Chapter VI


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Abstract

At the beginning of the 21st century, technology implementation and its effect on student achievement is a topic of much interest and debate. Science education in particular has been criticized for not utilizing the skills of a “techno-savvy” generation and for not effectively integrating technology into the K-12 science classroom. This chapter discusses ScienceMaps, an ongoing research and development effort consisting of an online resource portal for standards-based science instruction using GIS technology. ScienceMaps is unique in that it concentrates on using GIS to teach, not on teaching GIS. Using an Internet-based GIS, ScienceMaps provides access to GIS technology and data to anyone, anywhere, with access to an Internet browser. Assessment, evaluation, and future development directions for ScienceMaps are also discussed.

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Introduction

The issue of the effect of technology on student achievement has recently been the subject of much research and debate (J. Hilton, 2003; Hilton, 2005, 2006). Furthermore, as schools are being held more accountable for meeting state and national standards through their performance on standardized tests, the focus on improving student achievement through the use of technology is becoming an even greater issue. As school funding becomes more closely linked to performance on standardized tests, improving student achievement through innovative means, such as technology integration and use, is critical (Hilton, 2006). ScienceMaps is an online resource portal that provides standards-based instructional materials, designed and integrated for use with an Internet-based geographic information system (GIS), that allows for their immediate integration into science lessons. GIS technology is a powerful analytical tool that can help students visualize spatial relationships and supports the spatial analysis of data.

The goals of the ScienceMaps research and development effort are twofold: to support the ongoing development and field-testing of this innovative Internet-based courseware and to promote the integration of technology into the science curriculum so as to develop the problem-solving and critical-thinking skills of students while simultaneously addressing the diverse learning styles of learners.

Background

Archer (1998) believes that computers can raise student achievement and even improve a school’s climate. Eliot Levinson (2000) agrees but adds that many factors, such as staff development, infrastructure, and effective instructional materials, influence the effectiveness of technology. Simply put, if schools are to realize benefits from education technology, teachers and students must have adequate and equitable access to hardware and network connections; states and districts must give schools the capacity to use technology well by devising a thoughtful technology plan and offering adequate teacher training and technical support; teachers and students must use technology in effective ways (Jerald, 1998). Thus, not only must teachers be adequately trained in the technology, but they must also understand how to use the technology appropriately in support of students and the curriculum (Hanson & Carlson, 2005). This effective use of technology can only help to “re-excite” students about science. According to Drew (1996), “the number of students who find science interesting seems to shrink as they progress through the school system. Good teaching involves knowing what methods are effective” (p. 6).

Even though GIS is now available to K-12 education, modest budgets for technology and staff development, and limited emphasis on students developing spatial
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