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## Executive Summary

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The kindergarten year marks a period of rapid change in the ways children think about themselves and the world around them (Bredenkamp and Copple 1997; Sameroff and McDonough 1994). This change is influenced by both developmental factors (e.g., age, maturation) and environmental factors (e.g., schooling, home educational activities, family resources). Across this first year of schooling, children will acquire the knowledge and skills that will prove integral to their future success in school and in life.

Children enter school demonstrating a vast array of knowledge and skills, some children further along than others (West, Denton, and Germino Hausken 2000). The kindergarten year serves multiple purposes and is geared toward the development of both cognitive and noncognitive knowledge and skills (Seefeldt 1990). And, depending on the child, knowledge and skills develop in different areas and at different rates across this year of school.

To enrich the picture of children's first experience in formal education—the kindergarten year—we need to understand the knowledge and skills children possess as they enter kindergarten and we need to gain insight into how these develop across the kindergarten year. This report attempts to answer two basic sets of questions about children's knowledge and skill acquisition during the kindergarten year.

1. What gains are children making from the fall of their kindergarten year to the spring of their kindergarten year in their reading and mathematics knowledge and skills? Do these gains differ by child, family, and kindergarten program characteristics? As children are exiting kindergarten and preparing for first grade, how do their knowledge and skills differ by child, family, and kindergarten program characteristics (e.g., age, family risk factors)?
2. What gains are children making in specific knowledge and skills (e.g., recognizing letters, recognizing numbers, paying attention)? Do children's gains in specific knowledge and skills differ by child, family, and kindergarten program characteristics? At the end of their kindergarten year when children are preparing for first grade, do their

specific knowledge and skills differ by child, family, and kindergarten program characteristics (e.g., age, mother's education)?

The findings in this report come from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K). The ECLS-K, sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES), selected a nationally representative sample of kindergartners in the fall of 1998 and is following these children through the end of fifth grade. The full ECLS-K sample is comprised of approximately 22,000 children who attended about 1,000 kindergarten programs during the 1998–99 school year. The children attended both public (85 percent) and private (15 percent) kindergartens that offered full-day (55 percent) and part-day (45 percent) programs. All kindergarten children within the sampled schools were eligible for the sampling process, including language minority and special education students. The sample includes children from different racial/ethnic and socioeconomic backgrounds. In the fall of 1998, about 95 percent of kindergartners were entering school for the first time. This report focuses on these first-time kindergartners. When information on children's cognitive knowledge and skills is presented, this report focuses on the children in the sample who received the cognitive assessment in English in both the fall and the spring of their kindergarten year.<sup>1</sup>

## **Findings**

### ***Question 1: Gain, Differences in Gain, and Spring Kindergarten Status in Children's Knowledge and Skills***

To address the first set of questions, the change from the fall of kindergarten to the spring of kindergarten in children's reading and mathematics scale scores was examined. These scores reflect children's overall performance in these domains. The possibility that particular groups of children might demonstrate more or less gain over the kindergarten was also explored

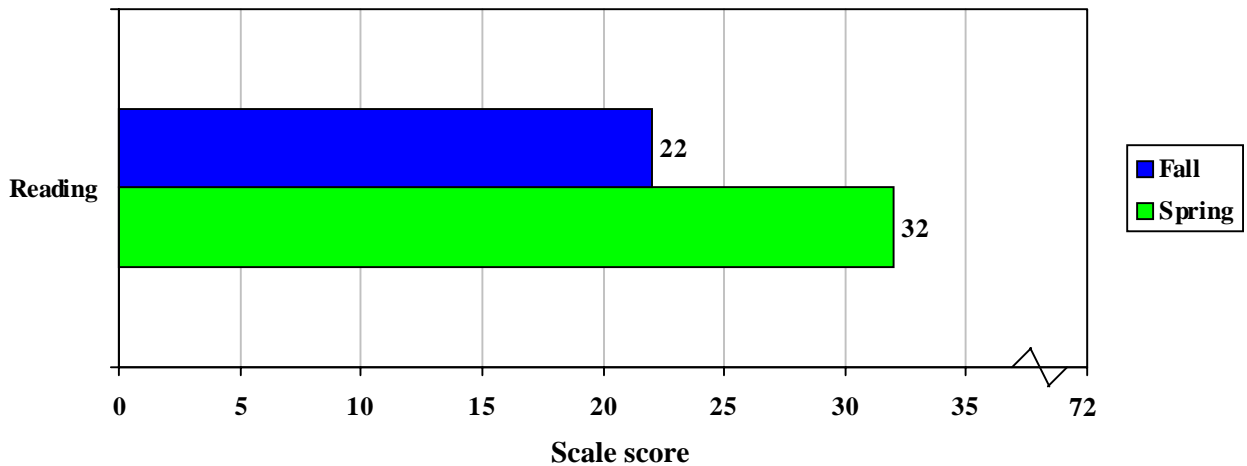
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<sup>1</sup> Approximately 30 percent of Hispanic children and 19 percent of Asian children were not assessed in English and are not included in the estimates related to cognitive knowledge and skills. The Hispanic children who were proficient in Spanish were assessed in Spanish (for details see *Methodology and Technical Notes, Constructs, and Variables Used in Analysis*). The Hispanic and the Asian children not assessed in English are included in the estimates related to noncognitive knowledge and skills. And, due to specific instructions listed in the child's school record, about one-half percent of children were excluded from the cognitive assessment based on a disability.

