EDUCATION EVENT REPORT AND RECOMMENDATIONS

Event:
ESRI Education User Conference (ESRI ED-UC) 2001

Attendee and Report Writer's Name:
Joseph Kerski, Geographer:
Education/GIS, Denver, RMMC.

Location:
San Diego, California

Other USGS Attendees: Darla Duval, EDC.

Event Dates: 6-8 July 2001.

Purpose of Event:
Educational Applications of Geographic Information Systems.

My Activities at Event:

(1) Conduct presentation on "Exploring Historical Floodplains Using GIS," a project I am working on with the Boulder Area Sustainability Information Network (BASIN), and Boulder Valley School District.

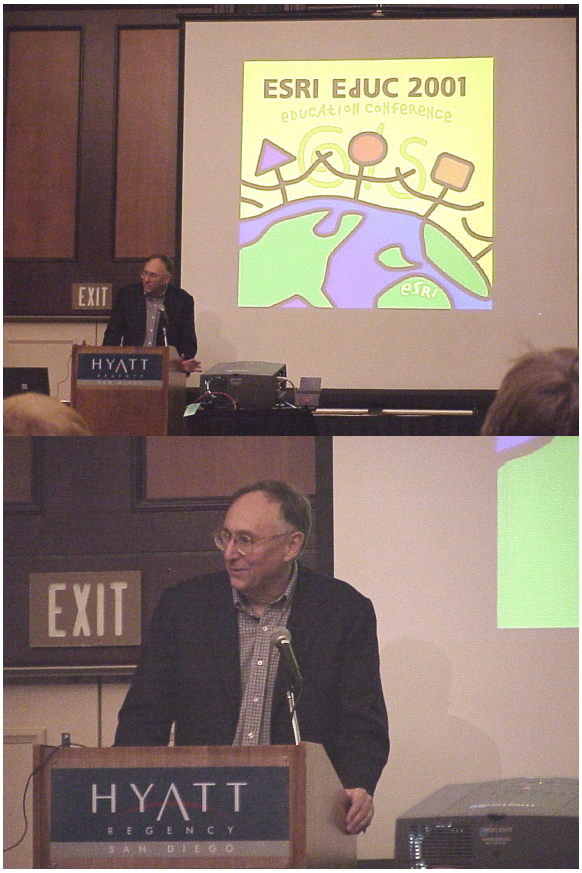
(2) Conduct hands-on computer workshop on "Accessing and Using USGS Vector Data within ArcView GIS".

(3) Conduct hands-on computer workshop on "Accessing and Using USGS Raster Data within ArcView GIS".

(4) Meet with "Virtual Immersion in Science Inquiry for Teachers (VISIT)" staff to discuss issues and plans for bringing this NSF-sponsored program to Colorado.

(5) Meet with educators to discuss my upcoming review of two new ESRI books for education.

(6) Meet with Montana Earth Observation System staff.



ESRI President Jack Dangermond at the conference during the closing session. His presence at the conference indicated the high value he places on educational applications of GIS.

Conference History and Description

This conference should lay to rest any notion that GIS is confined to a few school districts and isolated teachers. Although this conference followed several others during the past 7 years on GIS in education, none had been as large. Over 465 educators from many countries and from elementary to university level attended this conference, which featured three days of speakers as well as a poster session and an education exposition.

Sessions at the conference included presentations on programs, hands-on workshops in new extensions or software, and other items of interest to the educational

community.

The 1994 Conference on GIS in Education was followed by others in 1996 and 1997. In 1998, I attended the International Conference in GIS in Education in Ypsilanti, Michigan. In 1999, during the ESRI conference, a meeting of those interested in promoting GIS in K-12 and college curricula met. In 2000 and 2001, International Conferences on GIS in Education were held at the California State University-San Bernardino campus (see my report from the 2000 conference).

