

THE CHANGING ACADEMIC CORE

Importance of STEM Education for Everyone

"The rapid advances in technology in all fields mean that even those students who do not pursue professional occupations in technological fields will also require solid foundations in science and math in order to be productive and capable members of our Nation's society."⁴⁷ More than two-thirds of all new positions require some form of postsecondary education.⁴⁸ Nearly three-fourths of the increased need for postsecondary education requirements comes from the higher skills demanded by employers for jobs that previously did not require any college.⁴⁹ For example, employers with unfilled jobs were asked to identify why they were finding it difficult to locate qualified employees. A common response was that the applicants' skills were a primary hindrance, including a deficit in the applicants' mathematics, computer, and problem-solving skills. The need for more mathematics, computer, and problem-solving skills was found for more skilled occupations as well as for positions such as delivery truck driver.⁵⁰ In other words, the first step is to ensure that students learn a basic core of knowledge and skills starting in grade school; however, this is a critical, but not a sufficient goal. The accompanying task is to prepare an educated society of lifelong learners.

STEM education matters to average citizens as much as it does to workers in technical fields. A democratic society is founded on the premise that the electorate is sufficiently informed to make thoughtful decisions. The tremendous rate of technological change and globalization has increased the need for the electorate to keep current on multiple, complex topics. How many current registered voters understand the basic technology associated with wind farms, ethanol plants, stem cell research, and biotechnology? What information do they use when they vote or lobby elected officials on these topics? Do they have the basic knowledge to understand the health choices they may need to make? Do they have the basic knowledge to understand the breadth and scope of the possible uses of new technologies and their accompanying ethical and moral issues?

CHAPTER II

Keeping Illinois competitive requires gearing up the STEM skills with greater rigor in the P-12 curricula, increasing the number of students who pursue postsecondary education, and providing lifelong education opportunities to create

- an informed electorate of productive citizens
- a skilled workforce which is adaptable to new technology for all occupations
- a cadre of highly-skilled workers for the STEM professions

Many research reports, symposia, and coalitions have called for the revamping of STEM education to meet the new basic core of knowledge and skills needed for the 21st Century. The question becomes, "What is the basic core of knowledge and skills everyone should have?"

As part of the *Illinois Survey of Critical Technologies*, the Illinois Mathematics and Science Academy (IMSA) educators, researchers, engineers, and representatives of business and industry identified 26 science and mathematics concepts in five categories: biosciences, environmental and energy technologies, human health and development, information technology and communication, and materials science and advanced manufacturing.⁵¹ The experts considered these concepts to be primary drivers of Illinois' future success in the global economy. After examining teachers' knowledge and classroom instruction in the identified concepts, the *Illinois Survey of Critical Technologies* concluded that there is "a need to identify the 'new basics' in science and mathematics." Further, "the 'new basics' should result in revisions of content standards and assessments for students at all levels."⁵²

The first step is to identify the new basic core; the second step is to review standards, curricula, and assessments. This section summarizes some views on what the core should be. Part Two of this report examines student performance indicators. Chapter VI of Part Three discusses standards, assessment, and instruction.