

The Modeling Instruction Program in the ASU Department of Physics

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“ASU's summer program is a national treasure!” “I learned more about teaching and physics this summer than in 5 years of college!” “I LOVE this program!” This is what teachers write about the Modeling Instruction Program in the ASU Department of Physics. I have co-directed this program for 19 years. We improve learning and achievement of K-12 students in science and mathematics by providing model-centered STEM professional development for high school and middle school teachers. As the only program of its kind in Arizona, we maintain physics and chemistry education, improve its quality, and increase enrollment.

Since 2000 we have served typically 100 Arizona teachers each summer, primarily for lifelong professional development but also in a Master of Natural Science degree in physics teaching that is similar to Finland's degree. Finland, as you know, leads the world in test scores. Modeling Instruction was designated as Exemplary in science and Promising in technology by Expert Panels of the U.S. Department of Education. So our teachers are getting a world-class education.

What chiefly determines student achievement is teacher effectiveness. That is our focus, and we have well-documented evidence of success. Through teachers, we prepare students for the 21st century scientific and technical workforce and we promote scientific literacy. (Program details are at <http://modeling.asu.edu/MNS/MNS.html> .)

Arizona has a chronic shortage of high quality teachers of physical sciences. Three-fourths of the 280 physics teachers don't have a degree in physics; half of the ~600 chemistry teachers don't have a degree in chemistry; most physical science teachers don't have a degree in any physical science. Turnover is high. Thus teaching jobs go unfilled, for lack of Highly Qualified (NCLB) teachers; a shocking fact is that four large metro Phoenix high schools don't offer physics in 2012-2013.

The only way most teachers can increase their salary is by earning 15 graduate credits, for which they get a small raise of typically \$1000. Yet most teachers cannot afford our program. Our teachers have a salary of typically \$36,000 and it has been frozen for 5 years. Yet summer tuition has almost doubled, to ~\$1800 for 3 credits in summer 2013. Teachers write, *“I lose money taking classes instead of working in the summer; to me these classes are worth it, but I can not pay the tuition”* and *“I have to choose between feeding my children and taking classes.”*

Until 2010 ASU provided free tuition for teachers. Unfortunately, our federal ESEA Title II funding ended then, with no hope of renewal. Concomitantly, ASU stopped giving tuition exemptions for our teachers due to the tight ASU budget. Thus, teacher enrollment in our courses plummeted to half in summer 2012. High school physics, chemistry, and physical science in Arizona are now endangered.

Many teachers write that professional development in Modeling Instruction saved their career. Overwhelmingly they tell us that the ASU summer Modeling Instruction Program is the best way for them to become effective teachers. Our crucial program must be made affordable for them. How can this occur?