(e.g., children at risk for later school difficulty might not acquire reading knowledge and skills at the same rate as children not at risk for later school difficulty).

As their kindergarten year comes to a close, children demonstrate higher levels of reading and mathematics knowledge and skills than they demonstrated as they entered school for the first time. Children’s reading scale scores increased by 10 points from the fall to the spring (figure A). Therefore, the gain from fall to spring is about one standard deviation (an appreciable increase).

**Figure A.—First-time kindergartners’ mean reading scale scores: Fall 1998 and spring 1999**

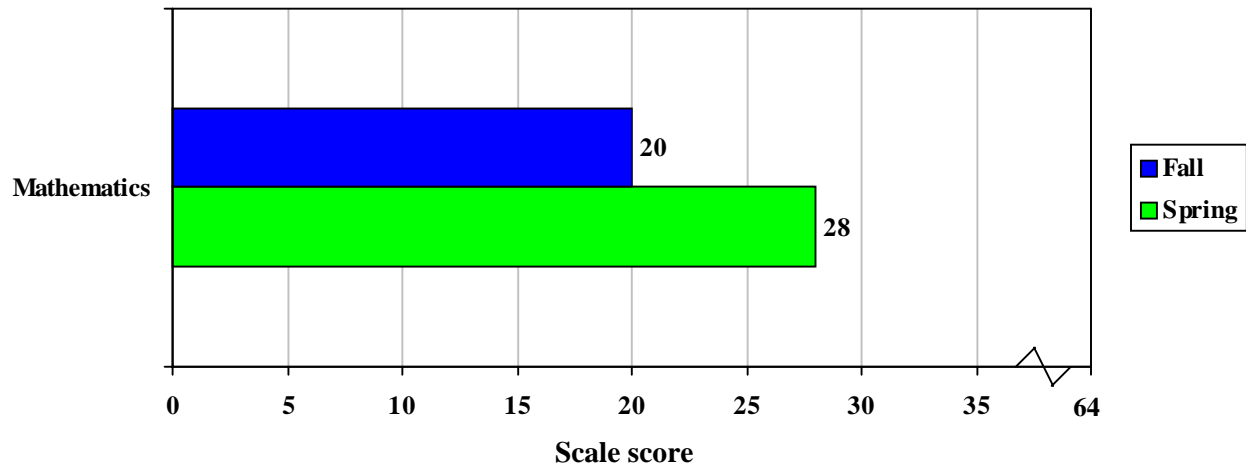


NOTE: The ECLS-K assessment was designed for both kindergarten and first-grade children. Therefore a mean score of approximately 30 in the spring of kindergarten is not unexpected.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Fall 1998 and Spring 1999.

Children’s mathematics scores increased by eight points from the fall to the spring (figure B). Thus, children’s mathematics knowledge and skills increased about one standard deviation during the kindergarten year. For the most part, the gains children demonstrate in their overall reading and mathematics knowledge and skills do not differ markedly by child, family, and kindergarten program characteristics. For example, there is not more than a two-point difference in the gains children demonstrate in reading and mathematics by mother’s education.

**Figure B.—First-time kindergartners’ mean mathematics scale scores: Fall 1998 and spring 1999**



NOTE: The ECLS-K assessment was designed for both kindergarten and first-grade children. Therefore a mean score of approximately 30 in the spring of kindergarten is not unexpected.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Fall 1998 and Spring 1999.

