VISIT: Virtual Immersion in Science Inquiry for Teachers

Three Years of Collaboration Experiences

Yichun Xie, Principal Investigator
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Los Angeles Unified School District

Presentation at ESRI GIS Education Conference
San Diego, CA
July 6-9, 2003
The Presentation Outline

1. What and Why is the VISIT
2. Outreach and Partners
3. Online Collaboratory
4. Investigations and Science Inquiry Lessons
5. Story from a Teacher Leader
6. Dissemination and Sustainability
Online Collaboration for

Inquiry Education
and GIS Instruction
Summary of the VISIT Program Participation

1. Collaboratory (Online Courses)

706 registration (including 30 teacher leaders), 229 active teachers, and 33 completed and got credits.

2. Workshops (Face-to-face Summer intensive institutes and hands-on workshops)

584 workshop participants (including workshops conducted by the VISIT partnering organizations), 153 of them registered in the Collaboratory (included in the total), and 26 completed intensive summer institutes or online courses and got credits.
Summary of VISIT Online Collaboratory

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NOTE: Totals in B, C, and D cannot be added up to produce the total number of people because some people are in more than one group.
Teachers’ Learning…

…through distributed spatial analysis technologies and human support system online

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Presentation at International GIS Education Conference
San Bernadino, CA
June, 2000
VISIT: Virtual Immersion in Science Inquiry for Teachers

Challenges and Lessons

Yichun Xie, Principal Investigator
Joanne Caniglia, Co-PI
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Presentation at ESRI GIS Education Conference
San Diego, CA
July 6-9, 2001
Effective Collaboration in Cyberspace for Teachers' Professional Development

- The VISIT Collaboratory Experience
- Virtual Immersion in Science Inquiry for Teachers

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Randall Raymond, Teacher Leader, Project VISIT
Detroit Public Schools

Presentation at ESRI GIS Education Conference
San Diego, CA
July 5-7, 2002
VISIT
What it is (Mission Statement)

The goals of VISIT are to:

• Engage teachers in scientific investigations using digital data while integrating instructional benchmarks, and educational standards.

• Practice scientific thinking in context of real-world problems.

• Expand the professional roles of teachers in inquiry-based instruction.
VISIT:
Levels of Collaboration

1. GIS for Teachers: Getting Started
   Prepare teachers with online communication skills and
   with basic skills needed to operate a GIS software
   package while exploring prepared GIS activities.

2. Classroom Tryout Tools
   Conduct a GIS-based short science inquiry lesson using
   prepared materials and report results to the collaboratory

3. Developing GIS Lessons
   Carry out the process for developing and implementing a
   GIS-based investigation for classroom use.
VISIT: How the program works

VISIT works with teachers through an online collaboratory as well as through face-to-face workshops.

VISIT also provides a series of options for obtaining graduate credits in science education free from Eastern Michigan University, or modest fee from Colorado School of Mines.
Partners of the VISIT Project

- Detroit Public Schools
- Boston Metropolitan Area Partnership
- Maine Math/Science Alliance (MMSA)
- Colorado State Geographic Alliance
- Colorado School of Mines
- GIS ETC Educational Technology Consultants
- Michigan Department of Education
- Michigan Virtual University
- Michigan Geographic Alliance
- Oakland County Public Schools
- Detroit New Detroit Science Center
- Lansing Community College
- Ann Arbor Public Schools
- Michigan Earth Science Teachers Association
- Hillsdale/Lenawee/Monroe Intermediate School Districts
Maine Math/Science Alliance (MMSA)

Under the leadership of Dr. Henrietta List of the Maine Math/Science Alliance, selected teachers across Maine attended an orientation workshop in the late fall 2001 and joined the VISIT Collaboratory. The MMSA continued this role into the VISIT third year. Henrietta List identified the state math/science standards to be addressed and coordinated with the teachers the types of investigations to be conducted.

