EDUCATIONAL PARTNERSHIP EVENT REPORT AND RECOMMENDATIONS

Presentation and Workshop, Denver Area Physics Teachers, University of Denver

Location: Denver, CO

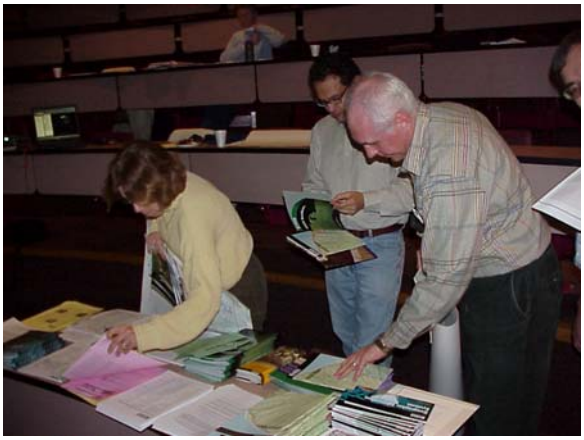
Dates: 8 February 2005

Attendee's Name and Report Author:
Joseph Kerski, Geographer: Education/GIS, USGS, Denver, Colorado.

Summary

Upon the request of University of Denver Physics Professor Steve Iona, I gave a presentation on the application of spatial thinking and GIS technology and methods to secondary school physics teachers.

Joseph Kerski at the University of Denver before the presentation. I have known Steve Iona for years from work with the Colorado K-12 education community and I appreciated the invitation to work with these excellent teachers. After demonstrating what GIS is and discussing its use in education, I focused on Physics applications, including force and motion from earthquakes, volcanoes, and tsunamis, examining satellite imagery as electromagnetic energy bands, the science behind Global Positioning Systems, investigating USGS gravity and aeromagnetic data spatially, the Coriolis effect in examining cyclones, and more. I thank Roger Palmer and others in the Educational GIS community for providing me with ideas on how to apply GIS to the Physics curriculum.



I brought several items that I thought would appeal to the teachers—lessons that I and others have written, information about teaching with GIS, maps, and booklets about physics, geography, and other sciences.

Steve Iona, Professor of Physics at the University of Denver, who convenes this ongoing meeting of educators, and who invited me to speak to them. Steve is

committed to the use of innovative teaching methods in education and I commend his leadership.

Some of the presentation attendees. I knew several of the educators because they had attended previous geography, GIS, and GPS workshops that I have given in the past.

After my presentation, Dr Courtney Willis from the University of Northern Colorado gave an excellent workshop in measuring the circumference, diameter, radius, volume, and mass of the Earth with a distance wheel and a GPS receiver. I had been intrigued with the idea since inspired by Ann Johnson of the ESRI education team, and Dr Willis showed additional ways in which students can use mathematics, science, and technology to understand previously inexplicable concepts and measurements. His emphasis was that instead of just reading the large numbers (of mass, volume, etc.) and wondering how the figures are derived, the students are deriving them on their own in a hands-on way. Dr Willis began with the calculations of the Earth's circumference that Greek librarian Eratosthenes did 2000 years ago.

Wheel that is rolled along the ground to calculate distance, in this case, each turn of the wheel is 5 feet on the ground. This is the first step in calculating the circumference of the Earth. The second is to measure with GPS how many arc seconds are traversed in a given ground distance.

Recommendations

1) The first decade of the 21st Century is an exciting yet challenging time for education in all disciplines. Never before in the history of the world has focused education been such a critical need for our society and for all people around the world. Students are receiving daily information in volumes unheard of in times past. We face complex problems of human health, natural hazards, security, biodiversity loss, urban growth, and others. Society needs people who can make critical decisions, and these people are shaped in our educational institutions. I

encourage all scientists to become involved with educational initiatives—to communicate what you do to educators, help them to use your research, and aid those who develop curriculum around your research.

2) As one of the nation's largest scientific organizations, the USGS can and has provided great input to publications, data sets, software, and other items related to science education. The value added in our involvement with the education focus area of communications is that we work with educators to demonstrate *how* our products can be used in conjunction with national science, geography, and technology standards.

It is not enough to tell educators which products are available. When we get involved with teachers—getting their input and working with them—we can better understand how to meet their needs. Workshops such as the Denver Physics workshop demonstrate exactly that.

3) As I hope I have made clear in this report, there are numerous excellent applications of GIS in Physics education, and with the bridging of remote sensing tools in GIS, these applications are growing. One recommendation to GIS software developers that I would make is to develop more tools and animations within GIS that allow Physics teachers to show force and motion. The static nature of most GIS maps and data is a hindrance to its use in the Physics curriculum.

End of Physics Teachers Report