

VI. STANDARDS, ASSESSMENT, AND INSTRUCTION

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State standards, instructional methods, and high school graduation requirements should reflect the 21st Century knowledge and skills students need to be ready for college and the workplace. Given this focus, this chapter examines

- *Illinois Learning Standards* and state assessments
- Instructional approaches to engage students
- Alignment of high school requirements to college and workplace readiness
- Alignment of STEM education to Illinois' economic development

Illinois Learning Standards and State Assessments

The *Illinois Learning Standards*¹⁴⁸ provide the framework for K-12 education by outlining the essential knowledge and skills students need to learn. The state assessments measure the degree to which students are progressing in meeting the standards. Taken together, the state standards and assessments are seminal factors in determining the quality of pre-college STEM education in Illinois.

Seven learning areas are detailed in the Illinois standards: English language arts, mathematics, science, social science, physical development and health, fine arts, and foreign languages. For each area, specific standards are given for early elementary, late elementary, middle/junior high school, early high school, and late high school levels.

Illinois' standards are considered to be above average by several rating studies. *The State of State Science Standards 2005*,¹⁴⁹ produced by the Fordham Foundation, gave Illinois a rating of B, the same rating it received in 2000. Nineteen states received either an A or B rating in 2005. Fordham reviewers attributed the high grade to the more detailed expectations indicated by "Performance Indicators" created by the Illinois State Board of Education and Illinois teachers. To increase its rating, Illinois needs to improve the "science content and instructional approach" of the science standards.

*The State of State Math Standards 2005*¹⁵⁰ graded Illinois standards as a C, higher than the D received in 1998 and 2000. To put this grade in perspective, the U.S. average was a high D, and only 6 states received a rating of A or B. The Fordham grades of mathematics standards are based on controversial assumptions, as national debates on mathematics content continue.

The Illinois Learning Standards, including its "Applications of Learning" and the workforce and career competencies, represent the knowledge and skills needed by students in the 21st Century.

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In addition to the student goals by level in school, each of the seven subject areas of the *Illinois Learning Standards* contains a section called “Applications for Learning,” which describes how students should apply the knowledge and skills in solving problems, communicating, using technology, working on teams, and making connections with other learning areas. (See Appendix A for more information on the Applications for Learning.)

As described in Chapter II, these “Applications of Learning” are similar in approach to that expounded by the Partnership for 21st Century Schools; e.g., the integration of content areas, the application of knowledge and skills in new ways, and the importance placed on interpersonal skills and communication. In Illinois there are no specific student indicators for the “Applications of Learning,” only general descriptions of the intended student outcomes for the subject area as a whole are given.

Are the standards aligned with workplace expectations? The Illinois standards development team recognized this need and included business and industry representatives on the group who drafted the standards. According to Harry Litchfield, co-chair of the standards project team and then an executive at Deere and Company, they were supportive of the process and product.¹⁵¹ They were instrumental in drafting the appendix of the *Illinois Learning Standards* which aligns the learning standards in each content area to a list of workplace skills and career development competencies (Appendix A). This appendix has been used extensively by educators in career and technical education to raise the level of rigor in their courses.

There is a growing national consensus that the 21st Century basic core is different than the traditional core, as discussed in Chapter II. Since content from Algebra II is included on the PSAE, the Illinois mathematics standards may be close to the 21st Century basic core. Nevertheless, neither science nor mathematics standards have been analyzed for their relationship to 21st Century expectations exemplified in the work of the *American Diploma Project* and the AAU/Pew “Standards for Success.”

Furthermore, rapid technological change and the blurring of the traditional disciplines require state-level processes to regularly critique and update the learning standards and assessments. For example, the *Illinois Survey of Critical Technologies* identified cutting-edge topics important for STEM education; e.g. artificial intelligence, alternative fuels, green technology, and fuel cells that cross traditional departmental lines.¹⁵² According to an Illinois State Board of Education science consultant, “There are so many new and important areas of knowledge, but Illinois lacks a system for deciding when new concepts should be added and where to focus scarce training resources.”¹⁵³

Even when the standards are aligned to the 21st Century basic core, as they obviously are in high-performing districts, curricula based on the standards must be enacted; that is, classroom instruction must reflect the standards. Several Illinois schools have addressed the alignment of instruction to the Illinois standards as part of their Comprehensive School Reform projects,¹⁵⁴ their Mathematics and Science Partnership grants, or their

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school improvement planning. Currently, a pilot project is using the *Surveys of Enacted Curriculum*¹⁵⁵ to determine the usefulness of that tool in assessing the alignment of classroom instruction to the *Illinois Learning Standards* in mathematics, science, and career and technical education.

Because “what is tested” is often “what is taught,” it is important to align state assessments with the most important knowledge and skills. The “Applications of Learning” and the list of workplace skills and career development competencies are not reflected in the state assessments except for the use of WorkKeys as part of the 11th grade assessment. Since state assessments are developed years in advance of actual administration, the critical technologies that will drive the Illinois economy for the future do not appear on the PSAE. If any of the “Applications of Learning” are to be assessed, local districts must take the initiative.

Instructional Approaches to Engage Students

Beyond alignment studies and the assessments that tend to direct instruction, practical applications of knowledge, such as those encouraged by the Applications of Learning, can help to engage students in learning science and mathematics. A common sense approach, perhaps, but one supported by research. In the last few decades, much has been learned on how we learn and the impact of different pedagogies on learning.¹⁵⁶ Unfortunately, it appears the research has not been widely implemented:

- The Bayer Survey of parents of under-represented students indicated that one of the challenges for their students is that science classes are boring or uninteresting (58% daughters, 51% sons).¹⁵⁷
- The Gates foundation found 88% of high school dropouts have passing grades and many dropouts list “boredom” as the reason for leaving school.

In the past ten years, national studies focused on how to improve STEM education and have offered recommendations ranging from a total reorganization of the educational system to less comprehensive approaches such as changing how mathematics and science content is taught. Some, such as Bill Gates, have argued for a new concept of high school:

When we looked at the millions of students our high schools are not preparing for higher education—we look at the damaging impact that has on their lives—we came to a painful conclusion: America’s high schools are obsolete...By obsolete, I don’t just mean that our high schools are broken, flawed, and under-funded—though a case could be made for every one of those points. By obsolete, I mean that our high schools—even when they’re working exactly as designed—cannot teach our kids what they need to know today. Training the workforce of tomorrow with the high schools of today is like trying to teach kids about tomorrow’s computers on a 50-year-old mainframe. It’s the wrong tool for the times.¹⁵⁸