Why Does Science Matter in the K-12 Setting?

by Sam Spiegel

The notion of science education as a "luxury" or only for elite students is no longer valid. Science and scientific literacy are vital for today’s citizens and for promoting a productive workforce. The research is becoming increasingly clear that students who are developing proficiency in science have improved learning results in English language arts and mathematics.

In 2007, a Carnegie Foundation commission of distinguished researchers and public and private leaders concluded

The nation's capacity to innovate for economic growth and the ability of American workers to thrive in the modern workforce depend on a broad foundation of math and science learning, as do our hopes for preserving a vibrant democracy and the promise of social mobility that lie at the heart of the American dream.

In 2010, the President’s Council of Advisors on Science and Technology (PCAST) reported

The success of the United States in the 21st Century—its wealth and welfare—will depend on the ideas and skills of its population. ... The value of these assets will be determined in no small measure by the effectiveness of science, technology, engineering and mathematics (STEM) education in the United States.

Despite the recognition of science as a critical content area for teaching and learning, science education has been largely neglected in many school districts over the past 20 years. As a result, the U.S. system of science education is far below par and, if left unattended, will leave millions of young Americans—and America itself—unprepared to successfully compete in a global economy.

The need to significantly increase student's exposure and learning of rigorous science content is well documented1. Additionally, there is a renewed emphasis on the need for students to develop strong habits of thinking in science associated with 21st Century—College/Workforce Ready skills and to recruit future scientists and...

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1 Snyder & Dillow, 2010; Fu, Raizen, & Shavelsom, 2009; Hanushek, Peterson, & Woessmann, 2011
engineers\(^2\). This need exists for all students ranging from those typically low achieving to those high performing\(^3\).

Many schools continue to face increasing pressures to meet performance measures focused on high-stakes testing and student performance in language arts and mathematics. Close to 50\% of school districts do not use science as a measure to meet Adequate Yearly Progress (AYP), perhaps because science is not directly linked to federal funding. However, rigorous science programs have been shown to reduce achievement gaps and to increase performance on language arts and mathematics exams.

Science provides discrete, real-world experiences for students to apply reading, writing, mathematics, and critical thinking. These experiences also provide a context to help students develop their reading, writing, and mathematics skills. Studies have shown that classes that provide rich learning experiences combined with rich talk not only enhance science performance scores, but also show statistically significant gains in ELA and mathematics scores\(^4\). Furthermore, studies show a direct correlation between STEM scores in K-12 schools and the local economy; the higher the STEM scores, the greater the economic capacity of the local community.

So then, why does science matter? Science is vital to the development of literate high school graduates, it advances student performance in reading, writing, and mathematics, and it leads to local economic development. It’s time we moved past the question of why schools need to have strong science education programs that are coherent and continuous from kindergarten through graduation. And instead focus our efforts on ways to rebuild and refine K-12 science education programs.

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\(^2\) National Academy of Sciences, 2010  
\(^3\) President's Council of Advisors on Science and Technology Reports to the President  

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