

Educational Outreach Event Report

Name: National GIS Institute for Educators

Participant and Author of Report:
Joseph Kerski, Geographer, USGS

Dates: 24-28 June 2002

Location:
Boulder, Colorado

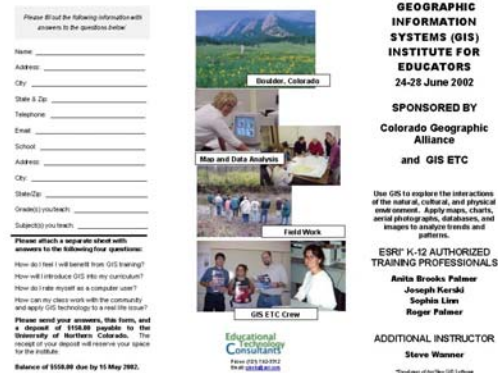
Executive Summary:

The USGS, the Colorado Geographic Alliance, and GIS ETC co-sponsored five days of intensive GIS training for 28 educators and 4 students representing 15 different states and 3 countries, from Grade 5 to university level. The countries included Canada, New Zealand, and the USA. For the first time in a national GIS institute for educators, high school students were brought in and worked side-by-side with the teachers. This proved extremely successful. The institute included hands-on work with spatial analysis using ArcView GIS software by ESRI, as well as a field component in chemistry, physical geography, and cultural geography using water quality measuring equipment and GPS receivers. GIS proved again to be an excellent tool to integrate curricular areas and educational levels while providing inquiry-based, problem-based learning while exploring real-world data with an exploratory tool.

Acknowledgements

I cannot thank my co-instructors enough for their excellence in preparing and conducting this institute: Anita Palmer, Roger Palmer, Sophia Linn, and Steve Wanner. Each is passionate about what they do and committed to quality education, and I very much enjoyed teaching with them. I thank Sophia Linn

and the Colorado Geographic Alliance for 10 scholarships for Colorado teachers to attend the institute. I also appreciated the assistance of Naomi Salaman and David Young from Boulder High School, and Connie Anderson, USGS intern. I thank Anne Olsen from New Zealand for participating in the daily planning and assessment. I also appreciated the efforts of VISIT project investigators, and in particular Dr Yichun Xie, for two scholarships and for attending the institute. As always, I also appreciated the resources and assistance from Esther Worker, ESRI. I thank the participants for sharing a week of their summer with us. It was a privilege working with educators from such a variety of geographic areas, curricular areas, grade levels, and backgrounds.



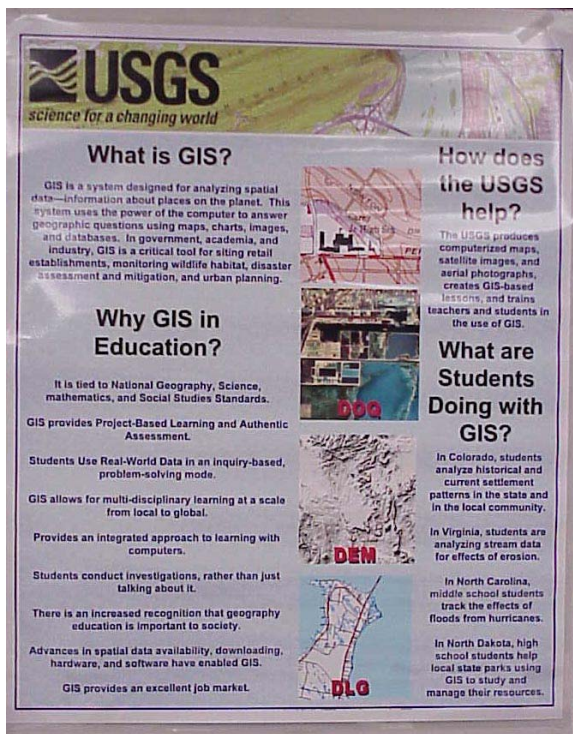
One of the flyers we used to advertise the workshop.



Institute participants in front of training site, Boulder High School.

The co-instructors and I have been planning this event for one year. We took care of the logistics, recruiting and marketing, data, lessons, resources, agenda, finances, and all other aspects required for a successful institute of this size. It was a distinct pleasure working as a team over the past year on this project. It was also a pleasure to host Anne Olsen from New Zealand in my home at the beginning and the end of the institute. I have already followed up with the participants in a supportive role, and in future institutes, particularly since GIS requires a long-term commitment and set of contacts.

information, tips, and other resources for each participant. We also created a custom CD-ROM for each participant, containing information sheets, utilities (such as Waypoint to download Garmin GPS points into a PC), spatial data, images, and lessons.



One of the GIS In education posters that I created for the institute.



One of the two computer labs at the school that we used for the institute. In one room was the "thorough investigations" group, and in another was the "special topics" group. Participants switched back and forth between the two rooms during the week. Each day, we held at least one activity with both groups combined.



