



RESEARCH BRIEF

Improving Early Childhood Measurement:

Findings from the Early Learning Network Using Measures that Capture How Young Children Spend Their Time

INTRODUCTION

Improved measurement of the active ingredients that promote children's gains in early childhood education programs is a topic of considerable interest to stakeholders. Accurate and reliable measurement of early childhood education experiences can aid policymakers, school administrators and educators in improving the quality of early education and help parents make choices among early learning options.¹

The Early Learning Network (ELN), a team of researchers from six institutions located across the United States and funded by the U.S. Department of Education's Institute of Education Sciences, is making strides in contributing to this knowledge base. Jointly, ELN team members took a multifaceted approach to direct observations of classroom processes.

In this brief, we explore some lessons learned from one approach: Fine-grained, time-based measures that capture how young children spend their time in prekindergarten (pre-K) and kindergarten classrooms. These measures quantify how much time individual or groups of children spend on different instructional and non-instructional activities, the content of instruction (e.g., literacy, math), the instructional format (e.g., whole group, small group, centers, individual), and in some cases, the frequency with which children experience certain types of dialogues with others (e.g., open-ended questions, multiple-turn exchanges). Measures being used by teams in the ELN are described in Box 1.



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Box 1. Time-based Measures of Classroom Activities

Individualizing Student Instruction (ISI) Observation System:² This measure records the continuous second-to-second experiences of *individual children* in the classroom, specifically a child's exposure to different content areas (e.g., math, literacy), types of learning activities (e.g., reading, free play), activity settings (e.g., small group, whole class) and each child's rate of off-task behavior. This coding system requires video of classroom activities. It is primarily meant for analysis at the child level but can be aggregated to the classroom level. *(Used by the ELN MDRC/University of Michigan/Harvard/Boston Public Schools team.)*

Language Interaction Snapshot (LISn):³ This measure captures the types of language interactions, types of learning activities and activity settings of *individual children* in 30-second cycles of observations. It can be coded live or from video, and it can be analyzed at the child level or aggregated to the classroom level. *(Used by the ELN University of North Carolina at Chapel Hill team.)*

Classroom Snapshot (C-SNAP):⁴ This measure captures exposure to different activity settings

and types of learning activities of individual children in 30-second cycles of observations. It can be coded live or from video, and in analysis, it is generally aggregated to the classroom level (though it can be analyzed at the child level). *(Used by the ELN Ohio State and University of Nebraska-Lincoln teams.)*

Behavioral Coding System (BCS):⁵ This measure captures activity setting, instructional content, teacher behaviors and child behaviors in 30-second cycles of observations. It can be coded live or from video, and in analysis, it is generally aggregated to the classroom level. *(Used by the ELN University of Virginia team.)*

Optimizing Learning Opportunities for Students (OLOS):⁶ This measure records the duration of time *individual children* are in different instructional and non-instructional activities, as well as the frequency of child talk and social behavior in 30-minute observation cycles. It can be used to code live or from video, and can be analyzed at the child or classroom level. *(Used by the majority of ELN teams.)*

WHAT WE'RE LEARNING

The Early Learning Network's emerging research has identified three key findings regarding time-based measures of children's classroom experiences, and implications for future work:

- 1** Time-based measures show that children's pre-K and kindergarten experiences are distinctly different.
- 2** Time-based measures show that learning experiences vary across children in the same classroom and by children's characteristics (race/ethnicity, gender and family income).
- 3** Evidence is mixed on whether time-based measures predict gains in children's early learning skills.

