

Promoting Effective Math Instruction for Young Children

The mathematical knowledge young children develop is critical to their later academic achievement. Strong math skills in kindergarten have been linked to later proficiency not only in mathematics, but also in reading and may even lead to increased high-school-graduation rates. On the other hand, children who begin school with poor math skills typically do not catch up. The least prepared are disproportionately children of color and those from low-income families. Clearly, any serious effort to close the achievement gap needs to focus on children's mathematical learning before school entry and in the early elementary grades.

No factor affects children's academic skills more than the quality of the teaching they receive. However, early grades teachers typically do not think math is the most important skill to teach, and are often less confident in their ability to teach math than other subjects. A lack of adequate preparation to teach mathematics has led to the continued use of instructional practices that do not promote deep comprehension. Pre-K and K-3 teachers need opportunities to learn more about the kinds of instruction that researchers have demonstrated can lead to deep understanding in math.

Currently, the opportunities for early education teachers to learn these effective mathematical teaching practices are rare. In California, preschool teachers are not required to take a single course that includes math instructional methods, and elementary school teachers are required to take only one math-methods course. Often these courses focus on older students and neither addresses the development of mathematical thinking of young children nor provide opportunities for teachers to learn to engage young children in mathematical problem solving.

Given the pressing need for improved mathematical teaching in early grades, this project is designed to: 1) Develop strategies and tools for enhancing the quality of mathematics teacher preparation for young children, and 2) To create a model program for developing instructional leaders in early math teaching.

Project Overview

Designed in collaboration between Megan Franke of UCLA's Center X: Where Research and Practice Intersect for Urban School Professionals, and Deborah Stipek and Susan O'Hara of Stanford's Center to Support Excellence in Teaching (CSET), this professional-development program is aimed at early education mathematical leaders and college faculty who train early childhood educators. Beginning in the summer of 2013, teacher leaders and faculty will engage in a long term, collaborative learning opportunity in order to learn more about how to support the development of children's mathematical thinking. Through exposure to examples of high quality mathematical teaching practice, and through

extended group time, participants will learn how to break down and analyze the components of high quality mathematical teaching practices for young children. They will also be provided multiple opportunities over time to enact teaching and coaching practices in their contexts with feedback from professional-development leaders and their peers.

The objectives of the project are:

1. To design, implement, and assess a model professional-development program that prepares educators in pre-K through 3rd grade to serve effectively in instructional leadership roles;
2. To increase the capacity of California community colleges and universities to prepare effective teachers of mathematics in preschool and the early elementary grades;
3. To promote better programmatic connections between pre-K and K-3;
4. To develop knowledge about effective strategies for improving math instruction with a diverse population of young children.

Participants

Preschool and K-3 Mathematics Leaders. 60 math coaches, professional developers, teachers, and administrators who show promise as mathematics instructional leaders will be selected to participate in a four-day initial program at either UCLA or Stanford University followed by four half-day seminars and two site-based professional development sessions throughout the year. This group will work to refine their knowledge of effective mathematics instruction and develop their skills as instructional leaders as part of a learning community.

College Faculty. 10 instructors in Southern California and Bay Area universities or community colleges with substantial preschool or multiple-subject teacher-preparation programs will be identified to participate in a four-day seminar on the UCLA or Stanford University campuses to collaborate in planning the details of the math teacher leader seminars. During the seminars, they will participate as leaders in small-group activities and provide individual support to participants. Faculty will also be invited to attend the half-day seminars during the academic year and the site-based professional-development programs. The goal of this program is to enhance college faculty members' knowledge of effective teaching strategies and skills in training teachers and to develop their commitment to strengthen mathematics-instruction training for preschool and elementary teachers in their respective colleges and universities. In the third year of implementation, UCLA and Stanford University will each partner with one of the California universities and a community colleges with the expectation that these institutions will deliver this program in subsequent years and that faculty participants in this program will promote changes in their own institutions that will lead to better math teaching preparation for pre-K and K-3 teachers throughout California.

Products

At the end of three years we expect to produce the following shareable materials:

- A professional development curriculum that is sufficiently specific to allow implementation in diverse settings without losing the integrity of the core principles and flexible enough to be adapted to the resources and needs of diverse settings;
- A summary (potentially publishable) of what we learned about effective (and ineffective) strategies for the preparation of coaches;
- A critical mass of university and community college faculty (as many as 30) in California who understand and can engage their students in the model we have developed for teaching mathematics to young children;
- A critical mass (as many as 180) preschool and K-3 teachers who are better prepared to teach math effectively to a diverse population of young children and who can support their colleagues in schools and districts.