

Explaining GIS Implementation and Effectiveness In American Secondary Schools.

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Despite its potential as catalyst in education reform, geographic information systems (GIS) and automated cartographic software have been adopted only by an estimated 1% of secondary schools across the United States. The reasons behind the current interest in GIS, its slow implementation, its effectiveness, and its extent in the curriculum are unclear. In order to uncover these reasons, a mailed survey of 1,500 American high school teachers who have adopted GIS into their curricula was conducted. This paper describes and analyzes the results of this survey. It reports on the geographic and curricular extent to which GIS is being implemented in secondary education, explains why and how GIS is being implemented, and assesses the effectiveness of GIS-based lesson modules on teaching and learning geographic content and skills.

Most accounts of secondary students and teachers using geographic information systems (GIS) to teach content areas such as geography or science are case studies. These provide a wealth of qualitative data, showing the diversity of teaching styles, projects, and disciplines in which GIS can be used. However, administrators and other policymakers often need empirical data that assesses the difference that GIS makes in terms of learning standards-based content and skills. This presentation examines these empirical data resulting from a series of 86 experiments that were conducted in three different high schools involving over 250 students. The experiments were conducted by creating a series of lessons on physical and cultural geography. Two versions of each lesson were created – a GIS version, and a version that used traditional printed materials such as atlases and textbooks. Students in the experimental groups were given the GIS versions, while students in the control groups used the printed materials. The effectiveness of GIS was assessed by comparing the resulting student project work, standardized pretests and posttests, and a spatial analysis test. Results were compared within and between schools and between gender. Despite mixed results, these experiments provide some of the first empirical data that assesses the effectiveness of GIS in secondary education in the United States.

Technological barriers to the adoption of GIS, such as limited hardware and software, may be less important than social and structural barriers. Social and structural barriers include time required

to develop GIS-based lesson modules, inadequate student access to computers, short class time periods, and administrative pressure to teach a greater amount of content rather than in-depth content. This analysis includes the sources that motivate and train teachers to use the technology, the patterns of diffusion of the technology, and the disciplines in which GIS is being implemented.