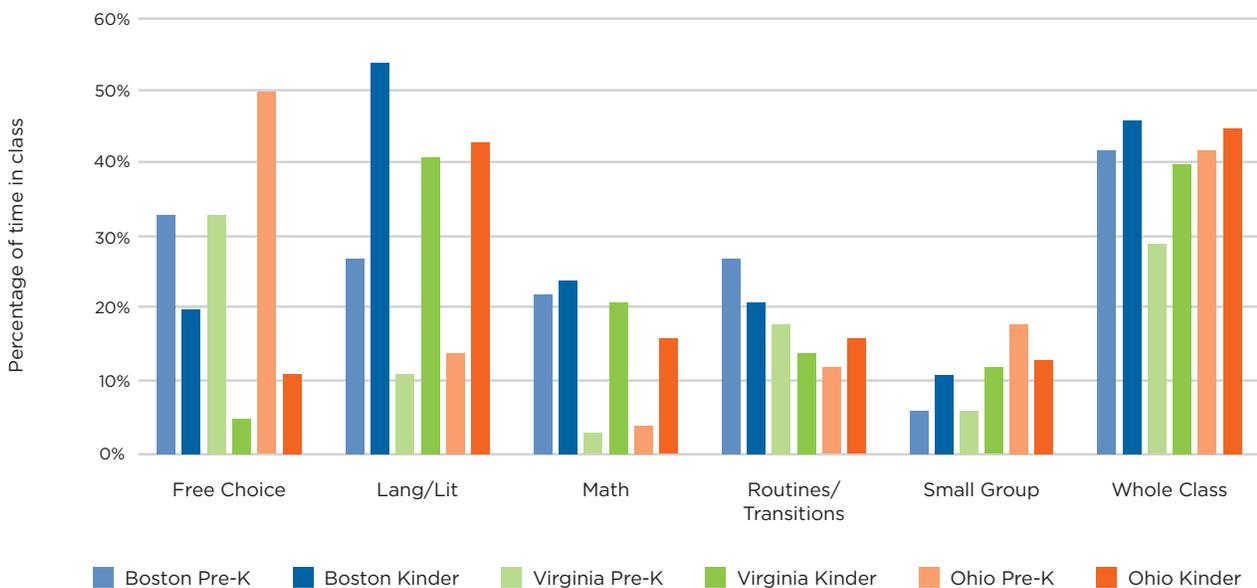
FINDING #1:

Time-based measures show that children’s pre-K and kindergarten experiences are distinctly different.

Three Early Learning Network study teams — using samples from Boston,⁷ Ohio⁸ and Fairfax County, VA⁹ — have released findings on how young children spend their time in pre-K and kindergarten classrooms. These findings reveal stark differences across grades. For example, as shown in Figure 1:

- Across the three settings, pre-K classrooms spent 33-50% of class time in free choice centers, in which children were able to select their peers and activities. In contrast, kindergarten classrooms spent 5-20% of time in free choice centers.
- Kindergarten classrooms spent substantially more time in academic content areas, such as language and literacy (41-54%) and math activities (16-24%). Pre-K classrooms spent as little as 11% of time in language and literacy activities and as little as 3% of time in math.
- Time spent in other contexts, such as whole class and small group instruction, did not differ substantially between pre-K and kindergarten settings.

Figure 1. Percent of Class Time Spent in Different Activities



Notably, greater consistency or alignment between pre-K and kindergarten classroom experiences was more evident in Boston than in Virginia or Ohio (see Figure 1). For example, Boston pre-K and kindergarten classrooms spent about the same amount of time on math, whereas time spent on math differed substantially when comparing pre-K and kindergarten classrooms in Virginia and Ohio. Of the three settings, only Boston had intentionally aligned pre-K through second grade instruction at the time data were collected.



In Boston, when compared to White and higher-income peers:

Pre-K

Black, Latino and lower-income pre-K students spent **5-11 minutes more** in language and literacy.

Kindergarten

Black, Latino and lower-income kindergartners spent **5-7 minutes less** in language and literacy.

FINDING #2:

Learning experiences vary across children within the same pre-K or kindergarten classroom and by children's characteristics (race/ethnicity, gender and family income).

The fine-grained measures used by the Early Learning Network teams also reveal that young children in the same classroom can spend their time in very different ways, and that their learning experiences vary based on characteristics, such as race/ethnicity, gender and family income.

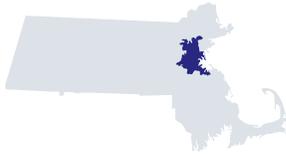
Regarding the variation among individual children in classrooms, in North Carolina pre-K classrooms, children were involved in literacy activities for 24% of the observed time but there was large variability across individual children.¹⁰ In California pre-K classrooms, the average child spent 31% of class time in literacy activities but some children spent substantially more and some substantially less.¹¹ Finally, in Boston pre-K and kindergarten classrooms, there was substantial variation across individual children in total time in instruction, off-task behaviors, language and literacy instruction, and math instruction.¹²

The Boston analysis also found that learning experiences varied substantially by *children's characteristics*. For example, on average, in a three-hour observation period in Boston pre-K classrooms, girls spent about nine minutes more in instruction (especially in literacy) than boys. Black, Latino and lower-income students also spent five to 11 more minutes in language and literacy instruction than their White and higher-income peers. In kindergarten, girls also spent about five minutes more time in instruction than boys. But in contrast to the pattern in pre-K, Black, Latino and lower-income students in kindergarten spent about five to seven minutes less in language and literacy instruction than their White and higher-income peers.

