

VIII. A CALL TO ACTION

A CALL TO ACTION FOR ILLINOIS

At a time when the Illinois economic infrastructure needs innovation and a workforce with 21st Century skills, slightly more than half of the Illinois high school graduates have the mathematics and science knowledge needed to be successful in postsecondary education or to secure livable-wage jobs. At the same time, the convergence of demographic, technological, and globalization trends has resulted in the decline of the middle class, a potential shortage of skilled workers, and the need for an aggressive research and development agenda to create more higher-paying jobs and to keep Illinois globally competitive.

Illinois has historically been home to some of the world's best and brightest in mathematics and science, as well as to international, cutting-edge industries. It is home, also, to some of the lowest performing students in the nation, and it is recovering from severe recessions, especially in manufacturing and high technology industries.

The key to addressing these challenges involves private and public sectors working together to align STEM across the span of grades from pre-kindergarten through graduate school and to ensure that the entire STEM education system prepares the skilled workers needed for 21st Century jobs.

Keeping Illinois Competitive joins numerous other reports in bringing to the forefront the critical challenges facing STEM education. Appendix C summarizes the recommendations from a selection of these reports. At least half of these studies recommended

- Improving K-12 mathematics and science curriculum
- Providing opportunities and incentives for professional development
- Providing students with incentives to pursue STEM careers

The spirit of these recommendations is reflected below in the challenges and issues facing STEM Education in Illinois. Keeping Illinois competitive requires that the following challenges be addressed through the collaborative leadership of the private and private sectors.

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CHAPTER VIII

Challenge One: Student Academic Achievement

Slightly more than half Illinois high school students have the requisite mathematics and science skills for postsecondary education or jobs in the emerging new economy.

Academic Progress - Within Illinois, students decrease in their levels of achievement as they move from the early grades through high school. The percentage of students meeting or exceeding the state standards in mathematics decreases from 79% in 3rd grade to 53% in 11th grade. In science, the decreases are similar – from 71% meeting or exceeding the standards in 4th grade to only 53% meeting or exceeding the standards in 11th grade.

Achievement Gap - Low-income students, including minorities, are the least prepared for college and the workplace. The performance of Hispanics has improved but is still well below that of their white and Asian peers.

High School Graduation - About 30% of all 9th grade students will not complete high school; closer to 50% of black and Hispanic males are likely to graduate.

ACT Scores - Exiting high school students have ACT scores which are among the top in the nation and among the lowest.

College Persistence - Once in college, about half of the community college freshmen and about one-fifth of the university freshmen do not return for their second year.

Improving the academic achievement of all students requires a P-20 approach to STEM education and the alignment of this system to the needs of the workplace.

The following issues were identified:

1. Academic achievement on state mathematics and science assessments by Illinois low-income students is significantly lower than that of their peers.
2. Low-income, black, and Hispanic populations have lower levels of postsecondary education than their peers.
3. Many students in Illinois high schools do not have opportunities to study college-preparatory academic curricula or explore rigorous career and technical education pathways.
4. Significant numbers of high school graduates take remedial mathematics coursework in college, and taking remedial courses reduces the likelihood that students will finish degree programs.

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Challenge Two: Alignment to 21st Century Knowledge and Skills

State curricula, assessments, and pedagogy are not consistently aligned with the 21st Century knowledge and skills needed for the state's economic vitality.

The nationally proposed curricula for the 21st Century include a broad core of academic knowledge, basic skills, higher-level thinking skills, interpersonal skills, meta-cognitive skills, and technology skills. To align curricula, assessments, and classroom instruction to this new academic core may require organizational, delivery, and pedagogical changes across the P-20 continuum.

The following issues were identified:

1. Content area performance descriptors and state assessments do not cover 21st Century skills such as those in the "Applications of Learning" or the career and workforce skills that are part of the *Illinois Learning Standards*.
2. A statewide, inclusive process to regularly review and update the *Illinois Learning Standards* and performance descriptors to include cutting-edge technology and research-based pedagogy does not exist at this time.
3. The emerging instructional models that integrate disciplines and are grounded in authentic, real-world problems could be explored by state level organizations.
4. Current data-collection methods in the state do not provide accurate, consistent information on graduation and drop-out rates or the pathways students take through the P-20 educational system.

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Challenge Three: Teacher Preparation

Many mathematics and science teachers do not have the proper qualifications or access to ongoing professional development to improve their teaching.

Illinois has high percentages of teachers in mathematics and science who do not have the required certification to teach in their assigned subject area. Slightly more than 50% of 8th grade mathematics teachers in Illinois are certified to teach mathematics. At the high school level, one-third of chemistry teachers, two-fifths of physics teachers, about one-half of biology teachers, and nearly three-fourths of earth science teachers do not hold the proper state certifications to teach in their content area.

The following issues were identified:

1. The training necessary to meet the minimum state certification requirements for the subjects they teach is either not being provided for, or not being pursued by, all Illinois science and mathematics teachers who are not fully qualified.
2. Barriers exist that prevent mathematics and science teachers from acquiring and implementing new content knowledge and pedagogical skills in the classroom.

Challenge Four: Investment in STEM Education

Strategies may not be adequate to recruit and retain the most qualified individuals for STEM professions and for research and development for innovation.

Illinois needs innovative research and development to increase the productivity in critical shortage occupations, to increase innovation in current business and industry, and to keep Illinois competitive both nationally and globally.

The following issues were identified:

1. Parents say that awareness programs aimed at recruiting high-potential students to postsecondary STEM education are inadequate.
2. Barriers exist which discourage or prohibit students, especially low-income students, from enrolling in and completing STEM programs.
3. P-20 instructional activities that develop the skills needed for innovation have not been identified and disseminated.
4. Investment in STEM research has decreased in recent years.

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Challenge Five: Lifelong Learning

In the 21st Century, all citizens and workers will need increasing mathematics and science skills and opportunities for lifelong learning.

It is important for all Illinoisans, as employees and as citizens, to understand the STEM issues that affect their lives. Keeping Illinois competitive requires all workers to keep their skills up to date according to their occupational standards.

The following issues were identified:

1. Continuing education is needed to keep all workers' skills current.
2. Citizens may not be sufficiently aware of the need for all citizens to keep their STEM knowledge and skills up-to-date

Keeping Illinois competitive requires all public and private sectors working together to create coordinated, integrated, innovative solutions to these challenges.

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