Chapter 5
Preparing the Next Generation of Innovators through Collaboration

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ABSTRACT
Every country is challenged to stay competitive in the new global economy. The education system within a country must play a pivotal role in ensuring the next generation is prepared to meet the challenges of the 21st Century workplace. Companies have realized that collaboration is a key competency that will bring success in the global economy. It is necessary that teachers understand the needs of our changing economy and incorporate methods to facilitate collaboration, communication, creativity, leadership, responsibility, self-direction, and people skills. This challenge is a global issue and this chapter discusses the steps the US is taking to ensure that its citizenry remains innovative, how the business community is using collaboration to be competitive, the issues encountered in schools to meet challenges of the 21st Century, and positive evidence that the landscape of education is changing in response to the desperate need to produce the next generation of innovators.

INTRODUCTION
Innovation will be the single most important factor in determining America's success through the 21st century. (Council on Competitiveness, 2005, p. 7)

Science and technology careers are the fastest growing career areas in the United States today and are projected to continue to grow throughout the next ten years at a record setting pace. Of the ten occupations expected to have double-digit growth before 2014, five of these include science and technology: network systems and data communications analysts, database administrator, computer software engineer and applications, medical scientist, and network and computer systems administrators (Owens, 2006). According to Thomas Owens (2006), editor of Business 2.0 Magazine, the bad news about outsourcing does not apply to the most creative and difficult
Preparing the Next Generation of Innovators

technical work, which is likely to remain here in the US. Adding to our nation’s need for technical workers is the retirement of the baby boomer generation, whose absence will quickly deplete the ranks of experienced technology workers, leaving openings for younger recruits. To fill this desperate need for science and technical workers in the US, students, even as young as middle school, should be encouraged to think about choosing a career in science and technology. Not only should these students be encouraged to consider these career options, but they should be prepared to be the innovators our nation will need to fill these high level positions of the future.

Meeting the US future demand for highly qualified science and technology workers entails a challenge for both primary and secondary teachers. Teachers must become fluent in the requirements of these industries (i.e., tools, capabilities, and resources) as well as the ability to translate these requirements into actionable and stimulating learning experiences. Teacher training and professional development needs to include the introduction of pedagogical strategies for preparing students for the 21st Century workplace and integrating technology-related competencies seamlessly into the current science and mathematics core curriculum.

There is an abundance of research that focuses on the need for more science, technology, engineering and mathematics (STEM) workers now and in the future. According to one recent estimate, while only five percent of the U.S. workforce is employed in STEM fields, the STEM workforce accounts for more than fifty percent of the nation’s sustained growth (Babco, 2004). In a document titled The Knowledge Economy: Is the United States Losing Its Competitive Edge? (Task Force, 2005), several serious signs of trouble were pointed out. The most significant sign is that the US is not awarding STEM degrees at the same rate as other countries. Undergraduate science and engineering (S&E) degrees within the US are being awarded less frequently than in other countries. For example, only 5.7% of first university degrees in the US are in the natural sciences and engineering, while in some European countries, including Spain, Ireland, Sweden, the United Kingdom, France and Finland, this percentage is between 8 and 13. In Japan Natural Science and Engineering awards make up 8%, and Taiwan and South Korea each award about 11%. In 2000, Asian universities accounted for almost 1.2 million of the world’s S&E degrees and European universities (including Russia and Eastern Europe) accounted for about 850,000 S&E degrees, while North American universities accounted for only about 500,000 degrees. In 2000, about 78% of doctoral degrees (89,000 of the approximately 114,000) earned worldwide in S&E were earned outside the United States (The Task Force on American Innovation, 2005).

Our nation is facing a serious future shortage of STEM professionals, and such shortages could put the US at risk in both the economic and security sectors since it would require dependence on engineers from other countries in high technology jobs in the future. The US congress responded to these needs by passing the The National Innovation Act of 2005 (109th Congress, 2005). This bill responded to the report published by the Council on Competitiveness (Council on Competitiveness, 2005), by focusing on three primary areas of importance for improving the US innovation in the 21st Century: (1) research investment, (2) increasing science and technology talent, and (3) developing an innovation infrastructure. This bill also established a President’s Council on Innovation to develop a comprehensive agenda to promote innovation in both the public and private sectors. It also expanded existing educational programs in physical science and engineering and considerably increased the funding for basic research, nearly doubling research funding for the National Science Foundation by 2011.

In 2006, President Bush unveiled his American Competitiveness Initiative (ACI) (White House Office of Communications, 2006), a strategy to
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