“We are moving diligently forward with our integration of GIS into middle school science and social studies through our state’s laptop initiative – 33000 iBooks in hands of all 7th and 8th grade teachers and students!! It is exciting work and ESRI and Maine Office of GIS are sponsoring a workshop for leadership in the state. So, we are off and running and I can attribute it to my work with VISIT. So, you all have captured a state through your project (an email from Dr. List, June 13, 2003, RE: GIS Conference).”
GIS etc Educational Technology Consultants

"VISIT participants have been learning about the implementation of GIS technology and methods in science and geography education. The GIS institute in Iron Mountain Michigan is focused on exactly that—how teachers can implement inquiry-based methods of instruction through the use of computer maps, satellite imagery, databases, and graphs in a GIS-based environment. The GIS institute in Iron Mountain builds on the skills and principles that VISIT has forged for the past several years, and would be the perfect finish for the summer VISIT participants or anyone who has participated in VISIT in years past. In addition, the institute would provide VISIT leaders with additional techniques, strategies, data, and lessons to use in future VISIT training and online leadership positions. Joseph Kerski, who has served on the VISIT advisory board since 1998, is one of the instructors of the GIS institute, and would help foster linkages between VISIT and the institute's goals. Most institute participants thus far are from Michigan, and therefore would be excellent future candidates for participants or leaders of VISIT during its next phase (an email on May 29, 2003 from Anita M. Palmer, ESRI Authorized K-12 Trainers, GIS etc Educational Technology Consultants, 1409 S. Lamar #438, Dallas, TX 75215, (214) 533-8376, gisetc@aol.com, www.gisetc.com)."
Modeling the Inquiry Process
The Inquiry and Research Process

Stage 1: Preparing for Research
Stage 2: Accessing Resources
Stage 3: Processing Information
Stage 4: Transferring Learning
The Inquiry Model: A Process Strategy

**Springboard:** Developing the problem or question by making it manageable and meaningful

**Hypotheses:** Generating some tentative answers or educated guesses

- **Initial examination of information**
- **Search for relationships among data**

**Data Collection and Analysis:** Arranging and interpreting data sets

- **Noting similarities and differences**
- **Trends and patterns identification**

**Conclusion:** Evaluating evidence against the hypotheses

**Generalizations:** Testing against new evidence
Inquiry spiral

Plan → Collect Information → Replan → Analyse → Reflect → Collect Information → Analyse → Reflect → Collect Information
Geographic Model for inquiry

- **Ask** (geographic) Questions
- **Acquire** (geographic) Information
- **Arrange** (geographic) Information
- **Analyze** (geographic) Information
- **Answer** (geographic) Questions
Acquiring

Asking
Acquiring

Asking

Arranging

Acquiring

Arranging
Multidisciplinary
Integrated
Holistic

Asking
Answering
Acquiring
Analyzing
Arranging

Analyzing
Arranging
Acquiring
VISIT
Virtual Immersion in Science Inquiry for Teachers
Enable teachers and other educators to:

- draw upon their own and others’ expertise to share tools and build knowledge.
- learn about, create and evaluate educational projects and experiences for use with their own students.
- develop scientific and geographic investigations that take advantage of tools for spatial visualization and analysis of geo-referenced data.
Overview of GIS Tools and Learning Materials

for

VISIT Participants

VISIT offers a variety of geospatial software tools and learning alternatives for teachers, scientists and students who conduct VISIT investigations and explorations. Most of the software packages are available free to educators and scientists. You can choose to follow one or more of the GIS Tools and Learning paths in VISIT in order to acquire and install the software, learn basic GIS concepts, and operate the software, and use the software tools to conduct investigations and explorations.

VISIT GIS learning resources are organized into three paths:

- **Resources in Learning Sequences** - GIS learning materials and tools are organized by levels of complexity from introduction to intermediate and to application;

- **Resources by Software** - GIS learning materials and tools are organized by software packages and;

- **Resources on Web** - Links and jumps to other GIS learning materials and tools available on Web sites by other research and educational institutions.

Resources in Learning Sequences

(Table 1)
The following lists the activities week-by-week. There is flexibility in this schedule to accommodate individual needs, school schedules, and individual goals. However, research has demonstrated clearly that success in an online course is directly related to a high degree of structure and scheduling. If you cannot do all the assignments for a week, you should at minimum participate three times in your topical forum.

PLEASE NOTE: You can access all of the readings, lessons, and forums for this course from the Course Menu of the VISIT Workshops and Forums webct “course”.
http://webct.emich.edu:8900/SCRIPT/VISITWorkshopsandForums/scripts/serve_home