The absence of a substantial differential gain in children’s general reading and mathematics knowledge and skills is seen again when we consider other characteristics of children, their families, and their kindergarten programs, such as children’s age as they enter school and family risks for later school difficulty. The same is true when we look at school type and kindergarten program type. However when we consider the specific knowledge and skills children are acquiring (e.g., letter recognition, addition and subtraction, making friends, paying attention), children are developing particular cognitive and noncognitive knowledge and skills at different rates.

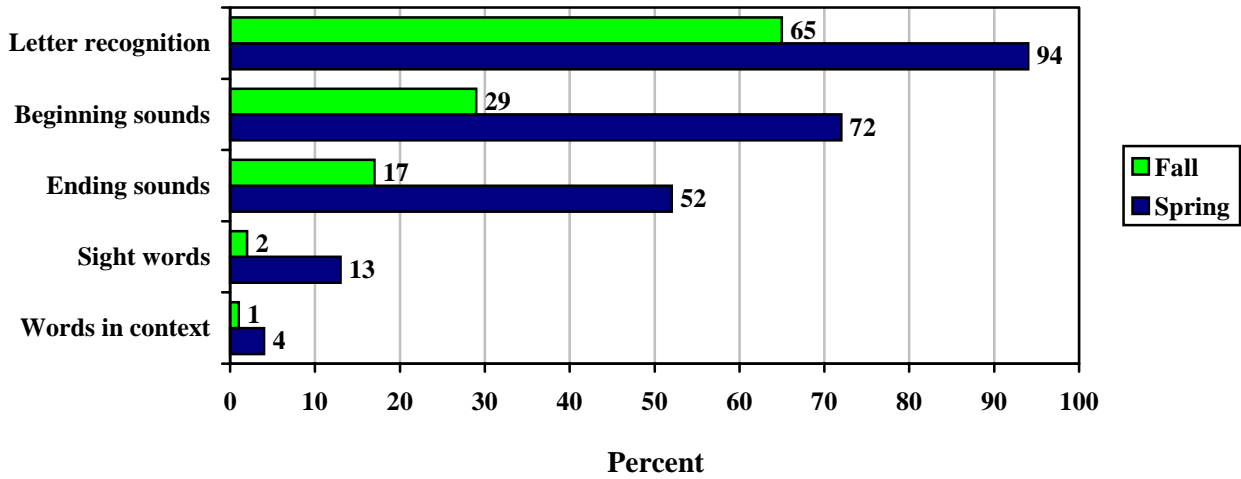
*Question 2: Gain, Differences in Gain and Spring Kindergarten Status in Children's Specific Knowledge and Skills*

To address the second set of questions, children's specific cognitive and noncognitive knowledge and skills were examined. Furthermore, the question of whether certain groups of children were more likely to acquire specific cognitive and noncognitive knowledge and skills than others was explored (e.g., does the probability that children acquire the reading skill of sight-word recognition vary by the level of their mother's education?). Finally, information is presented on the specific knowledge and skills children demonstrate in the spring of their kindergarten year as they are preparing for first grade.

In addition to the overall reading and mathematics scale scores, the ECLS-K assessment battery provides information on specific proficiencies. In the reading domain, the ECLS-K assessment battery provides information on: letter recognition; understanding of the letter-sound relationship at the beginning of words; understanding of the letter-sound relationship at the ending of words; sight-word recognition; and understanding of words in context. In the mathematics domain, the ECLS-K assessment battery provides information on: recognizing single-digit numbers and basic shapes; counting beyond 10, recognizing the sequence in basic patterns, and comparing the relative size (dimensional relationship) of objects; recognizing two-digit numbers, identifying the next number in a sequence, and identifying the ordinal position of an object; performing simple addition and subtraction; and performing basic multiplication and division.

