Ohio Mathematics Initiative

FAST FACTS

All Ohio public colleges and universities will offer pathways in mathematics that help students succeed, increase the percentage of students completing degree programs, and promote the effective transfer of credits for students moving from one institution to another.

FACT: *Where Discoveries Begin:* Ohio Plays Major Role in NSF-Funded Mathematics Research

With an annual budget of $7.3 billion (FY 2015), the National Science Foundation (NSF) is the funding source for approximately one-quarter of all federally supported basic research conducted by the nation's colleges and universities. In many fields, including mathematics, NSF is the major source of federal backing.

According to Dr. Joan Ferrini-Mundy, assistant director of the NSF for education and human resources, Ohio – an early leader in mathematics education reform – is playing a major role in NSF-funded research. Below are profiles of five projects where Ohio's research community is leading the way.

Teacher Professional Development for Technology-Enhanced Inquiry to Foster Students' 21st Century Learning (Start date: September 1, 2014)
Investigators: Kathleen Koenig, Lei Bao, Kathy Wright, Janet Zydney, and Casey Hord
Sponsor: University of Cincinnati

The goal of this Exploratory Design and Development Teaching project is to develop and evaluate a module for use in a 7th grade classroom that promotes student development of 21st century skills with a particular focus on student development of scientific reasoning. The technology-enhanced curriculum will be designed to engage learners in deep and meaningful investigations to promote student learning of content in parallel with 21st century skills. The module will be designed using principles of inquiry-based learning, as well as the principles of universal design for learning. This project will contribute directly to the limited research on the interventions that impact teachers' capacity to provide high-quality 21st century STEM education to all students.

BCC Ohio Longitudinal Data Archive (Start date: September 15, 2013)
Investigators: Randall Olsen, et al
Sponsor: The Ohio State University

By developing a shared interdisciplinary research platform across multiple universities and local and state agencies, the project (1) expands the community of users of the Ohio Longitudinal Data Archive; (2) establishes the legal agreements that facilitate access to the data; (3) matches and integrates multiple forms of data; (4) improves the technical accessibility and usability of data; and (5) connects with researchers and organizations in other states that are pursuing similar goals to make cross-state comparisons easier to produce.

In 1991, the National Science Foundation (NSF) provided funding to 10 states in support of comprehensive reforms in mathematics and science education. Without imposing a single strategy for change, NSF's Statewide Systemic Initiative called for reforms that improved curriculum and instructional alignment, removed barriers to change, supported teachers' efforts in the classroom and changed pedagogy by emphasizing "hands-on" and "inquiry-based" learning, instead of rote learning.

Ohio's Project Discovery was one of the original NSF-funded projects. For more than a decade, it generated an infusion of talent – as well as a continuing stream of state dollars – with three objectives: (1) initiate validated professional development models designed to build a critical mass of teachers who are knowledgeable in content and skilled in equitable and exemplary instructional practices; (2) develop an infrastructure to support those models and teachers; and (3) act as a catalyst for lasting systemic reform of the teaching and learning of mathematics and science.

The story of Discovery was one of sustained professional development for teachers, equitable instructional strategies and regional delivery and support. For almost a generation, it changed the landscape of mathematics and science education in Ohio – and it sparked a robust state/national research partnership that continues today.

Mathematics Transitions in STEM Education (Start date: August 1, 2012)
Investigators: Rodney Null, Mary Ann Hovis and Beth Basista
Sponsor: Rhodes State College

This project involves high school, two-year college and four-year university educators along with their business and industry partners in developing a mathematics course for high school seniors with the overarching goal of improving student readiness for technical degree programs. Ongoing activities include intensive professional development workshops and seminars and learning communities for mathematics teachers to ensure implementation of the course, which aligns with Common Core State Standards and Ohio's Mathematical Expectations for College Readiness. It also features a focus on actively engaging students in gathering, representing, analyzing and interpreting data through activities that emphasize application of mathematics in STEM fields.

National Center of Excellence in Welding Education and Training (Start Date: August 1, 2011)
Investigators: Monica Pfarr, Kenneth Smith, Kelly Zelesnik, Thomas Annable, Ernest Levert and Christopher Pollock
Sponsor: Lorain County Community College

The National Center for Welding Education and Training, also known as WELD-ED, is increasing the number of science and engineering welding technicians to meet workforce demands. The Center furthers comprehensive reform in welding education by providing technologically current educational materials and professional development opportunities to two-year colleges and other educational institutions. The focus is on welding technician education at community colleges, but secondary and university education programs are being advanced with a 2+2+2 model of vertical articulation. The welding industry in the United States is economically large and technically diverse. The industry has documented educational needs and considers technician education and training as essential to advanced manufacturing.

Teaching Practices that Support Fraction-Based Algorithmic Thinking (Start date: August 15, 2010)
Investigator: Debra Johanning
Sponsor: The University of Toledo

The goal of the research is to identify core mathematical teaching practices that engage and support students in algorithmic thinking associated with fraction operations. The products of this work will be educational materials that can be used by other teacher educators to support the general population of teachers in this domain. These materials will identify core routines of practice associated with algorithmic thinking for fraction operations, and offer activities and tools to support their development in practice. Moving forward in this area is critical in the successful preparation of students for STEM careers.

Ohio Mathematics Initiative