Using a Project to Teach an Advanced GIS Course

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Abstract

This paper will discus using an actual project in teaching GEOG 475. GEOG 475 is an advanced GIS course in the University of Idaho's GIS Certificate Program. All aspects of GIS are used in teaching through a project. Students will get experience in project planning, data preparation, analysis and presentation. A small class of 10 students will work on a single project for the semester. The students will gain experience in teamwork as well as covering all aspects of a GIS project. This paper will review the positive and negative aspects from this type of advanced GIS training.

Paper

As an Adjunct Professor for the Geography Department at the University of Idaho I have taught their GIS Certificate Courses for 3 years. This past semester I taught the advanced GIS course (GEOG 475) using HAZUS flood as a collaborative class project. HAZUS is an ArcGIS extension that the class used to model the flood hazard in the 10 counties of North Idaho and the populated counties in Southern Idaho. I used this class

project as a way to improve the implementation of a student project in the advanced course.

The University of Idaho is in Moscow, Idaho. In Coeur d'Alene, Idaho a University of Idaho outreach campus exists with a nearby Research Park in neighboring Post Falls, Idaho. The GIS Certificate Program is offered in the Geography Department on the main campus as well as at the Coeur d'Alene campus. The Coeur d'Alene courses are typically taught in a computer-facilitated classroom at the University of Idaho Research Park in Post Falls.

The GIS Certificate Program rewards a University of Idaho Certificate of Completion after successfully completing five 3-credit courses in GIS. The GIS Certificate Program has three courses in GIS technology and geographic theory with several courses in areas of applied GIS and fields related to GIS. The three GIS technical and theory courses have GEOG 385 as an introductory course that covers an introduction and overview of ArcGIS technology and basic geographic principles. After the introduction, the intermediate course, GEOG 470, focuses on the principles of visual communication, cartography and new forms of map communication including web maps, time series animation, and multimedia presentation of spatial information. The third course, GEOG 475, is the course I will focus on in this paper. This is the advanced GIS course covering a review of the geoprocessing tools and raster analysis, data models of tins, regions, networks and advanced geodatabase concepts, GIS-based modeling and the model builder. A large part of GEOG 475 is a student project that uses raw data in a GIS analysis. This project is intended to give the students a real world GIS project that goes beyond the canned exercises used in the introductory class. After the student completes the three GIS courses, two additional courses can be selected from the following: Scripting in ArcGIS, Programming ArcObjects, Remote Sensing with GIS, Hydrology Modeling and Decision Support Analysis.

The typical student of the GIS Certificate Program in Coeur d'Alene is post college age and works full time. The courses are taught in the evenings to accommodate

the typical student. Often the students are either employed as GIS technicians or are looking into an entry-level GIS position. We have students that come from several disciplines. Students of the Certificate Program are employed in local government, forestry, electric utilities, mining, engineering, drafting, surveying, public health and school administration. A few students are full time students at the University of Idaho and some are full time students at North Idaho Community College in Coeur d'Alene. This past spring semester I had eleven students who all were employed full time.

I have taught GEOG 475 four times including this last semester. Previous to this past semester I spent the semester covering advanced topics in GIS and gave weekly assignments that went along with the weekly topic. The students were also assigned a semester project at the beginning of the semester and were required to present a paper on their project at the end of the semester. The difficulty of this method of teaching GEOG 475 was that too little importance was given to the student project resulting in poor performance on the final projects. Some students did a great project and even put in much more work than required but too many students were not getting the value of the semester-long project. Causes of this problem included too little time given in helping students with their project due to the regular curriculum load and the reluctance of most students to ask for help in a timely matter. Other causes included higher priority given to the weekly assignments than to the long-term project even though periodic reminders and project deadlines were given throughout the semester.

I restructured the class in several ways to put more emphasis on the student project. First I lessened the curriculum coverage and assignments given in the course. I also assigned one large project for the students to work on for their semester project. In this course the project was to implement a HAZUS flood model with a custom scenario of flood due to a dam breach and a flood due to a rapid snow melt from a rain event. Each student worked on this project for a specific county in North Idaho.

The first six weeks of the course I lectured and gave lab exercises on the review topics of geoprocessing, vector data models, query tools, raster analysis and advanced

topics of region and network data models, projections, and advanced topics of the geodatabase, topology and the geostatistical analyst. The first six weeks ended with a midterm exam and the second six weeks started with organizing a GIS project.

The class project made use of HAZUS-MH which is a FEMA developed extension for ArcGIS that models flood, earthquake and wind events. Two weeks were used to introduce and run canned exercises in HAZUS for flood. Then students spent two weeks calculating a flood hazard for their separate areas of Idaho. Collaboratively, all of the 10-county area of North Idaho and a couple of highly populated areas in Southern Idaho were analyzed for flooding. The last two weeks students did a couple of custom flood scenarios. One was a flood initiated by dam failure and the second was a flood caused by a large amount of snowmelt in a short time due to rain.

The collaborative class project was a more successful way of incorporating a project in a GIS class. All of the students did well in working on the project, being successful in completing the project and presenting the results of their project. The students kept on track with the project because it was the focus of the class for the second half. Some of the hurdles in the project were: reversion to ArcGIS 9.0 for HAZUS and a learning curve for HAZUS-MH and its idiosyncrasies.

The students were at times frustrated with the project but most appreciated the project and all they learned with it. The scenarios were useful in giving the students a chance to use what they learned in ArcGIS and in HAZUS to produce a logical analysis. The most common complaint was that the resulting flood was not as catastrophic as they would have liked to show for all their work. Several students are interested in working further with HAZUS flood modeling.