GEOTECHNOLOGIES IN EDUCATION EVENT REPORT AND RECOMMENDATIONS

GeoTech Ohio 2005

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Location: New Albany, Ohio

Event Dates: 20-24 June 2005

Purpose: GeoTech Ohio 2005

Geotechnologies (Geographic Information Systems (GIS) and Global Positioning Systems (GPS) Educational Technology Institute.

Sponsors: USGS, Ashland University, New Albany School District.

Institute Leaders: Joseph Kerski (USGS), Anita Palmer (GISetc), Herb Broda (Ashland University), Josh Flory (New Albany School District).

This institute resulted after Herb Broda and Josh Flory attended the 2004 GeoTech Colorado institute co-taught by Joseph Kerski and wanted to bring this type of national institute to Ohio. The setting of New Albany Middle School, with its excellent outdoor laboratories—woodland and wetland—provided an excellent opportunity of conducting a field-based institute. This vision became a reality because of the dedication of everyone involved, and those at Ashland University and the USGS who supported the institute. We conducted an extensive marketing effort over the past year, resulting in 30 extremely inquisitive, innovative educators from a variety of educational levels and subjects.

The institute was featured in a series of press releases from Ashland University. It was also featured in a Department of the Interior "Highlight" sent to the White House, June 2005. We also were interviewed by a reporter from the local newspaper.

Participants in GeoTech Ohio 2005 came from universities, parks, museums, and K-12 educational institutions in 8 states.

GeoTech Ohio, held at New Albany Middle School, provided not only an excellent building facility for such an event, but also a 120-acre campus, including protected woodland, wetland, prairie, and lake for conducting field research. It was one of the best places that I have ever taught.

The instructional team—Herb Broda (Ashland University), Josh Flory (New Albany Middle School), Joseph Kerski (USGS), and Anita Palmer (GISetc). It was a sincere pleasure to work with each of my colleagues, the participants, and the students.

Dr. Frank Pettigrew (Dean of the College of Education, Ashland University), Dr. Herb Broda, Madeline Partlow (New Albany Middle School Principal), and Josh Flory. We were honored to have the dean and the principal among us for part of the institute.

Some of the high school students who helped with logistics, field support, and computer support for the institute. These were some of the best students I have worked with. All had been in courses with Mr. Flory in their middle school years, and it was clear that (1) he had made an impression on them in terms of their work ethic and environmental ethic, and (2) they were professional, courteous, knowledgeable, and a joy to work with.

We were also honored to have David Crecelius, GIS Coordinator for the Ohio Department of Natural Resources, who gave a presentation on the natural resources application of GIS. We used a great deal of Ohio DNR data in the workshop and therefore directly benefited from the work that David and his staff does.

We were also honored to have Charley Hickman in attendance. Charley is USGS National Spatial Data Infrastructure Liaison to several states, including Ohio, and brought a wealth of knowledge and enthusiasm to the institute.

We were also thrilled to have Bill Resch as part of our group. He teaches at New Albany as well and is incredibly knowledgeable about teaching and about science. He was conducting his own institute at the same time, and so we were grateful for the time he could spend with us. He worked tirelessly to establish the outdoor educational laboratories that have become a reality.

Workshop Themes

1. Critical thinking skills.
2. Spatial thinking.
3. Integration of geotechnologies (GIS, webmapping, GPS) with geography, science, mathematics, history, and environmental studies curriculum at the university and K-12 levels.
4. Scale.
5. How to locate, format, and use geospatial data for GIS-based projects.

Software Used

1. ArcGIS 9.1, ESRI, on laptop computers. This mobile setup was perfect for the institute.
2. Minnesota DNR Garmin utility for GPS upload.
3. Vizimap by Viziworld Inc.
4. GPS PhotoLink (demonstration).

Ready for the field with Garmin GPS units.

