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Having reviewed trends in the United States and abroad, the committee is deeply concerned that the scientific and technical building blocks of our economic leadership are eroding at a time when many other nations are gathering strength.¹

—*Rising Above the Gathering Storm, 2005*

The National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine expressed this concern, mirroring national reports issued in the last few years. The call to action—the critical and immediate need to address the challenges eroding the nation’s role as a global economic leader—are coming from all sectors of business, government, education, and society; and there are new reports daily in the professional and public media.

These calls for action are in response to the rapid changes and unprecedented challenges facing the nation. The convergence of rapid demographic and technological changes, along with the lightning-speed globalization of the economy, is resulting in a new world—one that is vastly different from anything the U.S. has known. The knowledge and skills necessary for economic success in this new world are more complex and demanding than those in the past. The days of finding a well-paying, lifelong job without postsecondary education are over. The need for increased skills applies to the average citizen as well as the worker. The issues facing voters are complex, and even a trip to the doctor requires more advanced knowledge of science than it did 20 years ago.

A Roadmap for American Innovation, a 2005 report on competitiveness, summarized the challenges facing the U.S. as follows:

- Talent, technology, and capital are available globally.
- Global competitors are gaining on the U.S. through investment in research and education.
- U.S. investment in engineering, math, and related sciences has been flat for more than a decade.
- High school students in the U.S. perform well below those in other industrialized nations in the fields of mathematics and science.²

Each of these challenges directly affects science, technology, engineering, and mathematics (STEM) education. How can Illinois ensure that all citizens have the 21st Century skills needed to be effective citizens and gainfully employed? How can Illinois ensure students leave high school with the necessary skills for citizenship, work, and postsecondary education? How can Illinois ensure that appropriate investments support the innovation endeavors needed to keep the state globally competitive?

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The U.S. was the primary leader in innovation in the 20th Century and now is only one of many countries investing heavily in education, research, and the infrastructure necessary to be a global leader. According to the Council on Competitiveness, "Innovation will be the single most important factor in determining America's success through the 21st Century,"³ and the future rests on talent, investment, and infrastructure:

- Talent - Preparing a quality workforce with appropriate knowledge and skills requires preparing people who can consistently develop new ideas and commercialize ideas produced from research and development. More in-depth math, science, and business skills are needed, leading to workers with multi-disciplinary backgrounds. Credit and non-credit education and training should evolve from higher education and business interactions.
- Investment - Public and private funding should allow for risk taking and exploratory approaches.
- Infrastructure - Government structures should ensure regulations and policies are innovation friendly.⁴

Echoing the Council on Competitiveness, a national consensus is emerging—the U.S. needs a better educated citizenry, especially in the STEM fields, and there needs to be support provided to this system through investment and infrastructure.

Multiple national initiatives are in place currently, with others proposed, to transform STEM education to meet the new challenges of the 21st Century. The President of the United States, the U.S. Department of Education, the Republican and Democrat parties, and Congress are discussing the challenges and proposing solutions. Numerous state coalitions have formed to improve STEM education. Major business and industry groups have offered recommendations. In light of the developing national momentum, this study analyzed STEM education in Illinois in comparison to various international, national, and state indicators of effectiveness. The ultimate goal was to identify the current strengths and critical challenges facing Illinois as it strives to remain competitive with other states and other nations in the 21st Century.

This report consists of four parts:

Trends Affecting Business and Education in Illinois

The impact of demographic, technological, and globalization trends on the workforce and on the knowledge and skills needed by citizens in the 21st Century.

Indicators of Illinois Students' STEM Performance

International, national, and state data at the student level, including academic achievement, readiness for college and work, and completion of college degrees.

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Aligning STEM Education to Illinois' Economic Infrastructure

Investment and infrastructure issues as they relate to STEM education, including instructional support, funding, and public awareness. Instructional support includes teacher preparation and supply as well as appropriate school curricula.

STEM Education Issues for 21st Century Competitiveness

The major issues in STEM education that Illinois needs to address.

The competitiveness of Illinois, both within the United States and as part of the global economy, depends upon informed, productive citizens; a skilled workforce that is adaptable to new technology regardless of the occupation; and a cadre of highly-skilled workers for the STEM professions. In other words, Illinois needs a strong STEM education system. The analyses presented in this study can be used to create the STEM education system needed for the 21st Century.