

# Learn ‘Modeling Instruction’ for Physical Science

## A Practical Two-week Summer Workshop for Science Teachers in Minnesota

*“I am a true believer. And so are my students. They have said on numerous occasions that they have learned more this year than they ever did in all of the other science classes. White-boarding sessions are incredible and the students take an ownership in the modeling.” – High School Chemistry Teacher*

Transform your science classroom using proven, highly-effective science teaching methods and curriculum. This workshop focuses on physical science for middle school or high school. Modeling Instruction (MI) is based on extensive research, developed by Arizona State University and pioneering teacher teams over the last 20 years. MI works for diverse student groups—from economically-challenged inner-city schools to private schools, and is well suited for differentiated learning. Through MI, students discover the joy of learning and mastering science. They move beyond memorizing science facts to solving problems and innovating because they learn scientific thinking skills.



### What is Modeling Instruction?

MI is a method of teaching that uses hands-on learning experiences to help students make sense of evidence, comprehend and then apply science principles. During this process, students explore their personal beliefs and then reconfigure them to better match evidence and science. With standard science instruction, students’ personal beliefs typically remain intact, yet contradict basic principles of science. Students who lack a sufficient grasp of science principles will resort to rote methods to get through science courses, yet not really understand the science.



With MI, students participate, investigate and then present what they observe and believe to fellow students. Scientific principles are represented as “science models” that students compare to their “personal models”. Once students discover and embrace these science models, they quickly build more knowledge on these modeling scaffolds. As teachers fully implement MI, their students perform at a higher level because they become self-motivated learners and critical thinkers.

Differing from standard science teaching methods, the MI training/coaching approach equips teachers to become confident practitioners. Teachers can incorporate MI into regular science curricula and shift to a full MI approach. Research also suggests that “crossover teachers” can become as effective as physics majors in teaching introductory physics using MI.

**When: July 19-30, 2010**  
**Monday-Thursday: 8 AM—3:30 PM**  
**Friday: 8 AM—12 Noon**  
**Where: Spring Lake Park High School**  
**Spring Lake Park, MN**

Modeling Instruction is one of only two high school science programs to receive an exemplary citation from the U.S. Department of Education



## Approach

Minnesota science standards for physical science focus on basic principles of physics and chemistry. The MI program presents a framework of physics and chemistry models that form the foundations for these standards. Once students learn and master the foundational models the teacher can quickly lead students to learn and comprehend other sub-strands and implications that students are expected to learn. The proportion of time in class shifts from fast-paced coverage of many details (often overloading students with information) to mastery of these core foundations. This approach can greatly benefit STEM programs.

## Content

In this two-week program (60 hours), teachers will be trained in the fundamentals of MI methodology. Teachers will learn techniques of instruction from the students' and teachers' perspectives. As training progresses, teachers will be coached in roles that build effective discourse, analysis of events and conceptual understanding. Teachers will become able to adapt principles and technologies to their school context. Teachers may bring their own equipment, otherwise equipment will be provided. Manuals and curriculum are also provided. A follow-up day in Fall 2010 will be scheduled to support teachers in applying MI practices in their own classes. Certificate and CEU Credits available.

Read more about the MI methods and results at: <http://modeling.asu.edu/>. MI has been extended to chemistry, biology and mathematics with comparable results.

## Instructors

**Callie Bush** teaches Intro. Physics, ELL Science, Human Anatomy & Physiology at Fridley HS. Her MI training: Mechanics, Modeling in Biology, and Mod-

eling—Energy & Constant Velocity. She has a BS in Biology & Natural Sciences, licensed in Life Science, Physics, and Middle School Science. She was a finalist for the Presidential Award for Excellence in Science Teaching this year. [Callie.Bush@Fridley.k12.mn.us](mailto:Callie.Bush@Fridley.k12.mn.us)

**Judy Hill** is licensed in and teaches physics and chemistry at Forest Lake High School. She is trained in mechanics modeling instruction at ASU. She has BS degrees in electrical engineering and science ed and a Masters in Science Ed. [jhill@forestlake.k12.mn.us](mailto:jhill@forestlake.k12.mn.us)

Stephen Bosacker is the organizer with Designs for Learning, providing "Services for Success" and consulting for Charter Schools.



## Costs and Registration

**\$750** – 2 weeks training July 19-30 plus 1 follow-up day in September 2010 (TBA).

**Lunches:** available through a caterer (order meals on the registration form), bring your own or restaurants are near the school.

**\$100 Deposit** due with registration. 50% due by June 18. Full payment by July 9. Refund of 60% if cancelled by June 30. If fewer than 20 teachers register by July 1, all payments will be refunded and the program cancelled for this year.

Hosted by Designs for Learning, 2233 University Ave. W., Suite 450, St. Paul, MN 55114 651-255-8832. [sbosacker@designlearn.net](mailto:sbosacker@designlearn.net)

Registration Form at: [www.designlearn.net/MI/registration](http://www.designlearn.net/MI/registration)

