



STEM Professional Development for Early Childhood Teachers

Kimberly Brenneman, Ph.D., Heising-Simons Foundation

Alissa A. Lange, Ph.D., Rutgers University



Supported by a grant from the Division of Research on Learning in Formal and Informal Settings, Directorate for Education and Human Resources

THE PROBLEM Young children, particularly those at risk for lack of school readiness, do not receive high quality learning experiences in STEM, often because the early childhood workforce has not received professional preparation to teach STEM. We need to strengthen preparation in STEM instruction for teachers of all young children, including those who are dual language learners.

WHY THIS MATTERS

- Children learning English and a non-English home language make up an increasing proportion of the U.S. population.
- **Young dual language learners (DLLs) are at risk for lower school readiness** than English-speaking peers.
- Early STEM skills predict later academic skills including reading, even better than early reading skills do.
- **High quality early learning experiences in STEM are likely to lead to increased school readiness**, achievement, and proficiency of STEM skills of all U.S. citizens.

OUR RESEARCH

- **Early childhood educators and researchers co-developed a system of professional development (PD) supports**, including workshops, coaching, and professional learning communities, with special focus on supporting STEM learning for DLLs.
- An iterative process of design-test-reflect-redesign was used to create PD resources to improve teachers' instructional practice for STEM and for dual language learning.
- Preliminary evidence was collected to **assess impacts of the PD system on teachers' attitudes, beliefs, and practice.**

WHAT HAVE WE LEARNED?

- **High-quality STEM PD matters.** Teachers can understand early STEM in a new way, improve quality of teaching, and use more and higher quality math and science talk.
- **85% of Cohort 1 participants reported positive changes in children**, including: increased understanding of math and science concepts, use of math and science language, interest and engagement in STEM, language skills for DLLs, and carryover of lessons into play.

"This project has ...helped me to view teaching in a different, more effective way....I now see how important it is to also let the students explore, think, and problem solve on their own..." Teacher participant

WHAT WE ALREADY KNOW

- Children in the U.S. fare poorly in international comparisons for science and math.
- High-quality early STEM learning experiences can close achievement gaps.
- **Teachers are not well prepared to teach STEM or to support DLLs.**

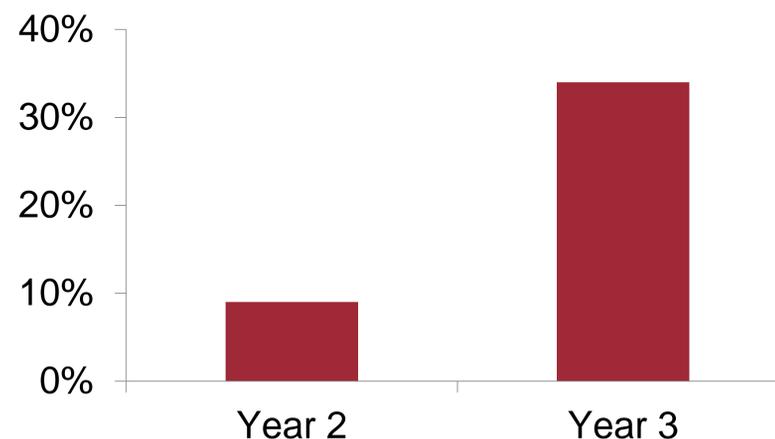


Figure 1. Percent of teacher, researcher, and teaching coach reflections that note teachers using "just the right amount" of content in science and math lessons

IMPLICATIONS

- **Engaging educators as co-creators of PD resources is a powerful way to improve uptake and increase validity of the approach.**
- **Positive change in teacher practice** in science and math is possible through sustained, practice-based PD.
- **Improving STEM instruction can strengthen language skills** for DLLs and all children.