ABSTRACT

The purpose of this project is focused on enhancing the information technology knowledge and skills of Indiana high school teachers and their students in the biology, chemistry, physics, mathematics, computer science, and technology education disciplines. More specifically, this project focuses on information technology knowledge and skills in two areas critical to the Indiana economy: advanced manufacturing and biotechnology. Finally, this project focuses on basic IT knowledge and skills common and prerequisite to both of the specialty areas with a unique emphasis on information security, a specialized area that is becoming increasingly more important.

Keywords: advanced manufacturing; biotechnology; information security; information technology; instructional design

INTRODUCTION

It is expected that internet services, data processing, computer systems design, and software publishing jobs will grow until 2012 (Bureau of Labor Statistics, 2004). Our national ability to meet this demand is threatened by a lack of sufficient exposure to information technology (IT) at the high school level. This project provides students with requisite/prerequisite skills and also awareness of career and educational paths in IT. In order for students to acquire skills and awareness, teachers must be trained in skills and career options, and counselors and parents must also be included in the career awareness component. Figure 1 shows how the project plans to increase the knowledge of students, teachers, and parents.

Need

The educational need being met and the target population are described starting with a discussion of economic factors that influence the need for biotechnology and advanced manufacturing in the State of Indiana, followed by a discussion of the foundational IT knowledge and skills needed by teachers to support their learning.
and subsequent curriculum development in biotechnology and advanced manufacturing. Finally, the need for the development of information assurance, security knowledge, and skills; beginning with foundational topics and progressing into the specializations; are discussed.

**Biotechnology**

Indiana is in the process of growing biotechnology as an industry sector with the potential to generate high wage, high skill jobs for its citizens. Currently, Indiana’s $11 billion health industries provided approximately 10 percent of Indiana’s employment, and 12 percent of Indiana worker’s earnings (Miller & Associates for Indiana Health and Industries Forum, 2002). In 2003, the Quarterly Export Report for Indiana stated:

*Indiana is proactively working to create a flourishing regional cluster in life sciences ...the initiative seeks to exploit commercial and academic activity already underway. Driving this initiative is the fact that average earnings of Indiana health industry workers in pharmaceuticals and medical devices is near $70,000 with steady growth since the 1970s, and that average Indiana health industry worker earns 2.5 times the region’s average wage. Hoosiers are coming together to work in new buildings and research parks and they are building virtual networks that facilitate partnering across the state. Universities are partnering with other universities as well as with new and existing companies. Companies are finding that new partners and suppliers are being drawn to the state. Companies on the leading edge of technology are sharing their innovative techniques in global networks. Japan and other countries are increasingly reaching out to the state’s life sciences organizations. (Mueller, 2003)*

However, significant workforce gaps have been predicted for Indiana’s health industries (Miller & Associates for Indiana Health and Industries Forum, 2002). Some of the contributing factors for the gap are due to the projected high rate of growth in the industry and the insufficient supply of educated workers entering the field. This is especially true for technological skills of entering workers. As stated in a report prepared by Ernst & Young (2001):

*With their incredible potential to improve our quality of life, technological forces best represented by information technology (IT) and biotechnology are radically changing the way health care is delivered....Advances in information technology and biotechnol-

---

**Figure 1. Overview of the project**