

B. Characteristics of study samples	PEK Cohorts 1 & 2 2005-06	PEK Cohorts 2 & 3 2006-07	Barnett et al. 2005	Gormley et al. 2005[b]	Hustedt et al. 2007	Hustedt et al. 2007	Hustedt et al. 2008
Sample size							
Treatment	263	268	2,728	1,461	504	382	405
Control	319	296	2,550	1,567	407	504	519
Gender							
Female	49%	48%	52%	48%	48%	49%	54%
Male	51%	52%	48%	52%	52%	51%	46%
Race/ethnicity							
American Indian	4%	4%	3%	9%	<1%	28%	19%
Asian	25%	28%	2%	1%	1%	1%	2%
Latino	15%	15%	21%	14%	6%	56%	57%
Black	36%	36%	25%	39%	36%	1%	2%
White	19%	16%	47%	36%	57%	10%	19%
Other	-	-	-	-	-	2%	<1%
Free/reduced-price lunch							
Eligible	69%	63%	-	66%	-	-	-
Ineligible	31%	37%	-	34%	-	-	-
Age upon PreK entry	4	4	4	4	4	4	4

Note: *Demographic characteristics are provided for the combined treatment and control groups.*

[a] *Includes certified teachers and teaching assistants.*

[b] *Demographic breakdowns for the combined treatment and control groups are approximations calculated from data provided in the published study.*

A16. PEK school component (fall 2006). Academic test standard scores in kindergarten: PEK Cohort 1 vs. kindergarten classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Peabody Picture Vocabulary Test III	Mean	91.47	87.40	83.60
	Adjusted mean[c]	91.02	86.95**	85.43**
	Number assessed	263	143	99
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	101.89	98.79	95.23
	Adjusted mean[c]	101.67	99.84	94.29***
	Number assessed	263	142	99
Spelling (writing)	Mean	102.25	99.75	97.89
	Adjusted mean[c]	102.05	101.02	96.59***
	Number assessed	263	143	99
Applied Problems (math)	Mean	93.93	91.45	88.98
	Adjusted mean[c]	93.70	91.88	88.97**
	Number assessed	262	142	98

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher 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] *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.*

[c] *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<.01, compared to PEK Cohort 1.*

*** *p<.001, compared to PEK Cohort 1.*

A17. PEK school component (fall 2007). Academic test standard scores in kindergarten: PEK Cohort 2 vs. kindergarten classmates

Test	PEK Cohort 2	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	92.1	85.7	83.1
Adjusted mean[c]	91.6	86.6**	83.1***
Number assessed	266	139	145
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	103.1	98.0	96.3
Adjusted mean[c]	103.4	98.5***	95.3***
Number assessed	266	139	145
Spelling (writing)			
Mean	104.1	99.9	97.2
Adjusted mean[c]	104.7	100.2**	95.9***
Number assessed	266	139	145
Applied Problems (math)			
Mean	94.5	91.4	87.9
Adjusted mean[c]	94.8	91.8*	87.1***
Number assessed	266	139	140

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher 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] *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.*

[c] *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.*

*** *p<.001, compared to PEK Cohort 2.*

A18. PEK school component (fall 2008). Academic test standard scores in kindergarten: PEK Cohort 3 vs. kindergarten classmates

Test	PEK Cohort 3	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	94.6	87.6	81.1
Adjusted mean[c]	94.7	87.0***	81.9***
Number assessed	235	152	78
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	106.9	102.3	98.4
Adjusted mean[c]	106.8	103.0***	97.3***
Number assessed	234	152	78
Spelling (writing)			
Mean	110.0	105.1	101.1
Adjusted mean[c]	109.7	106.0**	99.9***
Number assessed	234	152	78
Applied Problems (math)			
Mean	96.7	90.1	84.6
Adjusted mean[c]	96.7	90.6***	83.9***
Number assessed	234	152	78

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher 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] *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.*

[c] *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.*

A19. PEK school component. PEK academic test effect sizes in kindergarten: PEK students vs. kindergarten 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	.23	.30
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.15	.61
Spelling (writing)	.08	.44
Applied Problems (math)	.15	.37
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	.30	.49
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.49	.77
Spelling (writing)	.36	.73
Applied Problems (math)	.27	.60
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	.49	.70
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.32	.80
Spelling (writing)	.31	.90
Applied Problems (math)	.52	.95

[a] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 1 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.*