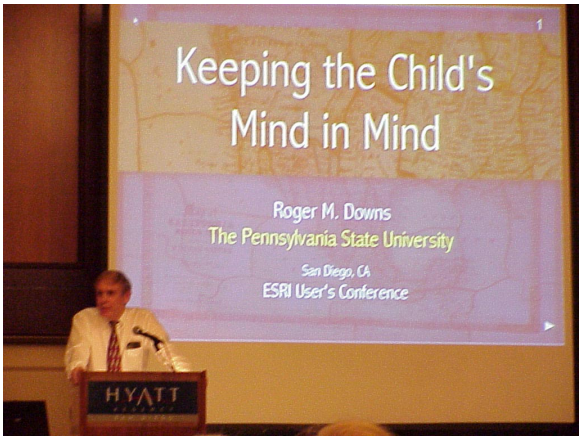
It was natural that the conference would eventually be at the same site as the large ESRI User Conference (see my separate report on this). ESRI has been incredibly supportive of GIS in education for a decade. The conference was organized by the ESRI education team (below), with whom I have enjoyed 7 fruitful years of work.

The number of researchers and practitioners interested in teaching with GIS, in a content area such as environmental science, geography, history, science, or mathematics, are growing, but still forms a relatively small, close-knit community. Therefore, it is not difficult to understand why I already knew many people at the conference, and it was excellent to further these relationships as well as form new ones.

George Dailey, Angela Lee, Ann Johnson, Charlie Fitzpatrick, and Milton Ospina of the ESRI Education Staff at the conference's opening session. This team organized the conference and were key to its success.

There are fundamental differences between teaching with GIS versus teaching about GIS. This conference emphasized the former--how to use GIS in teaching history, geography, chemistry, and so on, but it included many sessions for the latter as well.

Keynote Address



Pennsylvania State University professor Roger M. Downs gives the keynote address.

Dr. Roger M. Downs was chosen for the keynote because he has had a long history of research and teaching in geography, behavioral geography, environmental cognition, and geographic education, including a term as the geographer in residence at National Geographic Society. He is the chair of the National Research Council study "Thinking Spatially--The Incorporation of GIS Across the K12 Curriculum." I represented the USGS at one of these meetings for Barb Ryan (see my March 2001 report). He is also active in EarthKAM: Earth Knowledge Acquired by Middle School Students, a project that allows students to take photographs of Earth's surface from a camera aboard the Space Shuttle and conduct research projects using these image. He is on the US National Committee for the International Geographical Union, the Geographic Education National Implementation Project (GENIP), a

consortium of geographical associations committed to improving geographic education through the implementation of the National Geography Standards, the Fundamental Geography Themes, and the Skills of Inquiry.

His keynote address focused on the history of tools, the "accidents of design," to challenge the group to ask questions about GIS and other tools--does a function or method have to be the way that it is? Another challenge was the danger of fitting children of different ages and abilities to an expert system like GIS. Downs asked if we are short-circuiting the process where one acquires expertise in geography. The last challenge was that in training children to become skilled users of a tool, are we educating them to think geographically? His point was that training is fast, while education is slow--it takes time.

My Workshops

I am pleased to report that the attendance at my sessions far exceeded my expectations. My first presentation was on "Exploring Historical Floodplains Using GIS," a project I am working on with the Boulder Area Sustainability Information Network (BASIN), and Boulder Valley School District. Nearly 200 people attended this presentation.

Over 200 people attended both of my hands-on computer workshop on "Accessing and Using USGS Vector Data within ArcView GIS", and "Accessing and Using USGS Raster Data within ArcView GIS". Due to popular demand, I will place these presentations on my web site: http://rockyweb.cr.usgs.gov/public/outreach. Educators want to know how to use USGS spatial data in the curriculum, and we need to make it as easy as possible for them to access it, order it, and download it. This has implications for how we format and serve our data.

Participants at my "Using USGS Raster Data in ArcView GIS".

Other Sessions at the Conference

I attended sessions on ArcView 8, ModelBuilder, and Image Analysis. I have placed notes on ArcView 8 in my event report on the 2001 ESRI User Conference. I also attended a session by Dr Thompson of the University of Maryland, who developed "UrbanWorld," a GIS-based curriculum for college-level urban geography. I attended part of Mary Burns' and Barbara Parmenter's presentation, "Using GIS as a Problem-Solving Tool."

I attended a session by Sarah Bednarz, Andrew Klein, and Robert Bednarz of Texas A&M University discussing integrating spatial skills and information technology in science. See http://geoits.tamu.edu for more information. I attended a session by Marsha Alibrandi, Rita Hagevik, and Shannon White at North Carolina State University concerning GIS in teacher education--http://courses.ncsu.edu/common. They have created one of the few GIS-based teacher education courses in the USA: ECI496E: GIS in Education.

