Authentic Geoscience Research Experiences Using GPS-GIS Skills to Excite Alaska's Middle and High School Students about Earth Science

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ABSTRACT

Between August 2006 and 2007, over 50 pre-college students from across Alaska have participated in a 5-day, two-credit, introductory college-level, Earth Systems Science and GIS course as part of a year of enrichment activities through the NSF-funded Experiential Discoveries in Geoscience Education (EDGE project, http://www.uas.alaska.edu/envs/edge). These middle and high school students spent their week on the University Alaska southeast campus in Juneau, learning how to conduct watershed scale field activities in the Mendenhall Glacier system. Students divided their time between field excursions focused on with data collection and indoor GIS labs and classroom activities that utilized and put the data into a larger context. The students were introduced to earth surface processes related to glaciology, hydrology, and geomorphology and were introduced to the fundamentals of ArcGIS.
They observed first-hand, the ongoing effects of warming climate as they participated in EDGE field excursions where they learned about glacial geomorphology from river rafts, collected glacier stream discharge and other hydrologic data in local streams, and hiked through recessional moraines to track glacier ice loss over the last century. Subsequently, in the computer lab, EDGE students downloaded their GPS waypoints onto modern and historic maps, analyzed their stream flow data and created GIS based dynamic maps. During Fall 2006 and 2007 semesters, the students generated GIS earth science projects in their villages and towns as part of their coursework. After data analysis they created large-format posters and returned a March EDGE Symposium back in Juneau to present their work to peers, University students and faculty, and practicing scientist who volunteer their time as judges. Student research topics included permafrost loss and village relocation, invasive plant species incursions, ocean acidification, landscape change and glacier recession, the impact of tourist on bear behavior, and many other interesting topics. EDGE high school students go on to compete in the Southeast Alaska Regional Science Fair where they can qualify to go on to the INTEL international science fair. Use of their own georeferenced data gives the EDGE students and their EDGE-trained teacher mentors an important sense of ownership and enthusiasm about their projects.

EDGE Students
AUGUST
6 day workshop

EDGE Student Projects
SEPTEMBER-
DECEMBER
EDGE Teachers
Online Course

A Year of EDGE

EDGE Teacher/Mentor
JUNE
10 Day workshop

EDGE Symposium
MARCH
EDGE student Participants
EDGE teacher join Judges
Southeast Alaska Regional
HS Science Fair

MAY
SEAK
Winners