STATE SCHOLARS INITIATIVE

Why Physics in the State Scholars Curriculum?

Many people ask why physics is part of the State Scholars Core Course of Study: is it really that important to postgraduate success in college, work, and life? The answer is yes, according to researchers, employers, and high school graduates.

In publications like *Answers in the Toolbox* and *The Toolbox Revisited*, researchers have found that the intensity of a high school curriculum truly matters for those who plan to earn a baccalaureate degree.[1] Researchers defined "intensity" in terms of how many academic courses a student took and also in terms of the sequences of courses taken and the depth of study of a variety of subjects, including laboratory sciences (chemistry, biology, and physics). Student transcripts analyzed as part of the National Educational Longitudinal Study of 1988 (NELS) reveal a strong correlation (0.530) among students who complete three or more Carnegie units in core laboratory sciences with baccalaureate degree attainment (by December 2000 for 1992 high school graduates). Students who complete three or more units of laboratory sciences also have a higher likelihood of completing a rigorous high school curriculum (defined as the highest level of mathematics, science, and foreign language), with a correlation of 0.774.

According to the National Assessment of Educational Practice, physics is key to science proficiency. When researchers studied the effect of high school course-taking in science, they found that students who took physics had higher science proficiency scores than did students who only took chemistry and biology.[2]

Nationally, only about 35 percent of high school graduates surveyed in 2000 had ever enrolled in a physics class. Yet it turns out that those who've graduated understand well the value of science proficiency. In a 2005 survey, when high school graduates who were not in college were asked, "Knowing what you know today about the expectations of college/the work world, if you were able to do high school over again, when it comes to science would you have taken higher-level and more challenging courses if they were available?" 41 percent of them answered yes.[3] For today's students, that might be the most compelling evidence that physics, chemistry, and biology are important – no matter what path they choose to take after high school.

> "Science education has helped me as a student, a professional, and as governor of Tennessee. Studying physics first gave me a curiosity about the world and how it works. Later, it became my calling as a college student, and as a young professional, my science skills opened new doors for me. This personal experience now drives my efforts as a public official to give Tennessee's children top-notch training in math and science. My goal is to connect our kids with science education early on, giving them the tools they need to compete in a high-tech, global environment."
>
> *– Phil Bredesen, Governor of Tennessee*

Employers Seek Graduates with Science Knowledge

Nearly 70 percent of employers surveyed for a 2005 report said that high school graduate entrants into the workforce were "deficient" in critical thinking and problem solving, defined as the ability to "exercise sound reasoning and analytical thinking; use knowledge, facts, and data to solve workplace problems; [and] apply math and

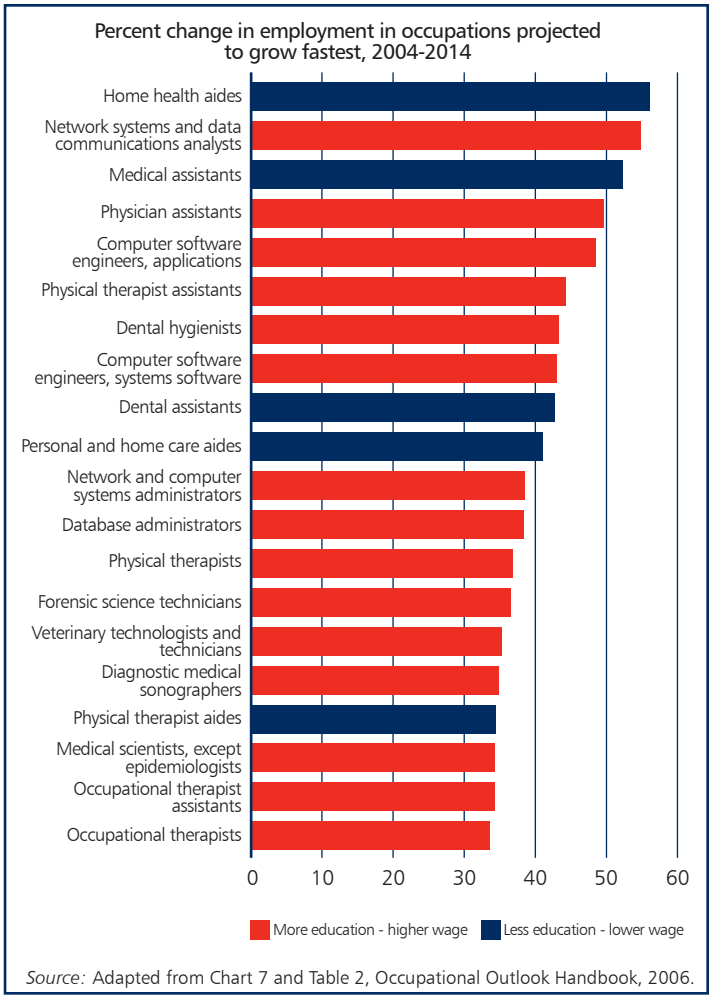
science concepts to problem solving."[4] Physics develops these skills and habits of mind.

- 44.5 percent of employer respondents in a 2006 Conference Board study rated high school graduate entrants into the workforce as "deficient" in science knowledge and skills.[5]

- Employers from the manufacturing sector were "significantly more likely to rate new [workforce] entrants with a high school diploma as 'deficient' in science" (62.1 percent of manufacturing employers, compared to 38.8 percent of employers in other industries).[6]

- In the same study, 57.5 percent of employer respondents reported that critical thinking and problem-solving abilities were "very important" to successful performance on the job for new workforce participants with high school degrees.[7]

- Almost all of the occupations expected to grow the fastest by 2014 (shown in chart) require the study of physics.[8]



Source: Adapted from Chart 7 and Table 2, Occupational Outlook Handbook, 2006.

But there's another important reason for studying physics, points out Nobel Prize-winning physicist and SSI Advisory Board member Leon Lederman: "A well-taught physics course is foundational. As it unfolds, the observational processes and the beauty of the all-encompassing ideas expose the student to the power and passion of learning, and show them that science is much more than what is in most textbooks. It is full of stories of humans engaged in trying to understand the world in which we live."

Endnotes

1. Clifford Adelman, *Answers in the Toolbox: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment* (Washington, D.C.: U.S. Department of Education, 1999); also see Clifford Adelman, *The Toolbox Revisited: Paths for Degree Completion from High School Through College* (Washington, D.C.: U.S. Department of Education, 2006).
2. Adelman, *The Toolbox Revisited*, 38.
3. Timothy Madigan, *Science Proficiency and Course Taking in High School: The Relationship of Science Course-taking Patterns to Increases in Science Proficiency Between 8th and 12th Grades*, NCES 97-838 (Washington, D.C.: U.S. Department of Education, National Center for Education Statistics, 1997).
4. Achieve, *Rising to the Challenge: Are High School Graduates Prepared for College and Work?* (Washington, D.C.: Achieve, February 2005).
5. The Conference Board, "Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce" (New York: The Conference Board, 2006), 32.
6. Ibid., 32.
7. Ibid., 35.
8. Ibid., 41.

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