CHAPTER VII

Essential elements of support include making parents aware of the need for their children to succeed in mathematics and science, providing qualified educators, providing financial aid to support promising students, and creating a rich environment for research activities.

RESOURCES FOR STEM EDUCATION

Keeping Illinois competitive requires that there is support for STEM education within the state. Essential elements of support include making parents aware of the need for their children to succeed in mathematics and science, providing qualified educators, providing financial aid to support promising students, and creating a rich environment for research activities.

This chapter includes sections on

- Student and parent awareness of the need for STEM education
- Preparation and professional development of educators
- Support for innovative research and development

Student and Parent Awareness of the Need for STEM Education

To increase student achievement in all grades, parents and students need to value strong mathematics and science skills. Research indicates there is a need for greater awareness of the importance of STEM Education:

- On a *Bayer Facts of Science Survey* in 2003, nearly 90% of the general public felt the low international mathematics and science ratings of the U.S. students could negatively affect the U.S. security and economy.[182] On the other hand, *Reality Check 2006: Are American Parents and Students Ready for More Math and Science* reported that 57% of the parents say the amount of current mathematics and science their child studies is about right.[183]
- A national survey of parents concluded that even though attitudes and interest in mathematics—particularly among minority students—have increased, "half of all students still plan to take mathematics only as long as they are required to do so."[184]
- In a national survey, nearly two-thirds of the college students and over three-fourths of the non-college students surveyed reported they would have worked harder and taken more rigorous courses in high school if they knew then what they know now.[185]
- The *Bayer Facts of Science Survey XI - 2005* asked parents of under-represented students about their children and science and engineering. Over 95% of the parents are confident that their children have the ability to succeed in science and engineering careers and see these careers valuable for their child. At the same time, 88% of the parents indicated that the science and engineering communities need to do a better job of telling today's students about these job opportunities and providing role models or mentors for their children (56% daughters, 45% sons).[186]

RESOURCES FOR STEM EDUCATION

- An ACT study found that over 90% of all surveyed students indicated that their mother or other female guardian was helpful in selecting their high school courses, whereas tenth-grade students reported that about 70% of their counselors were helpful.[187]
- Success in STEM college programs is related to the courses completed in high school,[188] which in turn is highly related to courses taken in middlle school.

Whether students are relying more on their mothers or their guidance counselors, data supplied by ACT makes clear that students are not choosing enough of the rigorous courses that will help them succeed in college and the workplace.[189] Instead, far too many of them are enrolling in middle school and high school courses that will lead them to years of remediation at the community college and/or university.

No comprehensive data was found on how well Illinois is meeting the challenge of providing accurate and timely career planning information to parents and students in elementary, middle, and high schools, as well as postsecondary institutions. However, the Illinois Department of Employment Security provides a comprehensive one-stop information center for workforce and career education at http://www.ilworkinfo.com/.

Preparation and Professional Development of Educators

In the 2005 debate over raising high school graduation requirements, local education leaders protested that qualified teachers were simply not available for more advanced science and mathematics courses. Research has supported their contention, placing the supply of qualified teachers as a central challenge for upgrading STEM education.

Illinois has a multiple-assessment qualification process for teachers: a passing performance on the *Basic Skills Test* before entrance into a teacher education program, a passing performance on *Content Tests,* and a passing performance on the *Assessment of Professional Teaching (APT),* an assessment of general knowledge of the teaching profession and pedagogical methodologies. In addition, Illinois has three-tiered licensing: initial, standard, and master, with specific requirements for advancing in level and remaining current in licensure. According to the *Illinois Teacher Salary Study 2003-2004,* the median schedules salary was $53,820, ranking the state 8th in the nation and 1st in the Midwest.[190]

That said, Illinois teachers for mathematics and science are consistently listed as critical shortages. In 2005, 225 school districts reported shortages of physics and chemistry teachers, up 8% and 9% respectively.[191] The future need for STEM teachers may be great: about 30% of the math and science teachers for grades 9-12 are over the age of 50.[192]

Illinois high school teachers of science and mathematics are required either to major in their subjects or take 24 academic credits in the subject and pass a test of content knowledge.