FINDING #3:

Evidence is mixed on whether time-based measures predict gains in children’s early learning skills in pre-K or kindergarten classrooms.

Four Early Learning Network teams examined whether time children spent in various activities predicted their gains in pre-K and/or kindergarten. Findings are mixed:



Boston, MA

In Boston,¹³ children’s exposure to different amounts and types of instruction did not account for differences in their math and language skill gains in pre-K or kindergarten. However, children who spent more time off-task made somewhat fewer gains in language and math skills. Additionally, time children were exposed to teacher modeling of materials before center time and instructional activities (regardless of instructional content) predicted gains in children’s math skills.



North Carolina

In North Carolina¹⁴ pre-K classrooms, similar to Boston pre-K classrooms, more time in general instructional content (e.g., math, literacy) did not predict children’s gains in math and literacy skills. However, more time in complex teacher-language exchanges predicted larger gains in children’s expressive vocabulary skills. And more time in specific instructional content (e.g., focusing on sounds, letters of words) predicted small gains in children’s literacy skills. There also were nuanced findings for exposure to specific instructional settings — more time in small groups predicted small, positive gains in children’s literacy skills, and more time in large groups predicted small, negative gains in children’s math skills.



Ohio

In Ohio,¹⁵ pre-K and kindergarten classrooms that spent less time in academic instruction had children who made fewer gains in language and math skills. However, children in classrooms that spent less time in academic instruction did not differ from those that spent more time in instruction supporting social-emotional gains.



Fairfax County, VA

In Virginia,¹⁶ more classroom time spent in teacher-directed activities and routines (in contrast to free play) in pre-K predicted small gains in literacy but not gains in executive function or math skills. Interestingly though, more classroom emphasis on academics and routines related to lower scores on teacher closeness, and more teacher conflict. Similar to the North Carolina and Boston samples, total time in literacy and math activities did not predict children’s literacy and math gains.

FINAL THOUGHTS

The Early Learning Network's research findings using time-based measures have several implications for early education and point to areas for future research:

- **More attention should be directed toward understanding the impacts of differences between children's pre-K and kindergarten classroom experiences.** Research by several ELN teams shows that children's experiences in pre-K and kindergarten classrooms are very distinct. The most coherent experience across these two grades was in Boston, where the district has made intentional, systems-wide reforms to promote pre-K through second-grade alignment. Coherence and alignment may support children's transitions and school success.
- **Additional measurement work in early education is needed and should consider variation in learning experiences across young children in the same classroom.** Previous literature¹⁷ and ELN studies reviewed here show substantial variation in individual children's classroom experiences. Researchers should not neglect this important element of children's experiences. Practitioners can put these findings into action by observing which children receive certain learning opportunities and then work to address inequities.
- **We are still learning what matters most about how young children spend their time.** Findings across the ELN studies are mixed on the implications of how young children spend their classroom time for their language, literacy, math, executive function and social-emotional skill gains. We need additional research to identify the right balance of activities, learning formats and content for individual children.



ENDNOTES

¹Burchinal, 2018; Weiland, 2018

²Connor et al., 2009

³Sprachman, Caspe, & Atkins-Burnett, 2010

⁴Fuligini et al., 2012

⁵Ritchie et al., 2001

⁶Connor et al., 2020

⁷Weiland et al., under review

⁸Justice et al., in press

⁹Vitiello et al., 2020

¹⁰Burchinal et al., 2021

¹¹Connor et al., 2020

¹²Weiland et al., under review

¹³Weiland et al., under review; Moffett et al., under review

¹⁴Bratsch-Hines et al., 2019; Burchinal et al., 2021

¹⁵Justice et al., in press

¹⁶Pianta et al., 2020

¹⁷Connor, Morrison, & Slominsky, 2006; Vitiello, Booren, Downer, & Williford, 2012

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The Early Learning Network is a research network working to improve the academic success of children in pre-K through third grade. Researchers are identifying research-proven policies and practices that narrow the achievement gap and maintain early learning success.

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