

Proven Practices



Data-Driven Innovation:

Development and Validation of the Early Math and Early Literacy Inventories

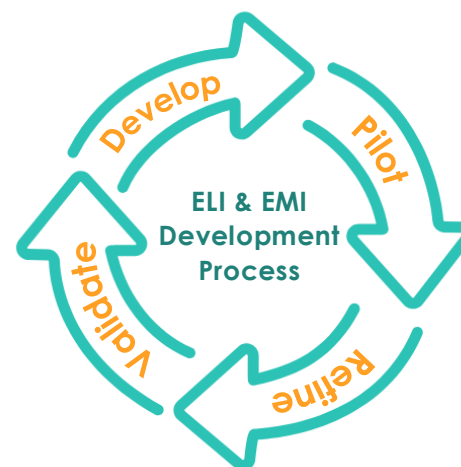


Early Learning Corps is a structured, empirically-validated AmeriCorps program that recruits, trains, and places AmeriCorps members (“tutors”) in early childhood classrooms across the nation to provide class-wide, small group, and individualized early literacy and math support to young children. Data-based decision-making is a key part of the program. Tutors and coaches use assessment data of early literacy and math skills to (1) identify children for supplemental support through small group or individual intervention, (2) monitor progress of those who receive supplemental support, (3) determine when supplemental support can be reduced or removed, and (4) assess the overall impact of tutoring support across the academic year.

The Project

This multi-year project focused on the development and validation of two assessments to guide tutoring support in partnering classrooms: The Early Math inventory (EMI) and the Early Literacy Inventory (ELI). The use of technically-adequate data is a critical component of ELC and the development of these new inventories of student strengths and needs introduces a number of key advantages for the program.

Most importantly, developing an assessment that is directly aligned with the developmental focus of ELC substantially improves the value of the data for decision-making and evaluation of impact on target skills. Relatedly, developing these tools internally creates the opportunity to modify and improve them over time with a lower annual and per-student cost.



Guiding Development Principles

Early Learning Corps Alignment

Ensure inventories align with the instructional focus of ELC tutoring to better guide decision-making.

Developmental Appropriateness

Ensure inventories tap into skills that are both important for future success and developmentally appropriate.

Efficient and Actionable

Ensure inventories can be delivered efficiently and produce information that is actionable for tutoring.



Initial Development

The procedures for content blueprinting included review of national early learning standards, Early Learning Corps design and implementation materials, empirical research on foundational early literacy skills, and conversations with practitioners. Collectively, these sources—along with the guiding development principles listed previously—provided a blueprint for development.

Piloting, Refinement, and Validation

EMI and ELI items were piloted with a subsample of ELC partnering classrooms, revised, and validated with a much larger sample before they were adopted in full. Both instruments were evaluated for evidence of reliability (e.g., the relative difficulty of items and consistency across items) and validity (e.g., the degree to which student scores on the instruments correlate with established early literacy and math assessments). This technical validation work further informed the composition of each instrument and provided evidence for use as a means to identify student needs, capture growth across time, and provide estimates of tutoring impact.

Current EMI and ELI Composition

Both instruments are delivered individually, in person, by program tutors. The EMI and ELI tap into a subset of early learning skills directly aligned with the instructional focus of ELC and which correlate strongly with academic success in elementary school. The number of items that each assessment includes is presented below, organized by subdomains of literacy and numeracy. The utility of the EMI and ELI data (and individual items) can be regularly evaluated for continuous improvement.

Early Literacy Inventory	Items	Early Math Inventory	Items
Letter Naming	26	Counting	4
Rhyming	15	Number Identification	4
Alliteration	15	Comparing Quantities	4
Word Parts	20	Number After Knowledge	4
Blending <i>Compound Words</i>	5	Comparing Numbers	4
Blending <i>Syllables</i>	5	Number After Is One More	4
Isolating <i>Word Parts</i>	5		
Isolating <i>Syllables</i>	5		

Reliability and Validity Evidence

The internal consistency estimates for the ELI and EMI—or the degree to which responses on items are consistent within each instrument—are high based on commonly used guidelines for assessment development (Salvia et al., 2017). Internal consistency ranges from 0 (extremely low) to 1 (extremely high).

It is also important to evaluate the data from new instruments by correlating student scores on other, established assessments of the same skill domain(s). During the validation work, student scores on the EMI were compared to their scores on the Preschool Early Numeracy Screener (Purpora et al., 2015), and student scores on the ELI were compared to their scores on the Preschool Early Literacy Indicators (Kaminski et al., 2023). This is conventionally known as establishing 'criterion validity'.

The average internal consistency estimate for the ELI (.94) and EMI (.90) are strong, providing evidence that both tools provide a reliable estimate of students' early literacy and math skills.

The correlation between the ELI and an established assessment of early literacy was 0.71 and the correlation between the EMI and an established measure of early numeracy was .88.

Similar to internal consistency estimates, estimates for the criterion validity of new tools are expressed as correlations on a scale of 0 to 1. For both instruments, the relationship between the new instruments and existing validated assessment tools was strong by typical standards, providing evidence that both inventories tap into meaningful and established domains of early numeracy and literacy performance.

Summary

1. The EMI and ELI were developed in direct response to an observed need to improve the utility, efficiency, and meaning of data to guide ELC instructional programming. Both measures are grounded in empirical research and informed by a diverse array of sources.
2. The EMI and ELI are shorter in duration relative to previous assessments adopted by the program while offering a similar level of diagnostic and evaluative utility.
3. The EMI and ELI are intended to be dynamic over time, positioning ELC to adapt to community needs and evolving research—ensuring tutors are positioned to continue making an impact on the academic development of young children.

*This brief report provides an overview of ELI and EMI development. For access to the full technical reports, please contact info@serveminnesota.org.