Modeling Instruction

Indicates a research-demonstrated benefit

Overview

Modeling Instruction is a guided-inquiry interactive-engagement method of physics teaching that organizes instruction around building, testing and applying the handful of scientific models that represent the content core of physics. The conceptual coherence afforded by the Modeling Method corrects many weaknesses of the traditional lecture-demonstration method, including fragmentation of knowledge, student passivity, and persistence of naive beliefs about the physical world.

Type of Method	Instructional strategy
Level	**Designed for:** Teacher Professional Development , High School , Intro College Calculus-based , Intro College Algebra-based, Intro College Conceptual, High School Chemistry **Can be adapted for:** Teacher Preparation, Intermediate Undergraduate, Advanced Undergraduate, Graduate, Astronomy, any science or mathematics course
Setting	**Designed for:** Lecture - Small (<30 students) , Studio **Can be adapted for:** Recitation/Discussion Session
Coverage	Few topics with great depth, Many topics with less depth
Topics	Mechanics, Electricity / Magnetism, Waves / Optics, Thermal / Statistical, Modern / Quantum, Astronomy, Other Science
Instructor Effort	High, Training and practice (a Modeling Workshop) are required to implement this method effectively as the learning environment is discourse-rich and this discourse must be encouraged and managed effectively.
Resource Needs	Computers for student use in class, Lab equipment for student use - professional, Tables arranged for group work
Skills	**Designed for:** Problem-solving skills , Conceptual understanding of physics content , Connecting conceptual and mathematical understanding , Representing knowledge in multiple ways , Coherent framework for physics, Think like a scientist, Reflecting on one's own learning, Self-confidence around physics, Designing experiments

	Can be adapted for: Understanding how physics relates to the real world, Enjoyment of physics, Laboratory skills, Creativity, Autonomy, scientific argumentation, scientific reasoning
Research Validation	**Based on research into:** how students learn **Demonstrated to improve:** scores on multiple choice conceptual tests , scores on written conceptual tests , traditional problem-solving ability **Studied using:** conceptual pre/post exams , problem-solving pre/post exams , beliefs pre/post exams , student interviews , classroom observations , video of students , research conducted at multiple institutions , research conducted by someone other than developers
Compatible Methods	PhET, JiTT, Physlets, SCALE-UP, OSP, ISLE, LA Program, MBL, CPU, PUM, Clickers, MOP, PRISMS PLUS, Responsive Teaching
Similar Method	None
Developer(s)	David Hestenes and Malcolm Wells
Website	http://modelinginstruction.org/