Before my presentation was an excellent presentation about educating planners, from John Marsden, professor at the University of Liverpool. John Kilpinen from Valparaiso University presented suggestions for better GIS lab instruction.

Why GIS in Education?

Many factors are encouraging the use of GIS in education, such as:

- Technological innovation
- Constructivism
- Integrated, authentic practice
- Authentic assessment
- School-to-career movement and funding
- School-to-community emphasis
- Active, student-centered learning
- National, state, and district content standards [see warning above].
- Public accountability demands for education
- Globalization
- Inquiry emphasis
- Information literacy
- Computer literacy
- Professional societies.
- Universities.
- Private companies, especially GIS companies, particularly ESRI.
- Government agencies' outreach staffs such as the USGS.
- Research groups (CIPE, TERC, UMAC).
- Advances in data availability and usability.
- Advances in hardware capability.
- Advances in software capability.

Observations and Recommendations

USGS Role in GIS in Education

How does GIS in education fit into the goals and mission of the USGS, and how can the USGS contribute to such an agenda? Our "Future Science Directions" and our USGS strategic plan each indicate how GIS in education ties into our mission. Our emphasis is integrated information for societal needs. GIS provides one of the best tools and science for integrating land-based information. Our National Map effort, Gateway to the Earth, and research projects show clearly that we need scientists who can analyze data from a variety of disciplines. Integrated studies are recommended by education scholars in K-12 curricula also, rather than the traditional model of separate subjects that do not overlap. In 2000, a National Research Council study identified 8 critical world environmental themes, and I believe that 6 of them require spatial data and a populace that can interpret such data.

We also have the data from the Customer Satisfaction/Outcome Survey, where a group of USGS staff (Steve Gillespie) surveyed 18 different science products, and received 332 useful responses from customers. One question they asked was what they used the product for--whether for research, resource management, hazard mitigation, or education. Across the 18 products, an average of 55% of the customers reported using our products for educational use.

I believe we must continue to support GIS in education by participating in and conducting GIS training for educators, creating GIS-based lessons using USGS and other spatial data resources, and by participating in GIS Day and other activities.

By participating in this conference, we demonstrated the leadership that the USGS has in national science literacy. We are the largest producer and one of the largest users of digital spatial geographic data. These are data sets not only used by geographers, but by anyone interested in solving a project that has to do with space—hydrologists, biologists, demographers, seismologists, geologists, sociologists, psychologists, environmental planners, public works officials, marketers, business analysts, and others. Someone has stated that if physics was the science of the 20th Century, then earth science will be the science of the 21st.

This wealth of data that we create at the USGS will be worthless unless we proactively create a scientifically literate populace.

One reason for attending this meeting was to illustrate USGS strength in integrating science

with education. The explosion in geographic technology presents an excellent opportunity for the USGS to get our data and products into the hands of students and educators across the country. Students familiar with our data will form an expanded future USGS customer base. We also sought to inform the educational and scientific community that our strength does not end with maps and digital cartographic data, but it includes hazards, water resources, energy, and biological research, for example.

By working with educators, the publicity generated for the USGS could be enormous, particularly with increasing media attention on both the need for geographic and science skills as well as the need for geographic and environmental research. Teachers are a powerful voice for the USGS and all science agencies and represent the largest single professional group in the country.

Furthermore, I believe the USGS will benefit from participating in this initiative because we will learn from the committee members about how to package our data for the educational community. This is a question that the Director's Education Team, of which I am a member, has been working on for years. We have all of the pieces, but need to write the interfaces, links, and guidelines.

Implementation Issues

Implementing a GIS is not primarily about hardware or software! Technology is a "process; a systematic blend of people, materials, methods, and machines" (Ely et al. 1992). GIS is both a technology and *a set of methods*! There are challenges in teaching with GIS--GIS is a system! Costs exist, the user is confronted with a blank screen, and the user must decide which data to use, find data, manipulate data, present data in a usable format, and then design a lesson around these data. Integrating GIS into classroom practice is a complex process. Educators must match the computers and software with instructional goals, subject matter, the students, and the context of instruction.