A20. PEK school component. Academic test age-equivalency scores[a] in kindergarten: PEK students vs. kindergarten classmates

Test		Mean adjusted[b] age-equivalency scores (years-months)	
		Kindergarten classmates[c]	
Cohort 1	**PEK Cohort 1 (N=262-3)**	**With preschool/ child care center (N=142-3)**	**Without preschool/ child care center (N=98-9)**
Peabody Picture Vocabulary Test III	4-11	4-08	4-06
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	5-10	5-09	5-06
Spelling (writing)	5-09	5-09	5-06
Applied Problems (math)	5-03	5-01	4-11
Cohort 2	**PEK Cohort 2 (N=266)**	**With preschool/ child care center (N=139)**	**Without preschool/ child care center[d] (N=145)**
Peabody Picture Vocabulary Test III	4-11	4-05	4-02
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-00	5-07	5-06
Spelling (writing)	5-11	5-09	5-06
Applied Problems (math)	5-03	5-01	4-09
Cohort 3	**PEK Cohort 3 (N=235)**	**With preschool/ child care center (N=152)**	**Without preschool/ child care center (N=78)**
Peabody Picture Vocabulary Test III	5-04	4-08	4-05
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-02	6-00	5-09
Spelling (writing)	6-04	6-02	5-09
Applied Problems (math)	5-05	5-01	4-09

[a] *In years and months.*

[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] *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.*

[d] *Children with missing data on preschool/child care experience were included in the no preschool/child care center group.*

A21. PEK school component (fall 2006). Teachers' ratings in kindergarten: PEK Cohort 1 vs. kindergarten classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	103.60	99.96	101.03
	Adjusted mean[c]	103.61	100.71	99.96*
	Number assessed	235	139	98
Problem Behaviors[e]	Mean	94.64	95.25	94.91
	Adjusted mean[c]	94.68	94.34	96.09
	Number assessed	236	141	100
Academic Competence[f]	Mean	97.14	94.32	88.37
	Adjusted mean[c]	96.62	95.38	88.06***
	Number assessed	221	132	84

Note: *Includes only students who were assessed on both social and academic skills. 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] *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.*

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

*** *p<.001, compared to PEK Cohort 1.*

A22. PEK school component (fall 2007). Teachers' ratings in kindergarten: PEK Cohort 2 vs. kindergarten classmates

Assessment		PEK Cohort 2	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	106.35	100.39	101.52
	Adjusted mean[c]	106.67	100.79**	100.60**
	Number assessed	238	119	132
Problem Behaviors	Mean	93.62	96.42	95.86
	Adjusted mean[c]	93.25	96.07*	96.85**
	Number assessed	244	129	139
Academic Competence	Mean	97.10	93.79	87.60
	Adjusted mean[c]	97.27	94.48*	86.66***
	Number assessed	242	130	140

Note: *Includes only students who were assessed on both social and academic skills. 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] *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.*

[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.*

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

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

*** *p<.001, compared to PEK Cohort 2.*

A23. PEK school component (fall 2008). Teachers' ratings in kindergarten: PEK Cohort 3 vs. kindergarten classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	104.9	96.1	99.0
	Adjusted mean[c]	104.5	97.2***	98.0**
	Number assessed	206	140	72
Problem Behaviors	Mean	93.9	99.9	98.0
	Adjusted mean[c]	93.8	99.3***	99.4**
	Number assessed	207	142	74
Academic Competence	Mean	98.2	90.9	86.0
	Adjusted mean[c]	97.8	91.3***	86.2***
	Number assessed	205	142	73

Note: *Includes only students who were assessed on both social and academic skills. 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] *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.*

[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.*

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

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

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

A24. PEK school component. Academic test standard score one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 vs. kindergarten 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***
Kindergarten 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***

[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 one's peers.*

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

* *p<.05*

** *p<.01*

*** *p<.001*

A25. PEK school component. Academic test standard score one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 vs. kindergarten 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***
Kindergarten 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***

[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 one's peers.*

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

* *p<.05*

** *p<.01*

*** *p<.001*

A26. PEK school component. Academic test age equivalency one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 vs. kindergarten 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
Kindergarten 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

[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 vs. kindergarten 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
Kindergarten 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

