Impact of Professional Development in Natural Resource Investigations Using Geospatial Technologies

As use of geospatial technologies has increased in the workplace, so has interest in using these technologies in the K-12 classroom. Prior research has identified several reasons for using geospatial technologies in the classroom, such as developing spatial thinking, supporting local investigations, analyzing changes in the environment, and getting students interested in technology and geography. Many educators agree that GIS can be a useful tool for student learning; however, if GIS is going to be successfully integrated into the classroom, many issues should be addressed, including those related to professional development.

The Innovative Technology Experiences for Students and Teachers (ITEST) program at the University of Kentucky (UK) has the professional development objectives of (1) increasing knowledge of geospatial technologies, including GIS, GPS, and remote sensing; (2) developing spatial thinking; and (3) applying that knowledge to community-based natural resource investigations. In a recent issue of *Natural Sciences Education* (formerly *Journal of Natural Resources and Life Sciences Education*), a UK team hypothesized that the components of this program would be an effective way to increase teachers’ knowledge of new technologies and spatial thinking and to instruct teachers how to apply that knowledge to community-based investigations. Questions the team sought to answer included the following:

- In what ways does the professional development help teachers improve their understanding of geospatial technologies and their ability to integrate geospatial technologies into their curriculum and instruction?
- Which components of the professional development were the most effective? Which needed improvement?
- Do teachers feel the instructional model is effective? Do teachers plan to continue its use?

The answers to these questions helped the team refine the professional development program and the community-based investigation model and implement both across Kentucky.

from the summer of 2008 through the fall of 2011. The group developed the professional development to help answer the class’s essential question. For example, questions for water investigations included “How does development in our community impact our water?” or “What are the sources of water pollution in our community?” Then, each teacher constructed an instructional plan to help answer the class’s essential question. The plan included all activities, field trips, UK instructors, and guest speakers’ visits.

The group worked with middle and high school teachers from across central and eastern Kentucky. Implementation began in the summer of 2008, and 54 teachers from 20 schools attended the 2009 professional development session on UK’s campus. Teachers from 18 schools representing 14 counties attended the 2010 professional development session. Many challenges were encountered as the program was implemented, including the complexity of the course, limited amount of technical and administrative support at participating schools, inadequate computer hardware, short classroom periods, and teachers working together.

The data collected support the hypothesis that the components of the professional development, when used together, were an effective way to increase teachers’ knowledge of new technologies and spatial thinking and instruct teachers how to apply that knowledge to community-based natural resource investigations.

The professional development sessions helped teachers improve their understanding of GIS topics, GPS for investigations and how to engage students in using technology for community-based natural resource investigations. Questions that were the most effective included:

- Which components of the professional development were the most effective? Which needed improvement?
- Do teachers feel the instructional model is effective? Do teachers plan to continue its use?