CENTER FOR MATHEMATICS AND SCIENCE EDUCATION

MathCamp

Improving mathematics and science education in Mississippi by fostering interaction between the academic and K-12 education communities, supporting the implementation of research-based methods in the classroom, and promoting interest in science, technology, engineering, and mathematics.

Special Report Summer 2009

Deepening understanding

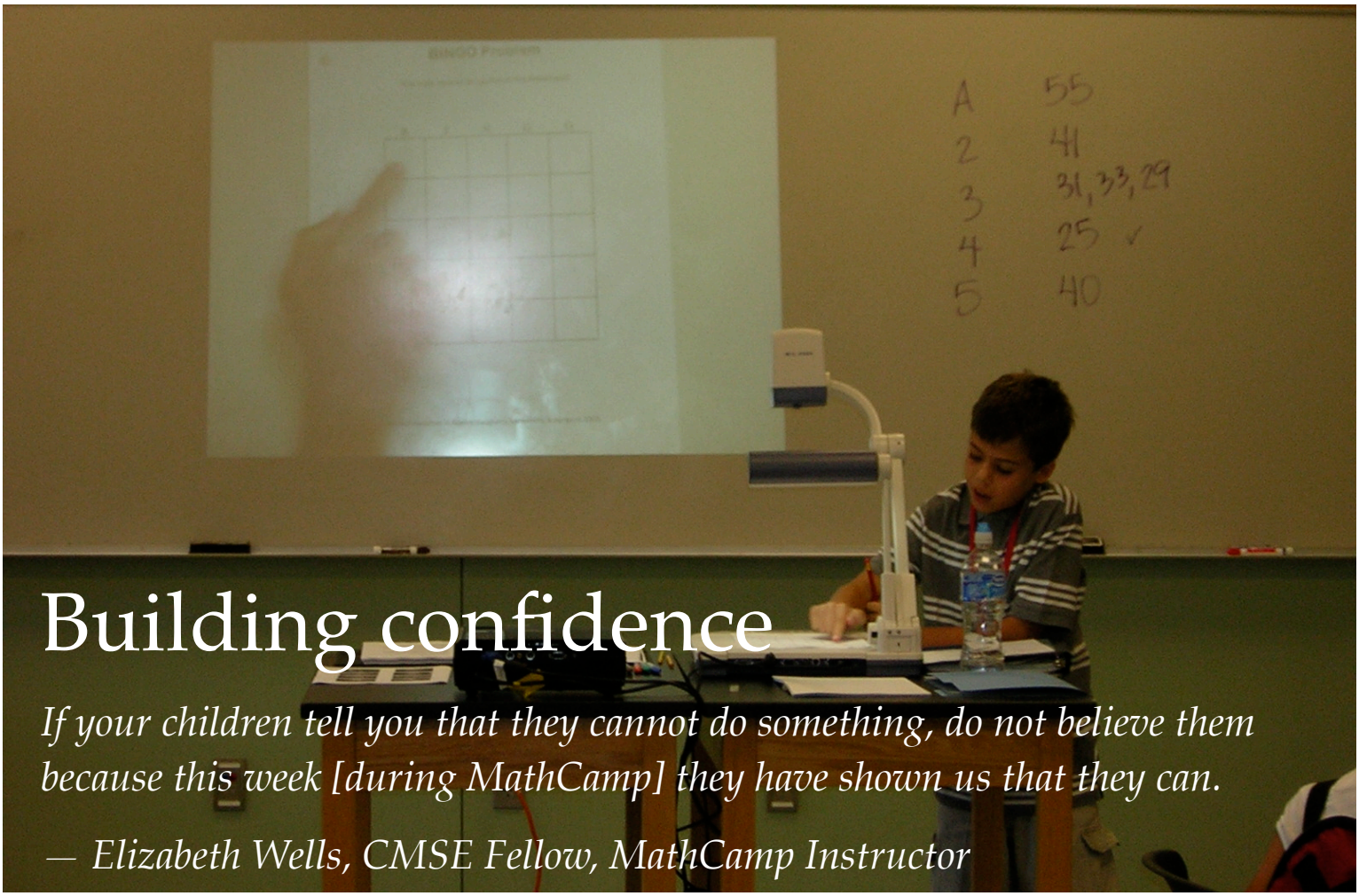
MathCamp engages students in learning mathematics in a way that defies standard convention—it is fun.

The Center for Mathematics and Science Education created the MathCamp program to expose students to methods of learning mathematics concepts that are participatory, hands-on, and challenging. At MathCamp, teachers no longer stand in front of the classroom and lecture—they ask questions and lead students to figuring out the answers. The rooms buzz with active student participation and discussion. Talking is encouraged. Students frequently work in groups to complete tasks in which they have to solve problems and be critical thinkers.

Children arrive at camp often being encouraged and coaxed by their parents because who can imagine that a week of doing math all day could be fun? The students who come to this camp are students who have not performed well in mathematics so far, but their teachers think that with help, they could do better. Students usually leave camp with a completely different view of mathematics. As camp concludes, students are dragged away by their parents wishing camp could go on longer. Many express interest in coming back to camp next year for Alumni Camp. Those who have completed Alumni Camp plead a case for having a camp for third year campers.