[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.*

A28. PEK school component (fall 2007). Academic test standard scores in first grade: PEK Cohort 1 vs. classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 1	With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III	Mean	93.4	91.6	88.7
	Adjusted mean[d]	93.3	91.0	89.3**
	Number assessed	238	121	140
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**
	Number assessed	238	121	140
Spelling (writing)	Mean	104.0	103.9	101.2
	Adjusted mean[d]	103.7	104.8	100.9*
	Number assessed	238	121	140
Applied Problems (math)	Mean	102.4	100.3	100.0
	Adjusted mean[d]	102.0	101.1	100.0
	Number assessed	238	121	140

Note: *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.*

A29. PEK school component (fall 2008). Academic test standard scores in first grade: PEK Cohort 2 vs. 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: *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.*

A30. PEK school component. Academic test age-equivalency scores in first grade: PEK students vs. classmates[a]

Test	Mean adjusted[b] age-equivalency scores (years-months)		
		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	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

[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.*

A31. PEK school component (fall 2007). Teachers' ratings in first grade: PEK Cohort 1 vs. classmatesa

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. 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.*

A32. PEK school component (fall 2008). Teachers' ratings in first grade: PEK Cohort 2 vs. classmates[a]

Assessment		PEK Cohort 2	Mean standard scores[b] — Classmate comparison group in 1st grade[c]: With preschool/ child care center	Mean standard scores[b] — Classmate comparison group in 1st grade[c]: 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. 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.*

A33. Kindergarten teacher ratings on connections with PEK

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Pre-kindergarten and kindergarten teachers at my school work together as a team in a Professional Learning Community.	-	-	36%	64%
I have received training and support on how to effectively differentiate instruction to meet the needs of a diverse student population.	4%	-	52%	44%
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).	8%	16%	32%	44%
I used student information given by the Pre-kindergarten teacher to help develop lessons, activities, and/or grouping strategies for my students this year.	8%	20%	32%	40%
There is sufficient communication between the Pre-kindergarten teacher and I.		16%	32%	52%
I observed the Pre-kindergarten classroom this year.	46%	12%	17%	25%
The Pre-kindergarten teacher observed my classroom this year.	36%	20%	20%	24%
Kindergarten teachers at my school regularly use individual student assessment data to inform and tailor teaching in the classrooms.	-	4%	12%	84%

Community-based PEK

A34. 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	0	0%	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	0	0%	2	2%
Total	26	100%	109	100%
Home language				
English	27	100%	94	85%
Hmong	0	0%	4	4%
Spanish	0	0%	8	7%
Other	0	0%	4	4%
Total	27	100%	110	100%

A34. 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: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 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.*

A35. 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	0	0%	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	0	0%	3	4%
Spanish	3	9%	3	4%
Total	35	100%	73	100%
Received Special Education services				
Yes	2	6%	0	0%
No	30	94%	60	100%
Total	32	100%	60	100%

A35. 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: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 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.*

A36. 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%

A36. 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: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 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.*

A37. 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.*

A38. 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.*

A39. 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.*

A40. PEK community component (fall 2007). Achievement test standard scores in kindergarten: PEK community-based Cohort 1 vs. kindergarten classmates

Test	Standard score[a] PEK community-based Cohort 1	Kindergarten classmates[b] With preschool/ child care center (not PEK)	Kindergarten classmates[b] Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	97.4	85.7	83.1
Adjusted mean[c]	93.0	87.1*	83.2**
Number assessed	47	139	145
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	102.0	98.0	96.3
Adjusted mean[c]	101.3	98.9	95.7*
Number assessed	47	139	145
Spelling (writing)			
Mean	103.0	99.9	97.2
Adjusted mean[c]	99.5	101.0	97.2
Number assessed	47	139	145
Applied Problems (math)			
Mean	96.0	91.4	87.9
Adjusted mean[c]	92.8	92.7	87.7
Number assessed	47	139	140

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher 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] *Upon kindergarten entry, PEK community-based Cohort 1 children were compared to PEK school-based Cohort 2 (Figure A27) as well as the PEK school-based Cohort 2 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) 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.*

[c] *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 community-based Cohort 1, **p<.01, compared to PEK community-based Cohort 1.*

A41. PEK community component (fall 2008). Achievement test standard scores in kindergarten: PEK community-based Cohort 2 vs. kindergarten classmates

