

Faculty Use of Geospatial Tools for Deep Learning in Science and Engineering Courses

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Abstract : Advances in science, technology, engineering, and mathematics (STEM) are viewed as important to countries' national economies and their capacities to be competitive in the global economy. However, many countries experience low numbers of students entering these disciplines. To strengthen the professional STEM pipelines, it is important that students are retained in these disciplines at universities. Scholars agree that to retain students in universities' STEM degrees, it is necessary that STEM course content shows the relevance of these academic fields to their daily lives. By increasing students' understanding on the importance of these degrees and careers, students' motivation to remain in these academic programs can also increase. An effective way to make STEM content relevant to students' lives is the use of geospatial technologies and geovisualization in the classroom. The Geospatial Revolution, and the science and technology associated with it, has provided scientists and engineers with an incredible amount of data about Earth and Earth systems. This data can be used in the classroom to support instruction and make content relevant to all students. The purpose of this study was to find out the prevalence use of geospatial technologies and geovisualization as teaching practices in a USA university. The Teaching Practices Inventory survey, which is a modified version of the Carl Wieman Science Education Initiative Teaching Practices Inventory, was selected for the study. Faculty in the STEM disciplines that participated in a summer learning institute at a 4-year university in the USA constituted the population selected for the study. One of the summer learning institute's main purpose was to have an impact on the teaching of STEM courses, particularly the teaching of gateway courses taken by many STEM majors. The sample population for the study is 97.5 of the total number of summer learning institute participants. Basic descriptive statistics through the Statistical Package for the Social Sciences (SPSS) were performed to find out: 1) The percentage of faculty using geospatial technologies and geovisualization; 2) Did the faculty associated department impact their use of geospatial tools?; and 3) Did the number of years in a teaching capacity impact their use of geospatial tools? Findings indicate that only 10 percent of respondents had used geospatial technologies, and 18 percent had used geospatial visualization. In addition, the use of geovisualization among faculty of different disciplines was broader than the use of geospatial technologies. The use of geospatial technologies concentrated in the engineering departments. Data seems to indicate the lack of incorporation of geospatial tools in STEM education. The use of geospatial tools is an effective way to engage students in deep STEM learning. Future research should look at the effect on student learning and retention in science and engineering programs when geospatial tools are used.

Keywords : engineering education, geospatial technology, geovisualization, STEM

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