Three of the instructors--Roger Palmer, Anita Palmer, Joseph Kerski

The resources were some of the best we have ever assembled for any institute in terms of quantity and quality of materials, including books, maps, software, data, posters, teachers packets, lessons, information sheets, and other resources. Each participant gathered a whole box of materials. We created a notebook containing lessons,

The workshop content included lessons on loading GPS coordinates in GIS, downloading and using USGS digital elevation models, neighborhood demographics, historical floodplains, biodiversity, political geography, climate,

world population, earthquakes, hurricanes, fire tower siting, watersheds, biomes, the Titanic, and more.



Joseph Kerski works with teachers in the institute in the library adjacent to one of the computer labs.



Teachers working through Anita's "What is the Missing Theme?" lesson.



At the end of each day, we gave a survey to the participants. The instructors reviewed the survey each evening and adjusted the next day's schedule of activities accordingly.

VISIT Project

VISIT stands for the Virtual Immersion in Science Inquiry for Teachers. VISIT is an Online Collaboratory for secondary school science teachers to participate in ongoing scientific investigations of contemporary problems in their localities through applying spatial analysis technologies. GIS is a major component of VISIT. VISIT is a three-year project supported by a grant from the National Science Foundation Teacher Enhancement program. See <http://www.emich.edu/visit/> for more information.

Since 1999, it has been a privilege for me to be on the advisory board of the VISIT program, along with university professors, ESRI staff, and other excellent individuals. Steve Wanner, Boulder High School Teacher, and I helped bring the VISIT program to Colorado in Fall 2001. Teachers receive three graduate credits through Eastern Michigan University for the online course for free, because the registration is paid with the NSF grant money.



Dr Xie from Eastern Michigan University explains the VISIT project.

The VISIT project sponsored two teachers to attend the National GIS Institute in Boulder. In addition, Dr. Xie, one of the principal investigators of the project, attended the institute and

presented the VISIT program to the attendees.

High School Students as Participants in the Teacher Institute

For the first time in a national GIS institute, we brought in high school students, tuition-free. I thank Sophia Linn and the Colorado Geographic Alliance for funding these students. These truly were some of the best and brightest students in the country. Two of them had used GIS before in the classroom.



The four high school students hailed from Michigan, Montana, North Dakota, and Colorado.

The reason for bringing these students in was two-fold. One, several of us are beginning a research project to assess the difference that GIS makes in student learning. We will survey these students over the next year to discover any content and attitudinal changes that GIS has brought to their education. We also surveyed the teachers for a teacher-based research project. Secondly, having students working alongside the teachers sends a powerful message to the teachers: They do not have to become GIS experts in order to use it in the classroom. The students will tinker with the software and figure things out!



One of the high school students working with a teacher using ArcView GIS.



Another student from institute explaining the use of ArcPad on an Ipaq pocket PC with an attached GPS unit.

Field Work

As in past institutes, the incorporation of scientific field work and GIS was an important component. This time, we collected approximately 8 variables from Boulder Creek, such as dissolved oxygen, pH, temperature, metals, chlorine, hardness, and other factors. I learned a great deal from Roger Palmer, who has a master's degree in chemistry, from Steve Wanner about Boulder floodplains and neighborhoods, and from others at the institute.



Co-instructors Sophia Linn (Colorado Geographic Alliance) and Anita Palmer (GIS ETC).

We used Garmin and Lowrance GPS units for the coordinate collection. Additional field equipment included ArcPad on Ipaq pocket computers with downloaded DOQs and DRGs for Boulder. We uploaded the attribute and coordinate information into the GIS during the afternoon following the field experience.



Collecting GPS coordinates and water chemistry samples from Boulder Creek.



Steve Wanner of Boulder High School, explaining historical floodplains of Boulder.



Measuring chemical constituents of stream samples collected in Boulder Creek.

Summary:

Hosting a GIS institute is interdisciplinary, multi-grade-level, involving multiple organizations, and is an excellent example of a long-term effort that is destined to bring about fundamental changes in the school curriculum. It has more to do with systemic change and networking than strictly with the use of inquiry-based tools such as GIS.

Once again, the overwhelmingly positive feedback from the 32 participants confirmed that this type of educational outreach is a good opportunity for the USGS, to work with educators at a value-added level. Some wrote on their daily evaluations that this was “the best

institute I have ever attended.” Teachers will be working with USGS data for these GIS-based activities that they incorporate into their curricula, and recognize that we do provide training that is relevant to their needs. We’re still learning, and there were no doubt things that we could have done better, but conducting an institute like this is an excellent way to keep on the path to improvement!

The institute also provided us another opportunity to work with the Colorado Geographic Alliance. When we work with a group in a long-term relationship, I firmly believe this brings us more benefit than a one-time presentation, particularly in the case of providing educators the opportunity to use and apply our digital data.

Institute Flyer

This flyer was handed out at conferences, posted to listserves, and directly emailed to hundreds of educators.

**GEOGRAPHIC
INFORMATION SYSTEMS
(GIS) INSTITUTE FOR
EDUCATORS
24-28 June 2002**

**SPONSORED BY
USGS**

and

Colorado Geographic Alliance

**Use GIS to explore the
interactions of the natural,
cultural, and physical
environment. Apply maps, charts,
aerial photographs, databases,**

**and images to analyze trends and
plan for the future.**

**Discover how to implement GIS in
your classroom utilizing
comprehensive geography,
science, and technology
standards.**

Trainers:

**Anita Palmer
Joseph Kerski
Roger Palmer
Steve Wanner
Sophia Linn**

Who should attend?

