

**Where**

University of Michigan's TeachingWorks Center

**Who**

Dr. Deborah Lowenberg Ball, Professor and Director of TeachingWorks, and Nicole Garcia, Director of the Elementary Mathematics Laboratory

**What**

The Elementary Mathematics Laboratory (EML) is a multilayered professional development experience taught by Dr. Deborah Loewenberg Ball, a professor at the University of Michigan and the director of TeachingWorks, and facilitated in collaboration with Ms. Nicole Garcia. EML partners with local school districts to enroll students in the upper elementary grades in the program. Practicing teachers, curriculum leaders, district administrators, teacher educators, and researchers around the world come to observe and reflect on problems of mathematical practice and instruction.

**Purpose**

EML is focused on supporting children in the community and professional educators as well as University of Michigan students through explicit work in teacher education. EML provides different lenses through which adult participants can examine concepts that are central to effective teaching of elementary mathematics (e.g., fractions, problem solving, articulating arguments).

**Description**

The EML is offered for 2 weeks each summer on the University of Michigan campus.

The teacher education program begins each morning before the children arrive. Participants are provided with a detailed lesson plan whose aim is to make visible what there is to see about the children, the mathematics, and the instruction. Participants are presented with a series of questions related to problems of practice, student thinking, or mathematical content. Dr. Ball facilitates a prebrief wherein participants engage in a discussion about student learning and instruction, including instructional design questions. Dr. Ball adjusts her teaching based on this conversation.

Following the prebrief, Dr. Ball teaches the adapted lesson to the children attending the EML summer program while the adult participants observe from bleachers in the classroom or through a remote viewing room. The participants are instructed to listen carefully to the children's conversation in whole and small groups and to take careful notes about their observations using tools tailored to the specific focus of the day or the EML theme. The observational tools are designed to support adult participants in paying close attention to the students and teacher's practice.

At the end of the lesson, Dr. Ball and the adult participants reconvene and spend 30 minutes examining the work that the students produced throughout the observed

class section. They consider what students were able to accomplish during the written work and mathematical discussion, and they are challenged to reframe their conceptualizations of what students can achieve mathematically.

Following this discussion, Dr. Ball and the adult participants debrief on the lesson. Dr. Ball leads the conversation with a 5- to 10-minute reflection on the issues that she encountered while teaching the lesson. She concludes by sharing several questions that she would like adult participants to consider, and she synthesizes her thoughts into two or three conversation points that the participants will discuss as a group. At this point, Dr. Ball steps out, and Ms. Garcia facilitates a conversation about those primary ideas. Ms. Garcia's goal is to encourage the observers to focus on the work of teaching—specifically, what is the work of the teacher, and how does this impact student learning?

Following the debriefing discussion, the EML provides the adult participants with content-focused professional development aligned with teaching practices that will be observed during Dr. Ball's demonstration lessons.

### Impact

Participating in the EML has proved to be a powerful experience for both children and adults. At the conclusion of the 2-week session, students feel more successful in mathematics and demonstrate more confidence in engaging in the work. Adult participants have been given the opportunity to delve into students' thinking and to examine associated evidence. From Ms. Garcia's perspective, one of the most powerful takeaways for teachers is understanding the difference between teaching a student a procedure and observing the student as she or he achieves a conceptual understanding of mathematics.