Activities and Lessons

1. Webmapping with the National Atlas, Terraserver, USGS Earthquake Center, Franklin County Assessors webmapping site.

2. Climate, population, and plate tectonics lessons from *Mapping Our World.*

3. Ohio physical and cultural analysis.

4. Franklin County physical and cultural geography analysis.

5. Accessing and analyzing Census TIGER files and demographic data.

6. Tornadoes of the USA analysis.

7. Downloading and using Terraserver USGS DOQs and DRGs for field base maps.

8. Collecting field data and GPS coordinates and examining field data within a GIS environment.

9. Digitizing map features.

10. Analyzing population change in USA counties, 1900-2000.

11. Analyzing changes on the landscape in New Albany and eastern Franklin County, 1904 to present.

12. Throughout the institute, we showed short GIS video clips.

13. Throughout the institute, we held discussions about pedagogical issues of teaching with geotechnologies, standards, logistics, and more. There was a great deal of collegiality and peer mentoring that occurred throughout the week.

14. Projects that the participants wanted to construct.

Workshop Format

Summary

Hands on work with GIS and GPS in the theme-based and tools-based lessons: 90% hands-on

Discussions on curricular implementation strategies and short presentations by teaching staff (Dr Herb Broda, Josh Flory, Anita Palmer, and Joseph Kerski) sprinkled throughout; 10%. Guest presentations by those mentioned in this report (Dean of College of Education, Ohio DNR, Principal of School), as well as the lead instructional team. We also had visits from Dan Mahar (Vizimap) and by a reporter from the local newspaper.

Laboratory work: 85%.
Field data collection: 15%.

Much of the time, participants worked in either a Thorough Investigations lab or a Special Topics lab, and switched back and forth depending on their needs at the time.

Dr Herb Broda with the participants on the first morning of the institute.

We began with the exploration and use of web-based GIS sites, including National Atlas, Terraserver, Ohio DNR, USGS National Earthquake Information Center, Franklin County Assessors.

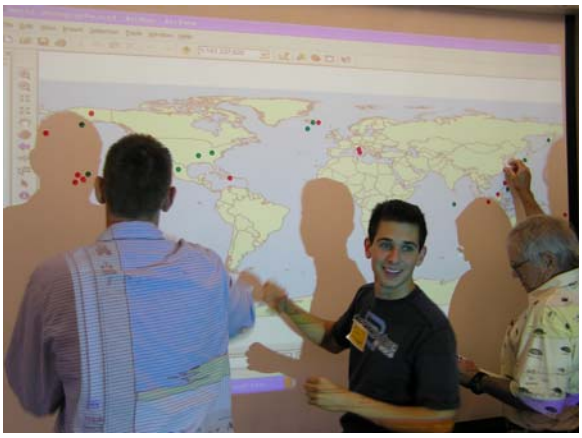
The remainder of the workshop included the examination of global, USA, Ohio, Franklin County, and New Albany-area current and historical issues of population, earthquakes, tornadoes, climate, landforms, watersheds, glacial geology, historical settlement and current urbanization, and other issues. These lessons were written by Anita Palmer of GISetc, other authors of the *Mapping Our World* book from ESRI Press, and by Joseph Kerski of the USGS. We also used some GPS field activities created by Herb Broda.

We worked in a variety of settings and featured different instructional styles, such as an innovative closing share-a-thon session. The institute featured evening gatherings (such as a post-institute field trip to Lake Erie and a visit to the Ohio State University ice core lab). We took care to include low-tech components, to illustrate that low-tech can be used effectively with high-tech, such as a hand-made tree-height clinometer and a "what is the missing theme" lesson with overhead transparencies.

Anita Palmer explaining the "Missing Theme" activity.

We custom-built this institute based on the needs of the participants and modified it daily based on the daily evaluations we received at the end of each day. This represented much of the value-added that we feel we can offer to educators.

Each participant received a vast array of material from the USGS and from ESRI and from GISetc, including a Mapping Our World book, Conservation Geography, USGS books, maps, and pamphlets, lessons, guidelines, and articles. Each participant received a custom-made CD with data, tools, lessons, and photographs.



Earthquake activity—mapping by hand where one expects earthquakes will occur.

Herb Broda on Afternoon 2 with the participants in the first field activity.

