

Emily McCallen
Integrating Geospatial Technology in the Classroom

12/03/2013

Geospatial technologies, those used for gathering, storing, processing, and delivering spatially referenced information, are growing in global importance. The geospatial industry generated \$73 billion in the United States in 2012 and is estimated to be growing 25-30% each year (U.S. Congress 2013). Geospatial tools also play an increasingly important role in science. They have been particularly embraced by the field of ecology, which has utilized emerging geospatial technologies to examine landscape level ecological patterns.

Despite their growing influence in science and everyday life, many students are never introduced to geospatial technologies during their K-12 education. Geospatial technologies may be particularly useful for developing applied geography skills, which are lacking in U.S. secondary students. Despite geography's standing as a core academic subject, only 20% of 12th graders tested at a proficient level of understanding (U.S. Department of Education 2010). This educational gap has even been recognized by legislators and addressed in the "Teaching Geography is Fundamental Act" which is currently in congressional committee. This project will involve working with Indiana high school teachers to help fill this educational gap and implement geospatial technologies within high school science classrooms across Indiana.

The first phase of the project will be to develop a two-week curriculum for Indiana high school science classes emphasizing the use of geospatial technologies in a scientific context. The lesson plans will focus on helping students design studies utilizing geospatial technologies to explore pressing ecological issues. The curriculum will be developed with teachers from South Mount High School in Crawfordsville, Indiana to ensure that it meets the needs of Indiana's high school teachers. It will be developed to be implemented within either a world geography or

biology classroom and will aim to meet at least three of Indiana's core standards for both classes. The program will be pilot tested at South Mount High School and tweaked as necessary before being made available in either digital PDF format or print format to Indiana's teachers.

The second phase of the project will be to develop a one-day workshop to familiarize Indiana high school teachers with the geospatial technologies used within the context of the developed curriculum. The workshop will walk teachers through the tasks that their students will be performing and allow them to troubleshoot any problems they can foresee arising. The workshop will be held annually as long as there is interest in the program. Since the workshop will be highly technical it will be capped at 10 participants. The workshop phase of the project is important, because professional development training has been shown to increase the use of geospatial technologies in science classrooms. A survey of teachers who had taken a geographic information systems (GIS) training workshop found that 63% implemented its use within their classroom (Baker et al. 2009) and when teachers were asked about implementing GIS in their classrooms 86% agreed or strongly agreed that teacher training is necessary (Audet and Paris 1997). Teachers that did implement GIS in their classrooms were likely to directly incorporate training material into their lessons (Baker et al .2009) so it makes sense to directly focus on the developed curriculum during the workshop

The goals of the project include instilling understanding of the importance and applicability of geospatial technologies to ecological fields of study in Indiana's high school teachers and students, encouraging Indiana's high school students to pursue further knowledge of geospatial technologies through extracurricular activities or continued education, and promoting proficient and advanced geography skills in Indiana's high school students. The first two goals will be assessed using surveys. Students in the pilot program will be given pre and post-

curriculum surveys to evaluate the effect of the lesson plans. Teachers will be asked to complete surveys after the workshop and will be encouraged to also give their students pre and post-curriculum surveys. The final goal can only be addressed by specifically looking National Assessment of Education Progress Geography test scores in areas where the curriculum was implemented and comparing them to areas where the curriculum was not implemented.

Literature Cited

R.H. Audet and J. Paris, GIS implementation model for schools: assessing the critical concerns, *Journal of Geography* 96 (1997) 293 – 300.

T.R. Baker, A. M. Palmer, and J. J. Kerski, A national survey to examine teacher professional development and implementation of desktop GIS, *Journal of Geography* 108 (2009) 174 – 185.

U.S. Congress, Teaching Geography is Fundamental Act of 2013, H.R. Bill 822, 113th Cong (2013).

U.S. Department of Education, National Center for Education Statistics, The nation's report card: geography 2010 (2010).