INTRODUCTION

Colorado 14ers, Pixel by Pixel is a stand-alone, computer-based exercise that concludes Digital Earth, an undergraduate University of Colorado at Colorado Springs (UCCS) Geography and Environmental Studies (GES) geospatial tools course. Digital Earth introduces geographic information systems (GIS), global positioning systems (GPS), geovisualization, remote sensing, geomorphometry, virtual globes, and web design. The course seeks to prepare students for the digital worlds they will encounter in upper-level geography courses and exposes students, in exciting and interactive ways, to the breadth and depth of geography. The course, which is required for all GES majors, focuses on eight computer-based exercises (labs). As examples, in one lab, students use the virtual globe ‘SkylineGlobe’ to compare and contrast fashion by ‘surfing’ crosswalk cameras in large cities across the globe. In another lab, students manipulate 3D models in a GIS to investigate controls of geology on settlement patterns in and around Durango, Colorado. Asking students to solve imaginative problems using interactive and exploratory approaches inspires interest in geospatial tools and their practical applica-

DOI: 10.4018/jagr.2011040102
tions. Digital Earth has been well received by students at UCCS as measured by higher than expected enrollment numbers and strong course evaluations.

\textit{Colorado 14ers, pixel by pixel} is the capstone exercise of Digital Earth and as such represents a summary of many of the concepts and tools encountered during the semester. Set in a virtual mountainous Colorado landscape, the exercise requires students to explore issues related to physical geography, map scale, spatial resolution, and digital measurement. The exercise asks students to demonstrate through various mappings how it is possible that one peak in a group of three 14,000 foot + peaks does not qualify as a \textit{true} 14er. A ‘14er’ is one of 54 iconic peaks in Colorado (e.g., Pikes Peak, Longs Peak, Mount of the Holy Cross) that reaches or exceeds an altitude of 14,000 feet (Blake, 2002).

\section*{PURPOSE STATEMENT}

The intent of the exercise is to focus student interest on an interesting geographic problem that requires a suite of geospatial tools to solve. To address this intent and the specific learning expectations of the exercise (described in the ‘Learning Objectives’ section below), five general purposes were developed:

\textit{Minimize intimidation:} Students of geography should learn to apply powerful and complex tools for geospatial analysis in non-intimidating and exciting ways. Negative or frustrating first encounters with geospatial tools such as ArcMap GIS can intimidate and dissuade students. Similarly, the datasets explored are often difficult to view, edit, and manage in these software environments. Avoiding intimidation is addressed in the exercise by providing students with data and a step-by-step, cookbook style set of instructions, many with screen-shot examples.

\textit{Talk the talk:} \textit{Colorado 14ers, Pixel by Pixel} is a capstone exercise for a course that serves as a prerequisite for all upper-level geospatial tools courses including GIS, remote sensing, image processing, and internet GIS. A student familiar with geospatial terminology (e.g., raster, vector, interpolation, DEM, TIGER) who possesses some general computer skills (e.g., copying folders, transferring files to a web server) and is armed with a diverse geospatial toolkit (e.g., GIS, geovisualization, geomorphometry) is positioned to enter upper-level courses with heightened confidence.

\textit{Scale is king:} With most geographers relying at some point on GIS, remote sensing, digital cartography, digital measurements, and raster and/or vector data analysis, it is important at early stages in a student’s academic trajectory to recognize that all-things-digital are influenced by scale.

\textit{Human impacts:} Geologic and atmospheric hazards, sustainability, climate change, and political stability are topics currently being addressed by geographers. To elucidate the connectedness between humans and environment in these contexts, students should interact with geographic data face-to-face to visualize tangible examples (forms) of natural and anthropogenic processes.

\textit{What geographers do:} Geographic investigations should be delivered to students using local, applied, and interesting case studies. This approach helps students recognize what geography is and what geographers do.

\section*{LEARNING OBJECTIVES}

The learning objectives of the exercise dictate that students gain experience using multiple geospatial tools, different data models, and different file types delivered at different resolutions. Concurrent with tool and scale-related objectives, the exercise seeks to introduce students to the depth and breadth of the discipline of geography and seeks to inspire students to
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