Guided inquiry entails changes in the technology, curriculum, social organization, and management of the classroom, teaching approach, and in basic beliefs about the nature of knowledge and the roles of teachers and learners. For example:

- unpredictable results
- student-directed learning
- broad vs deep learning

Students and teachers may have confusion about the fundamental representational and spatial concepts upon which an understanding of GIS rests. This is something that the USGS can directly help change through our education and outreach programs.

Geo-technology in education must be done within context of reform for long-term impact.

Standards

Content standards, which specify what students should know and be able to do, in technology, science, geography, social studies, and history, repeatedly emphasize hands-on exploration.
"The power of a GIS is that it allows us to ask questions of data."
--Geography Education Standards Project, 1994, p. 256.

However, the current manner in which standards are being assessed is a serious danger to the use of exploratory tools. The current assessment instruments are emphasizing memorizing facts, directly opposite to what is desired with the use of GIS and other spatial tools in the curriculum! This is a serious issue that needs to be addressed by the NRC.

Use GIS in the Right Way

I believe that we need to use GIS in the right

way.

1) Don't use it to exchange one form of time-consuming, rote tasks for another.--for example, entering data into tables or making the perfect map. These use only technical skills.
2) Don't use GIS just to add more information, but to use information more effectively to arrive at a decision. Use GIS to emphasize generative knowledge, not inert knowledge (Dede, 1995).

3) Use GIS to make decisions given incomplete information, inconsistent objectives, and uncertain consequences--just like the situation in the world outside of the classroom.

4) Design modules that can be directly used or easily modified and transferred--sustainable projects.

5) Design short lessons that a teacher can feel confident in accomplishing with a class at first, rather than a long project.

Benefits and Challenges

From a learning perspective, GIS is highly praised. Lessons around the country illustrate community-based, fieldwork based, interdisciplinary, open-ended projects involving ill-structured problems with real-world data. These projects help students use the same tool as is used in research and business to enhance motivation and learning, explore the world, and provide real employment skills.

From a teaching perspective, challenges exist, such as the traditional dominance of Macintosh computers, while most GIS software is written for Windows operating systems. ArcView, for example, runs on Macs, but only the 1997 version of the software. A lack of training in GIS and the perceived and real complexity of GIS tools is another challenge. The lack of preservice training means that the future implementation rate will continue to be slow. Other challenges are that:

- GIS is a complex, open-ended tool.
- Teachers must process data as well as develop lessons.
- Increases complexity of teachers' jobs.
- A lack of geographic training and thinking in both teachers and students.
- Inadequate time to learn software.
- Few lesson plans.
- Lack of training, funds, and technical support.
- Insufficient openings in curriculum for GIS.
- Few incentives for teachers.

Teachers ideally need to be paired with at least one other teacher in the school for increased likelihood that these methods will "take root," and they need some start-up lesson plans, and training. In my survey of 1,520 teachers, training was cited as the number one need.

GIS alters communication patterns and traditional roles of students and teachers, for example:
- Coaching
- Small group instruction
- Working more closely with weaker students
- Assessment based on products and progress
- Cooperation

GIS appears to be effective with non-traditional learners.

Students with GIS may learn at different rates and not all learned the same content or skills. With GIS, there is a shift from *covering* material to *sampling* material. There is a shift from unilaterally *declaring* what is worth knowing to *discovering* what is important. Students are examining processes over space and time.

In Binko's (1989) 4 stages of learning: awareness, understanding, guided practice, implementation, GIS is barely in the awareness phase for most teachers. In the

diffusion literature (championed by Everett Rogers), GIS is in use by the "early adopters"--there could be a big wave to come, but we must be bold in considering these comments and those of the NRC.

GIS implementation will be slow because it relies on inservice training. Therefore, the USGS and others need to address what future teachers are learning in colleges of education in universities.