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<td>Read Syllabus - Choose Forum - Install ArcVoyager - Do Race &amp; Ethnicity Lesson - Post Learning</td>
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<tr>
<td>1 Getting Started /2</td>
<td>Explore Lesson - Describe patterns - Respond to colleagues - Introduce self</td>
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<td>1 Getting Started /3</td>
<td>Choose and review an example of GIS in schools &amp; communities - Post analysis - Use forums</td>
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<tr>
<td>2 GIS for Teachers /4-6</td>
<td>Complete exercises - Post results &amp; comments - Use forums</td>
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<tr>
<td>3 Classroom Tryout /6-8</td>
<td>Plan tryout - Help others plan - Conduct tryout - Report results - Use forums</td>
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<tr>
<td>4 Develop a Lesson /6-8</td>
<td>Design Lesson - Post Specs - Help others - Use forums</td>
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<td>4 Develop a Lesson /8-12</td>
<td>Build Base Map - Locate Data - Prepare Data - Write Lesson - Finish developing / modifying lesson - Test lesson - Post progress, feedback - Post final product - Use forums</td>
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### Overall Goal

Participants will learn to identify, locate, and analyze spatial data and apply these processes into their curriculum and classroom practice. Participants use software tools for visualizing and analyzing geospatial data, and apply it in an instructional setting. Teacher investigators will develop and implement investigations or lessons whose process and outcomes are connected to existing educational standards and benchmarks.

By the end of this course, a VISIT participant will complete one of the following projects, either working as a member of a team or as an individual:

1. Develop a lesson or student project in which students in your classroom and curriculum use georeferenced [geospatial] data and tools for visualization and analysis.
2. Adapt an existing lesson for use in your own classroom, field test, and report results to the VISIT Collaboratory.

### Supporting Goals

Throughout the course and in support of that overall goal, you will learn and practice the following:

1. Collaborate with teachers, scientists and technologists on issues related to the topics of this course (including getting technical or scientific assistance with one’s own project, and assisting others in their project development). This is accomplished mainly by participating in online discussion forums and real-time chat on WebCT.
2. Locate, navigate and become familiar with VISIT's information, tools, lessons, data sources, other resources and people in WEBCT and on the WWW.
3. Download and install lesson materials, software tools and databases used in VISIT - from WEBCT and WWW.
4. Learn and practice basic operations of one or more GIS software tools (ArcView, ArcVoyager, web-based interactive mapping, others).
5. Work through example curriculum-related inquiries using GIS-based short lessons. Begin to recognize and analyze spatial data.
6. Using the VISIT rubric, evaluate a sample lesson for use/adaptation in your classroom, students, community and curriculum.
7. Adapt a lesson for use in your own classroom.
8. Develop a lesson or student project for use in your own classroom.
9. Locate and use online sources of georeferenced data for your own project.
Table of Contents

1. Overview: Develop a Lesson

2. Designing the Lesson
   2.1 Designing the Lesson (Instruction)
   2.2 Worksheet 1a
   2.3 Worksheet 1b
   2.4 Completed Example Worksheets
   2.5 Sample Advice from a VISIT Leader

3. Building the Base Map
   3.1 Making a Base Map for a GIS Project or Lesson
   3.2 Base Map: Important Data Types and Sources

4. Locating Data
   4.1 Locating Data for Your Project or Lesson: General Advice
   4.2 Interpreting and Using Metadata
   4.3 VISIT Guide to Data Sources
   4.4 Tips on using Search Engines and Keywords

5. Preparing Data
   5.1 Preparing Data for Your Project or Lesson
   5.2 Lessons on Adding Data into an ArcView Project
   5.3 Lessons on Adding Images into an ArcView Project

6. Writing the Lesson
   6.1 Writing the Lesson
   6.2 Worksheet 4a
   6.3 Worksheet 4b

7. Packaging & Submitting the Lesson
   7.1 What to Include in Your Final Product's ZIP File
   7.2 How to Create the ZIP file and Post It
(partial) List of Data Sources

- **Environmental Hazards and Chemistry**
  - U.S. EPA EnviroJustice Mapper
  - U.S. EPA EnviroMapper and Envirofacts
  - U.S. EPA CAMEO, MARPLOT and ALOHA
  - LandView III

- **Water Data**
  - National Hydrography Dataset (NHD)
  - National Park Service Nationwide Rivers Inventory (NRI)
  - Precipitation (NOAA)
  - Rouge River National Demonstration Project (RPO)
  - U.S. Geological Survey Real Time Water Data
  - Water on the Web

- **Watersheds and Natural Features**
  - U.S. EPA Surf Your Watershed
  - U.S. EPA Watershed Information Network Atlas
  - U.S. EPA EnviroMapper for Watersheds
  - U.S. EPA BASINS
  - Natural Resource Conservation Service (USDA)
  - New National Land Cover Dataset

- **Weather and Climate; Global Change**
  - Carbon Dioxide Information & Analysis Center
  - Climate Monitoring and Diagnostics Laboratory
Communication

The value of the culture of collaboration cannot be overemphasized and the importance of this atmosphere becomes obvious when one observes that other institutions of great tradition and research strength are trying to develop a culture of collaboration where none exists.
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Note: All private entries are italicized.
Weekly Announcements

Week 5 News & Announcements

- **Returning teachers**: please continue in your working group Forums (Earth Science 2002; Environmental Science 2002; Land Use Impact on Watersheds 2002; Social Studies 2002).
- **New this semester to VISIT**: Please read this Week 5 Announcement to the end.