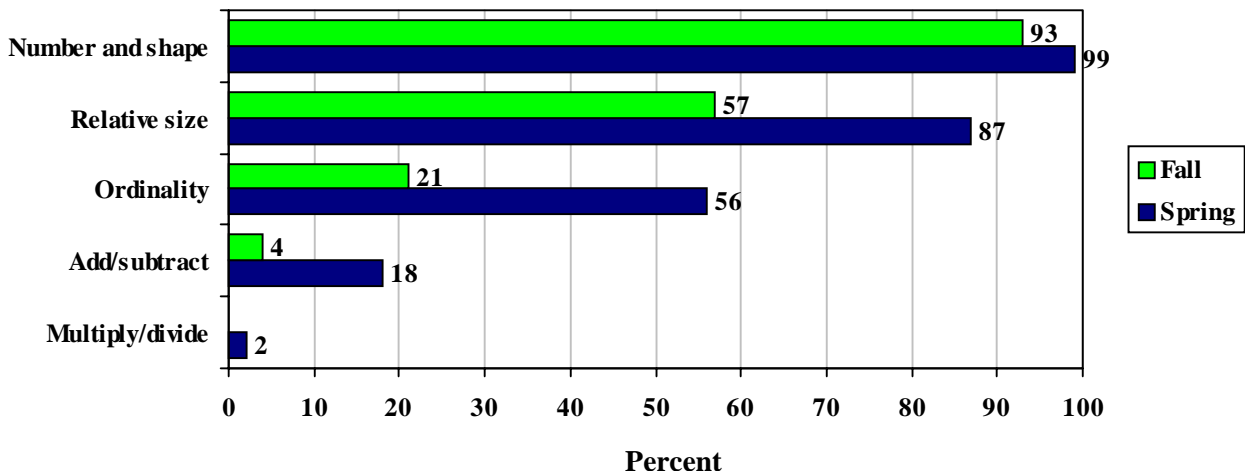
Across the kindergarten year, children acquire specific knowledge and skills in reading and mathematics (figures C and D). By the end of their kindergarten year, nearly all children recognize their letters, their numbers and their shapes. The percent of children who can recognize words by sight and demonstrate an understanding of words in context, though still relatively low, increased from kindergarten entry to kindergarten exit. And the numbers of children adding and subtracting also increased from kindergarten entry to kindergarten exit. We see less dramatic changes in children's social skills and approaches to learning across the kindergarten year, with a large percentage of children exhibiting prosocial behaviors and positive approaches to learning.

**Figure C.—Percentage of first-time kindergartners demonstrating specific reading knowledge and skills: Fall 1998 and spring 1999**



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Fall 1998 and Spring 1999.

**Figure D.—Percentage of first-time kindergartners demonstrating specific mathematics knowledge and skills: Fall 1998 and spring 1999**



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Fall 1998 and Spring 1999.

When we examined children’s overall gains in reading and mathematics knowledge and skills, as measured by their reading and mathematics scale scores, by child, family and kindergarten program characteristics, we found little evidence of differential gains from fall to spring. Based on those findings, the conclusion might be that from fall to spring of kindergarten, all children are acquiring knowledge and skills at approximately the same rate, and that they are learning the same things. However, this is not completely accurate. We see a very different picture when we look at children’s acquisition of specific knowledge and skills.

To illustrate, children from the more disadvantaged backgrounds (those with at least one risk factor) are closing the gaps in basic skills (i.e., recognizing their letters and counting beyond 10, recognizing the sequence in basic patterns and comparing the relative size of objects). However, these same children lag further behind their more advantaged classmates when it comes to gaining more sophisticated reading and mathematics knowledge and skills (i.e., recognizing words by sight or solving simple addition and subtraction problems). In fact, the gap has widened. The same basic patterns we see when we consider cumulative family-risk factors are present when we consider other child characteristics, such as race/ethnicity.

Furthermore, to illustrate, we see some evidence of differential gain in the frequency with which children demonstrate specific social skills. According to their teachers, younger children are more likely to acquire the skill of paying attention than their older counterparts during the kindergarten year.

As children are completing kindergarten and preparing for first grade, almost all (94 percent) children know their letters, and 72 percent understand the letter-sound relationship at the beginning of words, while 52 percent understand the letter-sound relationship at the ending of words. In fact, 13 percent demonstrate a proficient understanding of words by sight and 4 percent, words in context (figure C). In mathematics, 99 percent of children recognize their numbers and basic shapes, and the majority (87 percent) demonstrate understanding of dimensional relationships among objects (relative size). Just over half (56 percent) of children demonstrate an understanding of the mathematical concept ordinality. Moreover, 18

percent show they can add and subtract, and 2 percent are successfully performing multiplication and division (figure D).

### *Summary*

Young children need knowledge and new experiences to develop and thrive. Schools offer a plethora of learning and development opportunities for children. Consequently, it is not surprising that across the kindergarten year children are rapidly acquiring the knowledge and skills integral to succeed in school and life.

This report presents a simple picture of the gains children make across the kindergarten year. The ECLS-K will follow these children through the fifth grade. We will be able to track children's performance and the differences in their performance, not only by child and family characteristics but also by teacher and school characteristics. This report represents only the beginning of understanding the role of the kindergarten year in children's development. Future analyses, based on the information from the ECLS-K, will help us understand the role of such things as child care, home educational environment, teachers' instructional practices, class size and the general climate, and facilities and safety of the schools.