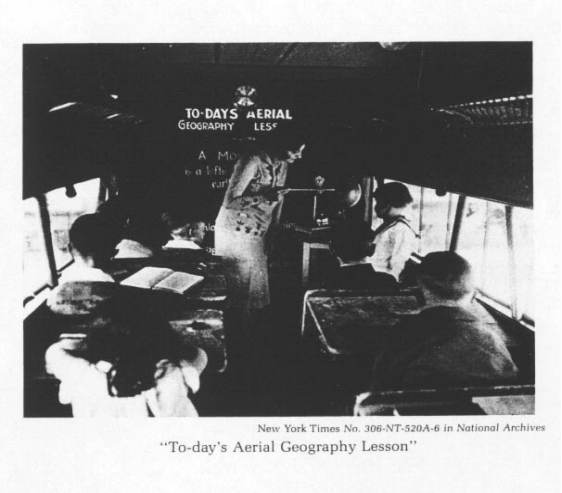
There is value in requiring students to "dig out" information, rather than handing it to them. GIS involves data management skills and a whole host of other skills besides spatial analysis. It is one of the few tools to take advantage of many computer skills, relational skills, and content skills.

The teacher's role is still critical to learning with GIS, and training teachers needs to be emphasized. Teachers are more likely to adopt GIS if they have previous computer experience, a problem-solving approach, a geographic perspective, a positive attitude toward work change, and active networking and communication skills.

GIS implementation cannot be effective without educational reform. This group can help instigate such reforms.

Our approach should not be: "How can we get GIS into the curriculum?" But: "How can GIS help meet curricular goals?"

I would like to summarize a recommendation with the following photograph. This photograph illustrates the inappropriate use of technology. Here, a class is using the latest technology of 1927--an airplane--over Los Angeles. However, this new technology is used within an outdated model of education—all eyes are on the teacher, instead of looking at the terrain below, where they could be noting patterns of human impact, land use, and the physical environment. Even the old desks have been brought on board and arranged in the old educational paradigm: teacher as dispenser of knowledge. Let's not make the same mistake with GIS!



New York Times *No. 306-NT-520A-6 in National Archives*
"To-day's Aerial Geography Lesson"

Reproduced with permission from Cuban, Larry. 1986. Teachers and Machines: The Classroom Use of Technology Since 1920. New York: Columbia University, Teachers College.

"The trouble with education…is that the best teaching methods are in fact the most difficult."
--Piaget, Jean. 1929. *The Child's Conception of the World.* London: Routledge.
Despite the challenges, GIS is too important a tool and method to ignore.

Teacher Training

Several Ed-UC presentations dealt with the topic of teacher training. I believe that the use of GIS has been slow because GIS training, conducted by myself and others, has primarily targeted inservice teachers – teachers who are already practicing in their profession. One exception was a one-week training at Roger Williams University that ESRI education staff (Charlie Fitzpatrick) and I conducted in January 1999, which was geared toward faculty in departments of education who are training students to become teachers. This *inservice* training

needs to be more fully embraced. Teachers teach in large degree, and follow the practices of, how they themselves were first taught in their preservice days.

Technology is changing rapidly—GIS is no exception. However, the pace of change in institutions of higher learning oftentimes is too slow to meet the changing demands of teachers, students, and the needs of society. I hope the group can make recommendations quickly and then follow through on these recommendations.

Teachers are under pressure these days as never before, such as being forced to adhere to district, state, and national content standards. These standards specify what students should know and be able to do in science, technology, math, geography, history, social studies, and other areas. Schools are also pressured to perform alternative means of assessment that includes portfolios, field work, computer-based presentations, and other means, in addition to standardized written tests.

During the next five years, schools will be faced with a massive retirement in the system. These new teachers need to be trained in a wide range of technology and methods. I believe that the USGS should capitalize by this massive turnover by emphasizing preservice training for the new teachers coming on board. Schools are also pressured to reduce class sizes, and provide alternative pathways for students, such as educational vouchers. They are expected to recruit and retain high-caliber individuals who must work long hours all during the year, but whose salaries are lower than most other professionals.

At the same time, national and state budgets are constrained, and the likelihood that teachers' salaries will be increased is low. At the same time, growing national population requires a massive number of new teachers over the next decade. In light of the teacher shortage, some areas are lowering the requirements that teachers must have. These individuals who are not required to have a teaching degree also represent wide-open territory for the USGS, for they will be even less aware of our products and services than teachers who have at least had a science methods or social studies methods course.