Test	PEK community-based Cohort 2	Standard score[a] Kindergarten classmates[b] With preschool/ child care center (not PEK)	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	101.5	87.6	81.1
Adjusted mean[c]	93.1	88.1	83.6**
Number assessed	34	152	78
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	105.9	102.3	98.4
Adjusted mean[c]	101.8	103.2	98.3
Number assessed	34	152	78
Spelling (writing)			
Mean	111.3	105.1	101.1
Adjusted mean[c]	107.7	106.2	100.4**
Number assessed	34	152	78
Applied Problems (math)			
Mean	97.7	90.1	84.6
Adjusted mean[c]	93.1	91.1	84.7**
Number assessed	34	152	78

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher 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] *Upon kindergarten entry, PEK community-based Cohort 2 children were compared to PEK school-based Cohort 3 (Figure A28) as well as the PEK school-based Cohort 3 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) 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, Special Education status, and test date differences among the groups being compared.*

* *p<.05, compared to PEK community-based Cohort 2.*

** *p<.01, compared to PEK community-based Cohort 2.*

A42. PEK community component (fall 2007). Achievement test standard scores in kindergarten: PEK community-based Cohort 1 vs. PEK school-based Cohort 2

Test	Standard score[a] PEK community-based Cohort 1	PEK school-based Cohort 2
Peabody Picture Vocabulary Test III		
Mean	97.4	92.1
Adjusted mean[b]	92.7	92.9
Number assessed	47	266
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)		
Mean	102.0	103.1
Adjusted mean[b]	100.4	103.4
Number assessed	47	266
Spelling (writing)		
Mean	103.0	104.1
Adjusted mean[b]	100.9	104.5
Number assessed	47	266
Applied Problems (math)		
Mean	96.0	94.5
Adjusted mean[b]	92.8	95.1
Number assessed	47	266

Note: *There were no statistically significant differences in adjusted mean test scores between the two groups.*

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

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

A43. PEK community component (fall 2008). Achievement test standard scores in kindergarten: PEK community-based Cohort 2 vs. PEK school-based Cohort 3

Test	Standard score[a] PEK community-based Cohort 2	PEK school-based Cohort 3
Peabody Picture Vocabulary Test III		
Mean	101.5	94.6
Adjusted mean[b]	95.9	95.4
Number assessed	34	235
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)		
Mean	105.9	106.9
Adjusted mean[b]	105.3	107.0
Number assessed	34	234
Spelling (writing)		
Mean	111.3	110.0
Adjusted mean[b]	109.7	110.2
Number assessed	34	234
Applied Problems (math)		
Mean	97.7	96.7
Adjusted mean[b]	95.1	97.1
Number assessed	34	234

Note: *There were no statistically significant differences in adjusted mean test scores between the two groups.*

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

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

A44. PEK community component (fall 2007). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 1 vs. kindergarten classmates

Assessment		PEK community-based Cohort 1	Standard score[a] Kindergarten classmates[b] With preschool/ child care center (not PEK)	Standard score[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	98.4	100.4	101.5
	Adjusted mean[c]	99.3	101.2	100.6
	Number assessed	38	119	132
Problem Behaviors	Mean	103.3	96.4	95.9
	Adjusted mean[c]	101.4	95.7[d]	97.0
	Number assessed	38	129	139
Academic Competence	Mean	93.7	93.8	87.6
	Adjusted mean[c]	93.9	94.5	86.8**
	Number assessed	38	130	140

Note: *Includes only students who were assessed on both social and academic skills. 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] *Upon kindergarten entry, PEK community-based Cohort 1 children were compared to PEK school-based Cohort 2 (Figure A48) as well as the PEK school-based Cohort 2 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) 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.*

[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] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 1.*

* *$p<.05$, compared to PEK community-based Cohort 1.*

** *$p<.01$, compared to PEK community-based Cohort 1.*

A45. PEK community component (fall 2007). Teacher ratings of social skills and problem behaviors in kindergarten: Subscale results for PEK community-based Cohort 1 vs. kindergarten classmates

