

GeoPriSM: Geospatial Projects in Science and Math

“Using geospatial technology, students can learn science in new ways. Some concepts come to life and make intuitive sense in ways that cannot be accomplished with a static representation such as a map or image. Manipulating real data, students build skill in data analysis, problem solving, and spatial thinking. Using the same data and analysis tools used by professionals, students can address real-world problems and make management decisions. They explore data in new ways and discover relationships, for example, between environmental factors and the distribution of a species.” (MaKinster, 2014)

The goal of the GeoPriSM project is to expand the depth and breadth of the implementation of geospatial technologies within K-12 schools both public and private, across the state of New Hampshire and therefore increase student achievement in science and math. A community of educators beginning to use geospatial technologies is already under development within the state. This project seeks to provide both those teachers and additional new recruits with intensive professional development aligned with the newly defined TPACK (Technological, Pedagogical, and Content Knowledge) Framework for using geospatial technologies to teach science. Teachers participating in the program will gain knowledge and skills in using geospatial technology, inquiry, and problem-based learning to enhance student engagement and achievement. Our goal is to include teachers at all grade levels (K-12), across all subject areas, and from all regions of the state.

It is our belief that mathematics and science achievement can be increased by the application of geospatial technologies across the curriculum, following the models of the writing across the curriculum and literacy movements. Geospatial technologies facilitate inquiry and problem-based learning, two strategies which have been shown to effectively increase student achievement in math and the sciences. The project partners will offer a wide variety of intensive summer institutes, as well as, academic year face-to-face and online workshops to teach geospatial technologies and their application in K-12 classrooms. In this way, the program will not only develop a cohort of geospatial technology using educators, but also provide individualization to help each teacher meet their content and skill needs. Participating teachers will also receive support as they implement their new skills with their students to produce Community Atlas projects. Community Atlas projects challenge students to describe their community using maps, images, and text. The “community” can be whatever the project designers decide, and the focus can range from a general description to the identification and solution of a specific community problem. The Community Atlas project will provide a focus for the implementation of the geospatial technology skills, as well as, ensure the participants move beyond basic use of the technology to inquiry and problem-based learning. No matter the content area focus of the Community Atlas project, participants will build skills in inquiry, mathematics, and other science processes.

The lead partner for this proposal will be Hopkinton School District, which has teachers who have been utilizing geospatial technologies and implementing Community Atlas projects since 1998. In recent years it has also served as the host facility for most of the K-12 geospatial technology professional development offerings within the state. Additional partners include Hillsboro-Deering School District (Title 1 Priority School), Pembroke Academy (Title 1 Focus School), Bow School District (which has implemented geospatial technologies in math courses and consistently scores well above the state average in NECAP testing), Stratford Public Schools (a north country school that has begun implementing geospatial technology), Longview School (a private alternative school that was an early adopter of geospatial technologies), Keene State College and the NH Geographic Alliance, UNH Cooperative Extension Geospatial Technologies Training Center, NH Fish and Game Aquatic Resource Education Program (which has implemented geospatial technologies across all its student projects), US Forest Service Northeastern Area State and Private Forestry, and NHEdGIS (the group administering the statewide license of Esri’s ArcGIS software on behalf of the NH Department of Education).

The GeoPriSM project intends to provide approximately 50 teachers with an intensive professional development experience of 80 hours as well as introduce geospatial technologies to many others in the first year of the project. In the following years, we will introduce new participants to the technology and encourage previous year’s participants to continue with the project, to provide assistance to new participants, and to expand their own skills. Participating teachers will be assessed before beginning the program and at the end of each academic year using a Geospatial TPACK assessment instrument modeled on one under development by MaKinster et al. Students of participating teachers will also complete content and skill assessments at the beginning and end of each academic year.