Discoveries

During one session, I found out about an excellent book that I believe that everyone involved with teacher training should read:

Loucks-Horsley, Susan. 1998. *Designing Professional Development for Teachers of Science and Mathematics*. Corwin Press-Sage. ISBN 0-8039-66628. The National Institute of Science Education. I found it on Amazon.com for $34.95 paperback.

I also learned about this National Institute of Science Education--a professional development and outreach program at the National Research Council's Center for Science-Math-Engineering Education.

An NRC Study

I recommend that everyone interested in this topic review the 2001 published study by the National Research Council of the National Academy of Sciences, on the future of the USGS. The report is available online from the National Academy Press at:
http://www.nap.edu/books/0309072646/html/

This report, by extension, can help us design our education program so that it more fully embraces societal needs.

Closing Session Presentation By and Meeting with EOS Staff

I believe one of the best things about this conference was that I finally, after years of reading their press releases and viewing their web pages, was able to meet many of the Montana Earth Observation System (EOS)

staff.

In my mind, the Montana EOS staff are doing the kind of educational outreach that is an excellent model for what needs to be done--a program that involves state, tribal, local, and federal agencies, foundations, private industry, the state library, universities, K-12, and many others. Not only that, but they do it all with a can-do, enthusiastic attitude. Just as one example, the EOS successfully negotiated with ESRI to provide a *state-wide ArcView license for all K-12 schools in Montana!*
For more information, see:

http://www.eoscenter.com
http://www.lewisandclarkeducationcenter.com.

Also, three new web sites and education content will be coming in the months ahead:

http://www.corps-of-discovery.com
http://www.2003-2006.com
http://www.lewisandclarkonline.tv

I had excellent conversations with Alex Philp, Director of the National Lewis and Clark Education Center, Charlotte Lauerman, K12 curriculum specialist, and Jeff Silkwood, GIS specialist, and look forward to working with them in the future.

University of Montana Online GIS For Educators Courses

I signed up to be an online mentor with the University of Montana's GIS courses. My first day in the course was 16 July 2001. First, I will monitor the Introductory and Intermediate courses, with the hope that in the future, I can participate as one of the instructors. I have been participating in the online threaded discussions and going through the exercises with the teachers participating in the course.

For related notes, see my section on the Lewis and Clark meeting in my report on the 2001 ESRI User Conference.

Dr. Kuglin is the Associate Dean of Continuing Education, and the EOS Executive Director. Dr. Kuglin spoke about the "technology puzzle," For more information, see http://www.kuglin.com.

While a CD can hold 600 floppies, a DVD can hold 16,000 floppy-disks worth of data.

Education Exhibit

Darla Duval (EDC) was our excellent lead on the USGS exhibit, and it is an understatement to say that it was continually busy for the three hours of the expo. We barely had time to breathe during those hours, but it was wonderful to meet with these innovative and interesting educators.

Joseph Kerski (standing) and Darla Duval (at laptop) working at USGS exhibit.

Our distribution items included:

--Flyers on AmericaView that Darla created, a project aimed at promoting the dissemination of satellite information and remote sensing education; http://americaview.usgs.gov

--A 15-page version from the 2001 ESRI Conference Proceedings of my research results on GIS in education,

--sample lessons on studying *Stipa comata* (needle grass) and *Earthquakes Everyday t*hat I have written based on USGS data and GIS technology and methods, and

--Article reprints that I have written that highlights work that students and teachers have accomplished with GIS.

--FS04897 Natl Land Cover Dataset fact sheet - 100
--96-0400 USGS GeoData - 200
--96-0011 Aerial Photographs and Satellite Images - 150
--97-0150 Exploring Maps - 100
--97-0250 What Do Maps Show - 100
--97-0350 Land and People - 100
--97-0200 Global Change - 100
--96-0201 Map Projections - 150
--50 USGS Bags (paper) - 200
--150 Landsat - historical booklet
-- Landsat cards, --Landsat info sheet
--MODIS info sheet, --ASTER info sheet
--Natl Land Cover Dataset fact sheet
--USGS GeoData - order
--Aerial Photographs and Satellite Images
--Sample CDs of DRGs, offshore continental shelf, etc. --Earth Science Week flyer with web sites from USGS
--Sample aerials - --Sample GIS - education training outlines - --AmericaView flyer from Darla. - --OhioView fact sheet - Darla
--EarthExplorer business cards - Darla

For the backdrop on the wall, we displayed a Landsat 7 mosaic of the USA, a GIS in education poster, and an enlarged NAPP photograph of San Diego harbor.