Assessment		PEK community-based Cohort 1	Raw scores: Kindergarten classmates[a] With preschool/ child care center (not PEK)	Raw scores: Kindergarten classmates[a] Without preschool/child care center
Total Social Skills subscales				
Cooperation	Mean	13.6	14.8	14.6
	Adjusted mean[b]	14.3	15.0	14.2
	Number assessed	36	120	130
Assertion	Mean	12.9	11.9	12.5
	Adjusted mean[b]	13.1	12.1	12.2
	Number assessed	36	124	130
Self-control	Mean	13.2	14.3	14.8
	Adjusted mean[b]	13.7	14.5	14.5
	Number assessed	34	121	134
Problem Behaviors subscales				
Externalizing	Mean	2.8	1.4	1.5
	Adjusted mean[b]	2.3	1.4[c]	1.7
	Number assessed	37	128	140
Internalizing	Mean	2.0	2.0	1.6
	Adjusted mean[b]	1.8	1.9	1.7
	Number assessed	37	130	139
Hyperactivity	Mean	5.6	3.3	3.4
	Adjusted mean[b]	5.0	3.1[d]	3.7
	Number assessed	38	126	139

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors subscales) than each of the two classmate groups.*

[a] *Upon kindergarten entry, PEK Cohort 1 child care children were compared to PEK school-based Cohort 2 (Figure A49) as well as the PEK school-based Cohort 2 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) 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.*

[b] *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.*

[c] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 1.*

[d] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.01$) compared to PEK community-based Cohort 1.*

**p<.05, compared to PEK community-based Cohort 1, **p<.01, compared to PEK community-based Cohort 1.*

A46. PEK community component (fall 2008). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 2 vs. kindergarten classmates

Assessment		PEK community-based Cohort 2	Standard score[a] Kindergarten classmates[b] With preschool/ child care center (not PEK)	Standard score[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	99.7	96.1	99.0
	Adjusted mean[c]	100.2	97.0	97.1
	Number assessed	27	140	72
Problem Behaviors	Mean	105.7	99.9	98.0
	Adjusted mean[c]	102.9	99.3	100.2
	Number assessed	27	142	74
Academic Competence	Mean	95.6	90.9	86.0
	Adjusted mean[c]	93.9	91.2	85.9**
	Number assessed	27	142	73

Note: *Includes only students who were assessed on both social and academic skills. 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] *Upon kindergarten entry, PEK community-based Cohort 2 children were compared to PEK school-based Cohort 3 (Figure A50) as well as the PEK school-based Cohort 3 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) 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.*

** *p<.01, compared to PEK community-based Cohort 2.*

A47. PEK community component (fall 2008). Teacher ratings of social skills and problem behaviors in kindergarten: Subscale results for PEK community-based Cohort 2 vs. kindergarten classmates

Assessment		PEK community-based Cohort 2	Raw scores: Kindergarten classmates[a] With preschool/ child care center (not PEK)	Raw scores: Kindergarten classmates[a] Without preschool/ child care center
Total Social Skills subscales				
Cooperation	Mean	14.3	12.9	14.1
	Adjusted mean[b]	14.7	13.1	13.6
	Number assessed	26	139	70
Assertion	Mean	13.1	11.9	11.9
	Adjusted mean[b]	12.4	12.1	11.7
	Number assessed	26	138	70
Self-control	Mean	13.5	13.2	14.1
	Adjusted mean[b]	13.9	13.4	13.6
	Number assessed	25	139	71
Problem Behaviors subscales				
Externalizing	Mean	3.3	2.1	1.7
	Adjusted mean[b]	2.6	1.9	2.2
	Number assessed	27	141	74
Internalizing	Mean	2.2	2.1	2.3
	Adjusted mean[b]	2.0	2.1	2.4
	Number assessed	26	142	74
Hyperactivity	Mean	5.7	4.3	3.7
	Adjusted mean[b]	5.1	4.1	4.1
	Number assessed	26	141	74

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors subscales) than each of the two classmate groups. There were no statistically significant differences in adjusted mean test scores between PEK community-based Cohort 2 and either of the two comparison groups.*

[a] *Upon kindergarten entry, PEK Cohort 2 child care children were compared to PEK school-based Cohort 3 (Figure A51) as well as the PEK school-based Cohort 3 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) prior to attending kindergarten, and those who did not.*

[b] *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.*

A48. PEK community component (fall 2007). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 1 vs. PEK school-based Cohort 2

Assessment		Standard score[a] PEK community-based Cohort 1	Standard score[a] PEK school-based Cohort 2
Social Skills Rating System			
Total Social Skills	Mean	98.4	106.4
	Adjusted mean[b]	98.7	106.3**
	Number assessed	38	238
Problem Behaviors	Mean	103.3	93.6
	Adjusted mean[b]	101.9	93.8***
	Number assessed	38	244
Academic Competence	Mean	93.7	97.1
	Adjusted mean[b]	93.1	97.2
	Number assessed	38	242