The methods used in the MathCamp classrooms are based on current research. All the tasks used are aligned with Mississippi's *Mathematics Curriculum Framework Revised* and the National Council for Teachers of Mathematics (NCTM) *Process Standards*. These standards outline expectations for students to participate in problem solving, communication, representation, reasoning and connections to other mathematics and real world situations.

The goal of MathCamp is to allow students to have a positive experience in learning mathematics while at the same time deepening their understanding of concepts. The students learn that they possess the capabilities to solve mathematical problems. They leave with increased confidence and many times with a new attitude about something they may have disliked just a week earlier.



Building confidence

If your children tell you that they cannot do something, do not believe them because this week [during MathCamp] they have shown us that they can.

— Elizabeth Wells, CMSE Fellow, MathCamp Instructor

Themes and Tasks

First-year campers participated in activities designed to deepen their understanding of geometric concepts.

Tasks that students participated in included building a polyhedron, developing Euler's formula for polyhedra, and tangram explorations. These tasks allowed students to use hands-on manipulatives to investigate properties of polygons and polyhedra.

The camp for alumni focused on Number Sense and Algebraic Reasoning. As second year campers, they had seen the types of activities that we do at MathCamp, which required us to select activities that would challenge these students in new ways. Alumni campers participated in tasks such as the Locker Problem, the Canoe Problem, and the Problem of 9's. These tasks present students with problems that are challenging but accessible and involve several opportunities to investigate different problem solving strategies. The students begin to gain confidence as they learn to think critically and become good problem solvers.

A new addition to the alumni camp was the integration of technology into their learning activities. Students engaged in tasks using the TI-Navigator System. This system allows students to communicate wirelessly through their graphing calculators to the instructor's computer and share their solutions and ideas. Also, these students had the opportunity to use GPS navigation units to search for hidden clues in a GeoCaching walk.

The goal with these tasks was to give students an opportunity to engage in the mathematical concepts laid out by the Mississippi Department of Education in a way that would deepen their understanding. We also sought to provide these students with experiences that they would not be able to have in the traditional classroom.

"I used to have trouble with Geometry but now I get it."

2009 MathCamp Participants

In 2009, 102 students (including alumni campers) completed a week of MathCamp. The campers came from all over Mississippi. 53 were female and 49 were male.

Applicants and Selection Process

CMSE received 185 applications for its 80 slots for new campers. Applications must come from a student's mathematics teacher or principal. On the application, the teacher must explain why the student is a good fit for the camp. Although all students could benefit from the lessons, the students who are struggling with mathematics are the students who stand to gain the most from this experience. Because space is limited, CMSE takes the selection of campers very seriously.

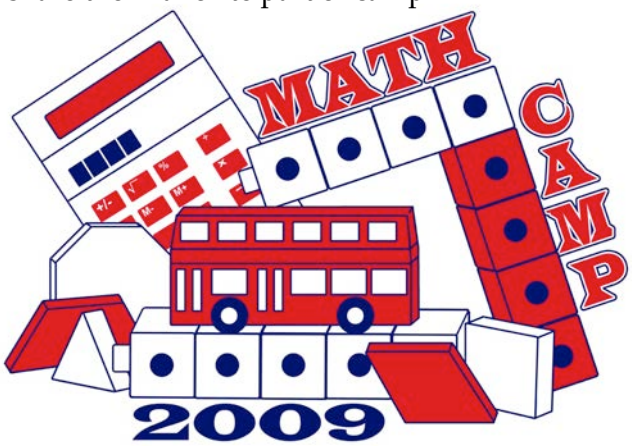
A committee of CMSE Fellows, the Associate Director, and the Camp Instruction Coordinator review each application before making selections.

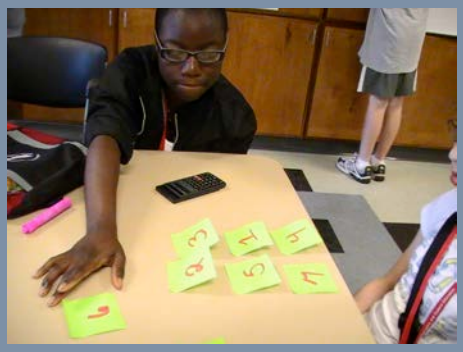
"MathCamp was really fun. I thought math was just boring old stuff."

Final Presentations

Camp concludes with a final presentation and awards ceremony. Campers are divided into small presentation groups. They were instructed on how to create a PowerPoint presentation and given time to create their own. Parents and teachers are invited to the presentations. They gather in an auditorium to hear and see what their children have learned and have been doing all week. Certificates are then awarded to all campers who complete the program.

The presentations further challenge students to communicate to the audience what they have learned. Each group explains a specific task that they were involved in and each camper gets the opportunity to share their favorite part of camp.





"For one thing, MathCamp changed the way I think about the equal sign."

Promoting interest

The goals of this program are to inspire in students a real interest and to improve their performance in mathematics and science.

Going Further - MathCamp for Teachers

In order for MathCamp to have an impact on more students and teachers across the state, we began recording the daily activities that took place during camp on video. The purpose of these videos is to create professional development modules to demonstrate to teachers how students can learn mathematical concepts through investigation and discovery. CMSE camp instructors modeled teaching strategies and questioning strategies that are research based and have been proven to be effective in helping students to develop a conceptual understanding of mathematical topics.