Other exhibitors included GIS and education organizations, college and training programs, software, and education-related applications. These included: ArcBridge Consulting for school bus routing, Cal Poly Pomona, Carnegie-Mellon University, More Ways of the Watersheds CD-based curriculum from www.frostvalley.org, Education Planning Solutions, GITA, the GLOBE program, NASA's EOS Education Project at the University of Montana (see my other notes about this program), NASA - Stennis Space Center, Davis Demographics, Erdas, NCGE, Omega Group, Penn State University, Rio Hondo College, SpaceStars/Digital Quest, the University of Arizona's SAGE project, the University of Redlands, and Westech College.

Acknowledgements

I thank Darla Duval for being such an excellent colleague for this event and all who approved my attendance.

VISIT Meeting

I attended a meeting of the VISIT board. Since 1999, I have been on the advisory board of this program, along with university professors, ESRI, and others; approximately 11 people total. 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.

Steve Wanner, Boulder High School Teacher, and I are bringing the VISIT program to Colorado. Currently, most of the VISIT teachers are in Michigan and Massachusetts. We will begin with a GIS training for teachers

on Saturday 6 October, and then be available for assistance while teachers continue with the online course. They receive three graduate credits through Eastern Michigan University for the online course for free, because the registration is paid with the NSF grant money.

At the San Diego meeting, the main topics discussed included appropriate forms of materials, technical support, data sources for teachers, and expected outcomes for teachers. Considerations and recommendations made by the advisors in these areas are identified below.

1) What form of materials will be most useful to teachers? Advisors' advice on this topic is based on their extensive experiences with a wide range of teachers and situations and their own resources. In addition to a number of specific packages and products, they recommended certain strategies. One approach advocated by Marsha Alibrandi is to have the teachers do physical, hands-on activities such as visiting a community-based office that does GIS projects. This led to discussion of having teachers use data collection forms, gathering data of their own, taking ownership of data. Randy Raymond spoke about having the teachers do some ground truthing, such as taking a remote sensed image of their school and making observations of the school grounds with a GPS. Similarly, Joseph Kerski described having teachers take a printout of an image from Terraserver, examining transparent overlays based on different themes, and identifying missing themes. Steve Case provides teachers with examples of presentation materials they can use with their own students, and assists the teachers in preparing their own presentation materials.

In terms of specific materials, some suggestions included the following: Sage project; "Lead the Way"; DAPSEP; KANCRN; World in a Box video from GITA; ArcIMS wildfires from USGS; National Atlas; "GIS for 21st century"; GIS Access; C3GISnet; ESRI's Community Atlas; and the Geography Network.

2) How can VISIT provide technical support to teachers?

Suggestions included the following:

- Have teachers ask questions on EdGIS listserve;
- Employ graduate students to help online;
- Employ teacher leaders to help other teachers;
- Look for local groups, community organizations and government agencies that can help or provide local mentors to teachers;
- The existing advisory board; Kerski and others. - Write FAQs

3) What types and sources of data are most important for VISIT to provide and use with teachers? First distinction is between local and non-local. All agree that local data is best. First at the local level is field data collection, using GPS and data collection forms. This is important for ownership and student enthusiasm. For other sources of local data, see examples in the Community Atlas, Pennsylvania Spatial Data Archives, and USGS Water Flow Stream Gages. One way to address local situation is to provide DOQ and give teachers/students opportunity to do ground truthing of the DOQ using GPS.

For non-local data, the first easy step is to use the ArcVoyager disk with its thematic global data. This does not require going to the Internet. Then, one can use Joseph Kerski's procedures for accessing data from USGS. Third, the Geography Network. Issue is you have to not only show the data source but more importantly how to mine and access and apply the data you find. Steve emphasizes importance of retaining skepticism about the accuracy, quality, relevance of the data.

4) Overall, advisors urged VISIT leadership to be more specific about the intended outcomes for teacher explorers.

Site for the Education User Conference--
San Diego Hyatt.

*** End of 2001 ESRI ED-UC Report ***