Note: *Includes only students who were assessed on both social and academic skills.*

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

[b] *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.*

** *p<.01, compared to PEK community-based Cohort 1.*

*** *p<.001, compared to PEK community-based Cohort 1.*

A49. PEK community component (fall 2007). Teacher ratings of social skills and problem behaviors in kindergarten: Subscale results for PEK community-based Cohort 1 vs. PEK school-based Cohort 2

Assessment		Raw scores: PEK community-based Cohort 1	Raw scores: PEK school-based Cohort 2
Total Social Skills subscales			
Cooperation	Mean	13.6	16.0
	Adjusted mean[a]	14.0	15.9**
	Number assessed	36	235
Assertion	Mean	12.9	13.7
	Adjusted mean[a]	12.6	13.7
	Number assessed	36	232
Self-control	Mean	13.2	15.5
	Adjusted mean[a]	13.5	15.4*
	Number assessed	34	236
Problem Behaviors subscales			
Externalizing	Mean	2.8	1.4
	Adjusted mean[a]	2.5	1.4**
	Number assessed	37	243
Internalizing	Mean	2.0	1.4
	Adjusted mean[a]	2.0	1.4
	Number assessed	37	243
Hyperactivity	Mean	5.6	2.7
	Adjusted mean[a]	5.1	2.8***
	Number assessed	38	243

Note: *Includes only students who were assessed on both social and academic skills.*

[a] *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.*

* *p<.05, compared to PEK community-based Cohort 1.*

** *p<.01, compared to PEK community-based Cohort 1.*

*** *p<.001, compared to PEK community-based Cohort 1.*

A50. PEK community component (fall 2008). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 2 vs. PEK school-based Cohort 3

Assessment		Standard score[a] PEK community-based Cohort 2	PEK school-based Cohort 3
Social Skills Rating System			
Total Social Skills	Mean	99.7	104.9
	Adjusted mean[b]	101.5	104.7
	Number assessed	27	206
Problem Behaviors	Mean	105.7	93.9
	Adjusted mean[b]	103.6	94.1**
	Number assessed	27	207
Academic Competence	Mean	95.6	98.2
	Adjusted mean[b]	97.3	97.9
	Number assessed	27	205

Note: *Includes only students who were assessed on both social and academic skills.*

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

[b] *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.*

** *p<.01, compared to PEK community-based Cohort 2.*

A51. PEK community component (fall 2008). Teacher ratings of social skills and problem behaviors in kindergarten: Subscale results for PEK community-based Cohort 2 vs. PEK school-based Cohort 3

Assessment		Raw scores: PEK community-based Cohort 2	Raw scores: PEK school-based Cohort 3
Total Social Skills subscales			
Cooperation	Mean	14.3	16.0
	Adjusted mean[a]	15.2	15.9
	Number assessed	26	204
Assertion	Mean	13.1	13.1
	Adjusted mean[a]	12.6	13.1
	Number assessed	26	203
Self-control	Mean	13.5	15.1
	Adjusted mean[a]	14.3	15.0
	Number assessed	25	202
Problem Behaviors subscales			
Externalizing	Mean	3.3	1.3
	Adjusted mean[a]	2.8	1.3**
	Number assessed	27	207
Internalizing	Mean	2.2	1.9
	Adjusted mean[a]	2.2	1.9
	Number assessed	26	206
Hyperactivity	Mean	5.7	2.4
	Adjusted mean[a]	5.1	2.5***
	Number assessed	26	205

Note: *Includes only students who were assessed on both social and academic skills.*

[a] *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.*

** *p<.01, compared to PEK community-based Cohort 2.*

*** *p<.001, compared to PEK community-based Cohort 2.*

A52. PEK community component: Language and Literacy supports in Cohort 3 child care centers, fall 2008 to spring 2009