One activity was comparing early 20th Century maps in a GIS with a more recent aerial photograph (below) and discussing the forces and the results of change.

Picnic, Day One. This provided some additional networking time and an opportunity to become familiar with our field studies site.

Above and below, lab work.

Field Work

Five groups collected field data on the following themes: water quality, animals, tree species and height, land use, and trails. The participants brought all of the field data to the GIS environment where it became part of a growing database that Mr. Flory and his students can use in the future at the school. It also illustrated how the participants can plan field experiences in their own settings.

The wetland conservation area of the school district is the result of a cooperative effort among many organizations, including Ohio State University, the US Army Corps of Engineers, Ashland University, the Village of New Albany, and others.

The human-modified landscape in New Albany is one of white fences, grass, and trees, and is under intense urbanization pressure at the edge of Columbus. We discussed local issues and encouraged community connections when the participants return to their own work environments.

Wetland.

Joseph Kerski in the field adjacent to the woodland.

High school student examining water he collected in the lake.

Above and below, collecting water quality data.

The trash found in the lake illustrates that our job of environmental education is far from complete!

Examining and recording animals and the evidence of animals in the field.

Prairie ecosystem.

It was good to see evidence of amphibians in the area despite their global decline.

Trail in Swickard Woods.

Recommendations

GeoTech Ohio 2005 and events like it illustrate the impact that a combination of spatial analysis, authentic, outdoor experiential learning, and inquiry-based, problem-solving learning with real-world data can have. It empowers students to investigate their world, connect with their environment and with their community, and augment their self-image and their perceived role in the world. The conference attendees well illustrated the wide applications of GIS and GPS throughout education—history, math, geography, teacher education, environmental studies, earth science, biology, and more.

GeoTech emphasized interdisciplinary linkages between geography and science, and examining real-world issues in education and standards-based education. During the past 20 years, the USA has fallen from 3rd to 17th worldwide in the percentage of college undergraduates who major in science. Now more than ever, it is important that educators, GIS specialists, and scientists remain involved with events such as this and with nurturing the relationships and partnerships that follow.
I believe that the USGS and other federal organizations have a role to play in preparing teachers and students to use our data and products, and spatial data and technologies. I believe that it is also our responsibility to do so as a public service agency. Our relationship with the GeoTech event organizers has been fruitful and continues to grow. We had met several of the participants during prior workshops.

By conducting workshops, we have the opportunity of working one-on-one with the teachers. We have the opportunity of obtaining their feedback on curricular materials that we develop. We work with educators to demonstrate ***how*** our products and spatial data in general can be used in conjunction with national science and geography standards. It does more than explaining ***what*** products are available.

I attempted to emphasize USGS strength in real-world data and technology in education, particularly geospatial and scientific information. Both the growth in educational technology and the curricular content standards present excellent opportunities for us to introduce our data and products to students and educators across the country. Educators who are trained in the types and applications of our data are a powerful lobby for the USGS. Students familiar with our data will form a geospatially-literate society. Another objective was to "train the trainers"--teachers--to magnify our effectiveness and maximize our limited resources. These trainers will themselves have already begun to network with and train other educators, administrators, and students.

By participating in this event, the attention generated from teachers and students across the country for science and for geography could be enormous, given current concern with teaching about globalization, the environment, and

technology.

We need to remain involved in education as an agency. Education shows our relevance to Congress and the general public. Education serves the needs of diversity, recruitment, and retention.

Acknowledgements

I appreciated USGS support of my attendance at this event and thank Sherry Jackson for her help with the materials. I thank my co-organizers of GeoTech—Dr Herb Broda, Josh Flory, and Anita Palmer, for their hard work over these past 12 months. They truly went above and beyond all expectations and put in countless hours of unpaid work. I look forward to our continued collaboration. I thank all of our guests for their contribution. I appreciated the work that the students did for this institute. I thank the participants for making this event so memorable. I am certain that I am forgetting someone who worked hard on this institute, but know that your efforts were much appreciated as well.

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GeoTech Ohio 2005 Report