The Arizona Crisis in Physics Education

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FACT: In Greater Phoenix, only 20% of high school students take physics. Nationwide, 40% do. The U.S.A. is experiencing a severe shortage of science, technology, engineering, and mathematics (STEM) professionals. STEM jobs are growing twice as fast as other fields. High school physics is a prerequisite for nearly all STEM careers.

WHY SHOULD WE CARE?

* The STEM economy is here: 60% of new jobs in the 21st century will require skills that only 20% of the current workforce have. No one has realized that these 20 percenters are the ones with physics skills. Businessmen and politicians have failed to realize that physics is STEM!
* High school physics is needed for almost all STEM college majors and careers.
* Only 10% of Hispanics and Blacks in Greater Phoenix take physics. We need STEM opportunities for our kids!

HEED THE RESEARCH:

* ACT research shows that high school students who take physics are twice as likely to be ready for college science. Thus ACT recommends a minimum core curriculum in high school that includes biology, chemistry, and physics**.**
* A college student who took high school physics is twice as likely to earn a STEM degree than a student whose highest high school course was chemistry. [Tyson et al., U of So. FL, 2007]

CURRENT STATE OF ARIZONA PHYSICS TEACHERS:

* 410 people in Arizona have a Physics Certificate, according to the Arizona Department of Education. But only about **160** of them taught high school physics in AZ in 2015-2016.
* Most large public high schools have only 1 physics teacher, who teaches chiefly other subjects.
*A recent trend has seen high school physics classes eliminated in order to maintain student access in AP classes. In many schools, students are now being displaced to biology and other non-math-based sciences, where there is an abundance of qualified staff.

WE ARE NOT REPLACING PHYSICS TEACHERS FAST ENOUGH.

* Arizona's 3 universities produce about 6 physics teachers yearly, altogether.
* 25 open positions for physics teachers in Greater Phoenix were advertised in spring 2016.
* Schools are dropping physics and replacing it with science courses that are less rigorous.

WE NEED TO INCREASE THE NUMBER OF PHYSICS TEACHERS IN ARIZONA:

* Re-train existing science teachers (e.g., biology, earth science) to teach physics and chemistry.
* The ASU Modeling Instruction Program is one of the best physics and chemistry teacher professional development programs in the world, with proven data and results of success. Teachers learn deep content and effective hands-on, minds-on pedagogy so that in science class, students DO science.
* Provide free graduate tuition to any Arizona teachers if they teach in AZ for a set amount of time.
* Fund 200 teachers in 5 years to take 12 graduate credits in physics and/or chemistry @ $700/credit.
* By increasing the number of physics and chemistry teachers in Arizona, we can double the number of students who have access to higher level STEM. Quality STEM instruction is critical for Arizona prosperity and will yield long-term sustainable and tangible benefits. Arizona needs a capable and mathematically adept workforce. Arizona desperately needs to invest in high school sciences before it is too late. We need help from our Arizona leadership to make substantial, long term, sustainable changes.

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