

## **The Progress of the Modeling Curricula in Physics, Chemistry and Biology in Indiana**

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During the past 5 years, the NISMEC group<sup>1</sup> have brought the Arizona State Modeling Curricula<sup>2</sup> to Indiana principally through a series of teacher professional development workshops during each summer. These workshops have reached the whole state - from Evansville in the south, to Indianapolis in the center, and to Notre Dame and Hammond in the north. The workshops have all been funded through grants to Notre Dame from the Indiana Department of Education (Math-Science Partnership grants) and from the Indiana Commission on Higher Education (Teacher Quality Improvement grants).

It has been wonderful to observe the consequent growth of Indiana High School Modeling in the sciences, from just a handful of teachers having had training before 2008, to more than 250 high school science teachers at present.

These one-, two- and three-week workshops have changed the landscape of high school science teaching in Indiana, bringing enhanced student engagement through cooperative learning and student-centered instruction methods, very much in line with the Next Generation Practice Standards<sup>3</sup>. The previous article indicates how effective the Modeling paradigm has become when introduced into physics, chemistry and biology high school classrooms.

In this article, we briefly describe the recent progress Professional Development of Modeling teaching in Indiana and a perspective of developments in the immediate future.

Our first offerings of Professional Development in Physics Modeling were led by Hugh Ross, who has been teaching physics modeling for many years at Guerin High School, and he has continued to lead most of the Indiana physics workshops, which have taken place at the University of Notre Dame and at Southern Indiana University, as well as one workshop at Guerin HS for Indianapolis area teachers.

We arranged workshops in chemistry in all three parts of the state (north, south and central) in the following years, but initially needed to bring instructors in from out-of-state: Ray Howansky from Philadelphia, PA, and Levi Torrison from Phoenix, AZ. Indicative of the progress within the state, we now have our own highly-qualified Chemistry modeling workshop instructors: Ben Buehler at Blue Valley Junior High School, Erica Posthuma-Adams at University HS, Ryan Bruick at Noblesville HS, and Lynda Rose at Penn-Harris-Madison HS in Mishawaka.

The biology story is quite different: since no biology modeling curriculum existed at the ASU modeling site, during the past three years, we have developed our own Indiana Modeling Curriculum, specifically aimed at the needs for Indiana teachers. The curriculum is now more than 90% complete, and is web-accessible and is being tested by biology teachers statewide<sup>4</sup>. We are eager to receive feedback for improvements from any teachers who are trying it out.

The summer of 2013, we have been developing and testing a modeling curriculum specifically for Indiana's ICP course, under the guidance of Bob Pustek of Morton High School, Hammond, and Lynda Rose, Hugh Ross and Ben Buehler. The four of them led teachers in

workshops at Hammond and at Notre Dame. We expect that this curriculum will shortly be web-accessible at the NISMEC website<sup>1</sup> for testing throughout Indiana.

What does the future hold for the Modeling curricula for science in Indiana?

Now that we have a working, active nucleus of modeling expert teachers in Indiana, we hope to continue to expand our numbers: modeling remains a goal for the enhancement of high school science classrooms across Indiana;

- Formation of the Indiana Modeling Teacher Group - at the HASTI conference - 5-7 Feb 2014.
- Workshops in Physics, Chemistry, ICP and Biology in Hammond Indiana, June 2014
- “Flipped” Modeling Workshops, partially on-line during the school year, short face-to-face one-week workshops in the summer - at Notre Dame, Evansville, and the Indianapolis area - 2014 onwards.
- Modeling conference (the first national, annual meeting) at Notre Dame, Fall 2014, jointly by AMTA, NISMEC and the Indiana Modeling Teacher Group (arrangements in progress).
- Development of Modeling Curricula for high school astronomy/space science, earth science and anatomy.

Please join us to learn how to use Modeling Instruction in your classroom ([hgberry@nd.edu](mailto:hgberry@nd.edu)).

## References

1. NISMEC: The Northern Indiana Science, Mathematics, and Engineering Collaborative [nd.edu/~nismec/nismec11.htm](http://nd.edu/~nismec/nismec11.htm)
2. AMTA: The American Modeling Teacher Association [modelinginstruction.org/](http://modelinginstruction.org/)
3. The Next Generation Practice Standards: [nextgenscience.org](http://nextgenscience.org)
4. NISMEC: [nd.edu/~hgberry//biology2013/biology2.html](http://nd.edu/~hgberry//biology2013/biology2.html)

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