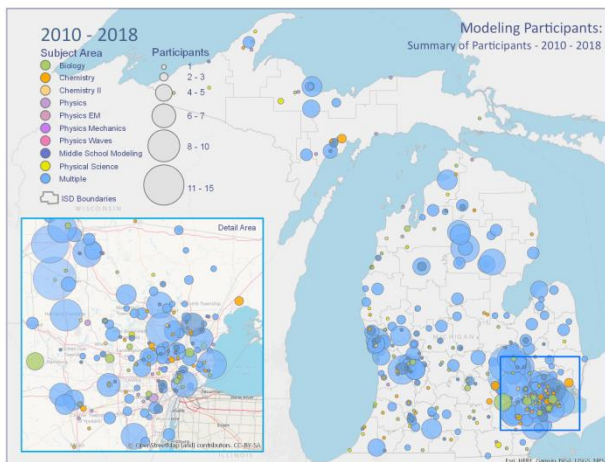




MODELING IS HIGHLY EFFECTIVE AT:

- Achieving the vision of the new (NGSS-based) Michigan Science Standards
- Enacting the 8 Math Practices of the Michigan Mathematics Standards
- Developing STEM-Employment Proficiencies and a STEM Mindset while inspiring STEM-aspirations in students (Page 2).

PARTNERS: The Modeling Instruction in Michigan program provides professional development to Michigan secondary science teachers in Modeling Instruction. It is a comprehensive statewide program conceived and organized by lead members of the MiSTEM Network and Michigan Math-Science Network in partnership with Eastern Michigan University, the Detroit Metropolitan Area Physics Teachers and the American Modeling Teachers Association.



HISTORY AND CHARACTER: Modeling Instruction was created by an NSF funded grant carried out at Arizona State University. In our work, we make use of their carefully designed instructional frameworks that has been shown to markedly increase teacher content mastery and instructional skill and student proficiency in STEM. Modeling Instruction relies on findings that enduring conceptual mastery of science content and practices is developed through student-centered investigations and collaborative model building and deployment supported by well facilitated productive academic talk in the classroom. The workshops are an immersion design where

teachers learn from the same techniques and materials they will utilize with their students. Student preconceptions are directly confronted and compared to indisputable results from classroom investigations and interpretation of evidence. Skilled teachers support a class culture that activates student thinking and identities, instigating a translation of their evidence to models, explanations and solutions.

Models are deployed to explain phenomenon and solve real world problems.

PROGRAM COMPONENTS

- Intensive three week long summer workshop in high school physics, physical science, chemistry and biology and in middle school science (including a version with MiSTAR)
- Follow up fall Saturday workshops and winter evening webinars
- Classroom Learning Lab events were teachers host guest participants and higher education partners who observe and reflect on instruction
- The Aspiring Modeling Facilitators Academy which aims to increase the number of skilled facilitators in Michigan.



PROFICIENCIES for STEM PROFESSIONS

- ✓ Systems Thinker: building and revising evidence based models
- ✓ Critical Thinker: using evidence and computational models
- ✓ Designer: shaping and revising experiments, models, solutions and arguments
- ✓ Problem Solver: deploying models to challenges
- ✓ Collaborator: Relying on interdependence with co-investigators
- ✓ Flexible Contributor: Adapts to new insights by redesigning models
- ✓ Multi-faceted Communicator: Deploying skills for context, purpose and audience
- ✓ Technologically Enhanced: analyzes, models and simulates with varying tools

STEM MINDSET and STEM ASPIRATION

- ✓ Owns a sense of wonder
- ✓ Eager to explore and engage
- ✓ Arbitrated by evidence and argument
- ✓ Confident with complexities
- ✓ Accepting of ambiguity
- ✓ Values and empowered by math and science
- ✓ Computationally Confident
- ✓ Accomplished STEM Communicator and Collaborator
- ✓ Recognizes the open doors to STEM professions



MICHIGAN MATHEMATICS
& SCIENCE LEADERSHIP
NETWORK



Transforming STEM Education



Referenced to:

//MiTalent Architecture/Skills4Success/Career Ready Practices/Waukee APEX Focus/Michigan Career College Ready/ GTIB Resolutions//

<http://mimodelinginstruction.org>