Chapter 13
Career and Technical Education Technology:
Three Decades in Review and Technological Trends in the Future

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ABSTRACT

In the last three decades, the nature of technology incorporation into career and technical education (CTE) training has changed. Technology used in the field has been supplemented by technology used in training per se. Technology has increasingly infiltrated into today's social arena, workplace, and education. In response, the use of technology in CTE reflects both educational philosophy and societal context. Teaching about technology differs from teaching with technology; the former focuses on content, and the latter focuses on process. The nature of CTE, instruction as a whole, and technology in particular, have shaped how CTE faculty teach with technology over the past three decades. In this period, technology-enhanced CTE instruction has moved from top-down to broad-based, from one-directional to two- and multi-directional communication, from static to dynamic, from programmer-dependent to content-dependent, and from administrative- to learning-oriented. Representative practices and a model of CTE technology-enhanced instruction are discussed.

13.1 INTRODUCTION

By its nature, career and technical education (CTE) has incorporated technology from its inception. Apprenticeships illustrate the basic premise of seeing, doing under supervision, and performing independently. Only in the last century has CTE become more theoretical and less hands-on, due to scale as factories and other large companies have emerged, increasing sophistication of the career field's skill set, and advanced knowledge and growing theoretical underpinnings that impact problem-solving. Having one teacher train a room full of CTE students in basic processes, such as reading and producing blueprints, for instance, enables employers to provide targeted on-the-job training rather than starting from scratch.

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In the last three decades, instruction about specific technology tools has been complemented with instruction to support generic technology competency. The basic notion is that the entire workforce needs to be able to select and apply technology for specific tasks (U.S. Department of Labor, 1991).

As training has expanded in scale and format, the nature of technology incorporation into CTE training has also changed. Technology used in the field has been supplemented by technology used in training per se. For example, a PowerPoint might never be used in daily work, but CTE instructors might routinely incorporate such a presentation tool in preparation courses.

This chapter examines the trends in technology-enhanced CTE instruction in the late 20th century and early 21st century. As such, it notes the conditions for technology incorporation, and explains representative practices.

13.2 TECHNOLOGY TRENDS

In the last 30 years, the work force in general has come to routinely use technology. A brief history of significant technology advances offers an overview of technology's infiltration into today's workplace, education, and social arena (Shelly, Cashman, Gunter, & Gunter., 2007).

13.2.1 Technology Inventions

By the late 1970s, micro processor chips, desktop computers, and the Ethernet had been invented. In 1979 the spreadsheet program VisiCalc was introduced; its acceptance by business heralded the start of personal computers on a large scale. In the same year, the first public information service, CompuServe and the Source, enabled people to connect with each other via remote servers and agreed upon protocols.

In 1980 two inventions made the personal computer more useable by the general public: the MS-DOS operating system developed for IBM's forthcoming personal computer, and the Winchester hard drive for storage. Building on IBM's computer reputation in the business world, its 1981 introduction of their desktop computer led to immediate acceptance by corporations; within a year the number of computers sold doubled.

In 1982 the introduction of the Hayes 300 bps modem signaled the ability for individuals to telecommunicate, sharing digital documents efficiently. It was no surprise that Time magazine named the computer as Machine of the Year, displacing any influential people.

Lotus 1-2-3 constituted the first "suite" of productivity program applications (spreadsheet, database, and graphics), which became a best-seller for IBM personal computers (PC) in 1983. Hewlett-Packard's LaserJet printer, introduced the following year, enabled users to produce professional looking documents. Not to be outdone by IBM, Apple released the Macintosh in the same year, which had the significance of using an intuitive graphical user interface. This approach to computing was readily accepted by graphics and multimedia industries.

By 1987 the Intel 80386 microprocessor enabled personal computers to perform as well as large computer systems. Perl, a general high-level dynamic programming language, was invented to facilitate report processing.

The next significant step occurred in 1989 when Tim Berners-Lee created an Internet-based hypermedia information sharing innovation called the World Wide Web (WWW). It leveraged graphical interfaces so that users did not have to type sequential instructions in order to transfer information. Three years later, Microsoft's Windows 3.1 operating system joined the graphical interface bandwagon. In 1993, Marc Andreessen's graphic Web browser Mosaic, which led to Netscape's Navigator WWW browser in 1994, completed the graphical computer "picture."

Sun Microsystem launched the object-oriented programming language Java in 1995. This break-