All Grade 6-12 teachers and school technology coordinators who want to support students in exploring the world in a problem-solving, computerized environment.

Where is it being held?

Boulder High School, Colorado

When is it being held?

24-28 June 2002
8:00 am - 5:00 pm

What is GIS?

GIS is a system designed for storing, updating, analyzing, displaying, and manipulating information about places on the planet, otherwise known as spatial data. This system uses the power of the computer to answer geographic questions by arranging and displaying all kinds of data about places in a variety of ways such as with maps, charts, and tables.

How is GIS being used in the classroom?

Working with the Colorado Division of Wildlife, high school freshmen conducted public surveys and open houses and used GIS to draft a comprehensive wildlife area management plan, including presenting their final recommendations to the Wildlife Commission.

Rhode Island students studied the economic impact of rivers in their communities.

In North Dakota, high school students helped local state parks use GIS to study and manage their resources. Middle school students mapped out alternative sites for a local landfill and ways to monitor its operation.

Vermont middle school students used GIS technology, science journals, and photos to determine the origin of a local pond and its ecological relationship to the community.

Who are Your Instructors?

Dr. Joseph Kerski, USGS

Joseph Kerski serves as education outreach geographer at the US Geological Survey in Denver, Colorado and an instructor of GIS at the University of Denver. He conducts 40 educational workshops each year for educators on the integration of scientific data into the curriculum. He holds a Ph.D. in geography with an emphasis on GIS and geography education.

Roger Palmer, Red River High School

Roger Palmer teaches high school chemistry and summer field science in Grand Forks, ND. He is involved with a NASA initiative in the upper mid-west that uses NASA generated imagery to teach math, science, and geography to K-12 students. He holds an M.S. in Chemistry and conducts research with students in the use of GIS to model integrated approaches to environmental problems.

Anita Palmer, GIS ETC

Anita Palmer is a high school technology teacher who most recently taught GIS and AutoCAD in Carson City, NV. She has authored and taught numerous technology classes for K-12 teachers focusing on integration of technology throughout the curriculum. She is one of the three authors of the first GIS curriculum book for the 6-12th grade world geography classroom. She is completing her M.S. in geography with an emphasis on GIS in education.

Sophia Linn, Colorado Geographic Alliance

Sophia Linn serves as program manager for the Colorado Geographic Alliance, an organization that serves over 5,000 geography teachers. She is active in the implementation of technology into geography and science curricula and holds an M.A. degree in geography

with an emphasis on education and cartography.

Steve Wanner, Boulder High School

Steve Wanner has taught geography for over 30 years in the Boulder Valley School District. He has been using GIS in the curriculum since 1996, and has designed units on world regional geography, historical floodplains, and neighborhood analysis using GIS.

What will you receive?

- 45 hours of hands-on ArcView GIS training, fieldwork, and theory by nationally-renowned instructors.
- Teacher manual with ready-to-use lessons easily applied to content standards.
- Digital data for use in the classroom, maps, books, and other goodies.
- Book *Mapping Our World: GIS Lessons for Educators*
- Optional: 3 re-certification credits through Colorado School of Mines (\$100).

What are your costs?

- Registration - \$700.00.
- Airfare for out-of-town guests.
- Optional:
 - Breakfast and Lunch Monday-Friday \$66.25.
 - 6 Nights Lodging at College Inn, 1 block from the High School, + Breakfast and Lunch, \$365, single occupancy. \$212 per person, double occupancy.
- Entertainment/activities – Hiking, bicycling and exploring the beautiful Boulder area in the Rocky Mountains. Roger Palmer's incredible harmonica playing is also a favorite event!

To Register:

GIS Institute, Dept of Geography,
University of Northern Colorado,
Greeley CO 80639

For More Information:

Anita Brooks gisetc@aol.com
(701) 792-3312

Sophia Linn sophia@frii.com
(970)224-9117

Joseph Kerski jikerski@usgs.gov
(303) 202-4315

What are your costs?

Registration - \$700.00

Airfare for out-of-town guests

Rooms and food at College Inn

Entertainment/activities – Hiking, bicycling and exploring the beautiful Boulder area adjacent to the Rocky Mountains. Roger Palmer's incredible harmonica playing is also a favorite event!

Application

Please fill out the following information along with answers to the questions:

Name:

Address:

City:

State & Zip:

Telephone:

Email:

School:

Address:

City:

State/Zip:

Grade(s) you teach:

Subject(s) you teach:

Please attach a separate sheet with answers to the following four questions:

How do I feel I will benefit from GIS training?

How will I introduce GIS into my curriculum?

How do I rate myself as a computer user?

How can my class work with the community and apply GIS technology to a real life issue?

Please send your answers, this form, and a deposit of \$150.00 payable to: University of Northern Colorado

Balance of \$550.00 due by May 15, 2002.



Flatirons, Boulder Colorado. Boulder was a wonderful place to hold an international institute such as this.

****end of report****