ELLCO indicator and possible points for each indicator	2008 Average score (n=12)[a]	2009 Average score (n=12)[a]	Change in average score and percent out of possible points	
Literacy Environment Checklist (41)	19.3	33.6	+14.3	(+35%)
Book area (3)	1.8	2.8	+1.0	(+33%)
Book selection (8)	6.5	7.8	+1.3	(+16%)
Book use (9)	1.9	7.6	+5.7	(+63%)
Book Subscale (20)	10.2	18.3	+8.1	(+41%)
Writing materials (8)	5.4	7.7	+2.3	(+29%)
Writing around the room (13)	3.7	7.7	+4.0	(+31%)
Writing Subscale (21)	9.1	15.3	+6.2	(+30%)
Classroom Observation (General Classroom Environment Subscale and Language, Literacy & Curriculum Subscale)				
General Classroom Environment Subscale (30)	19.1	24.0	+4.9	(+16%)
Organization of the classroom (5)	3.6	4.7	+1.1	(+22%)
Contents of the classroom (5)	2.8	4.3	+1.5	(+30%)
Presence/use of technology (5)	1.5	2.4	+0.9	(+18%)
Opportunities for child choice and initiative (5)	3.5	4.7	+1.2	(+24%)
Classroom management strategies (5)	4.0	3.9	-0.1	(-2%)
Classroom climate (5)	3.8	4.1	+0.3	(+6%)
Language, Literacy, & Curriculum Subscale (40)	21.8	33.2	+11.4	(+29%)
Oral language facilitation (5)	3.0	3.6	+0.6	(+12%)
Presence of books (5)	3.0	4.8	+1.8	(+36%)
Approaches to book reading (5)	3.0	5.0	+2.0	(+40%)
Approaches to children's writing (5)	2.7	4.6	+1.9	(+38%)
Approaches to curriculum integration (5)	2.6	4.3	+1.7	(+34%)
Recognizing diversity in the classroom (5)	2.9	3.6	+0.7	(+14%)
Facilitating home support for literacy (5)	2.0	3.7	+1.7	(+34%)
Approaches to assessment (5)	2.5	3.7	+1.2	(+24%)
Literacy Activities Rating Scale (12)	4.3	9.5	+5.2	(+43%)

[a] *Only classrooms with pre and post assessments are included .*

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

A53. PEK community component: Language and Literacy supports in Cohort 3 child care homes, fall 2008 to spring 2009

CHELLO indicator and possible points for each indicator	2008 Average score N=11	2009 Average score N=11	Change in average score and percent out of possible points	
Literacy Environment Checklist (26)	16.9	22.5	+5.6	(+22%)
Book Area (5)	4.1	4.4	+.3	(6%)
Book Use (9)	6.8	8.1	+1.3	(+14%)
Writing Materials (6)	3	5.5	+2.5	(42%)
Toys (3)	1.8	2.6	+.8	(+27%)
Technology (3)	1.2	1.9	+.7	(+23%)
Group/Family Observation: Physical Environment (15)	11.3	12.2	+.9	(+6%)
Organization of the Environment (5)	3.6	3.8	+.2	(+4%)
Materials in the Environment (5)	3.8	4.3	+.5	(+10%)
Daily Schedule (5)	3.9	4.3	+.4	(+8%)
Group/Family Observation: Support for Learning(15)	11.4	12.3	+.9	(+6%)
Adult Affect (5)	3.8	4	+.2	(+4%)
Adult-Child Language Interaction (5)	3.7	4.4	+.7	(+14%)
Adult Control Behaviors (5)	3.8	3.9	+.1	(+2%)
Group/Family Observation: Adult Teaching Strategies (35)	19.7	28.4	+8.7	(+25%)
Vocabulary Building (5)	3.1	3.9	+.8	(+16%)
Responsive Strategies (5)	3.2	3.9	+.7	(+14%)
Use of Print (5)	2.2	4.2	+2	(+4%)
Storybook/Storytelling activities (5)	3.9	4.8	+.9	(+18%)
Writing/Drawing activities (5)	2.8	4.4	+1.6	(+32%)
Monitoring children's progress (5)	1.5	3.4	+1.9	(+38%)
Family support and interaction (5)	3	3.9	+.9	(+18%)

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

A54. Impacts of PEK professional development

How much do you agree or disagree with the following statements:	Group	N	Number of participants: Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Participation in PEK professional development has had a large impact on practices at my child care center.	Directors	9	8	1	-	-
Participation in PEK professional development has had a large impact on my teaching practices.	Center teachers	19	12	7	-	-
	Family providers	13	13	-	-	-

A55. Preparation of children for school

How much do you agree or disagree with the following statement:	Group	N	Number of participants: Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
My center better prepares children for school because of our participation in PEK.	Directors	9	9	-	-	-
I better prepare children for school because of my participation in PEK.	Center teachers	19	12	6	1	-
	Family providers	13	12	1	-	-