Week 5 starts today (Sunday March 9). Please share your learning.

During the past four weeks of VISIT, 71 teachers and leaders have shared insights about data layers, data sources, visualization, learning styles, generating hypotheses, using GIS maps in Powerpoint presentations, supporting state standards. Important discussion topics have included watersheds, frog populations, historical patterns of U.S. population, invasive species, sustainable communities, landforms, and much more.

During Week 4, more participants looked closely at GIS applications in schools and communities.

In week 5, we continue 2 GIS For Teachers in the Course Menu. 2 GIS for Teachers provides a collection of hands-on instructional materials and data sets that participants may use to become familiar with GIS software, or develop skills and concepts (if already familiar with the software), or tailor materials for classroom use.

Here's what to do this week:

1. Make sure you’ve responded to a peer’s Week 4 post in your topical forum
2. Then go to 2 GIS for Teachers in the Course Menu, and choose "1.1 GIS for Teachers: Activities"
3. Note that we’ve scheduled Weeks 4, 5, and 6 of the Collaboratory for review and posting of the activities in 2 GIS For Teachers.
4. Something to think about as you plan your posts: Notice how helpful and efficient it is when people give their posts relevant, unique subject headings?
5. Watch the Calendar for any scheduled online chats. These can be a quick way to solve problems and generate ideas.
6. Also, take advantage of other Forums such as Main, Leaders, Technical HELP, and Water Cooler Conversations.
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The earthquake lesson caught their attention
Subject: The earthquake lesson caught their attention

Message no. 10155 Posted by Lisa McCray (v_mccray) on Fri Feb 28, 2003 13:44

Dear all, I was playing with the earthquake and volcano lesson while a group of teachers was attending a WebQuest workshop. I couldn’t stand not sharing with them so at the end of their workshop I took five minutes just to give them a taste of what this GIS lesson included. They were so enthusiastic about this. Some of them started leading the discussion about hypotheses to try queries to make... Anyway I just wanted to share.

I have attached my ideas on the earthquake and volcano lesson and a map I generated. On the map I was trying to investigate the relationship between earthquakes and fault lines. Left room to talk about rivers and lakes too. I had to change some of the symbols to make the map easier to read.

Hope I’m on the right track with this.

Lisa

See Attached
Subject: The earthquake lesson caught their attention

Message no. 10233 Branch from no. 10155 Posted by Cynthia Vernon (v_evernon) on Sun Mar 02, 2003 23:57

Lisa,

I will be passing on your information to one of the teachers who are skeptical in regards to GIS. He's already done plate tectonics this year... but I've been emailing him any/all the info I find on here. (After he told me he didn't cover it, I passed his room, saw the kids with maps on their desks---there WAS a misunderstanding---after mentioning this to him he said he'd be happy to see the software. It's been three months!) You're info will refresh the topic!

Cindy

Previous Message Next Message
Subject: Re: The earthquake lesson caught their attention

Cindy, if I could, I would come show him myself. In a room full of teachers, I had everyone's attention (and that's not always easy) most of them were suggesting ways to use the little bit that I showed them.

One thing I think I have learned—just because you don't know a whole lot about the software doesn't mean it isn't useful to you. The old KISS principle.

I think it's great you are trying to encourage others.

Lisa
GIS in Education: An Examination of Pedagogy

Abstract

Geographic information systems (GIS) have been identified as one of the most critical and important software programs for implementing computer-based technology in social studies and science education. Much of the research about effective GIS integration is “garnered from intuition.” This study will present the results of three different teaching methods based on the Jasper Yodbury Problem Solving Series and provide a model for successful GIS implementation into any preservice teacher education program.

“No exemplary models for integrating GIS into preservice teacher preparation programs exist.”

Since the inclusion of geography as a core subject in the Goals 2000: Educate America Act, there has been widespread acceptance among citizens of the United States of the goal of developing students who are internationally competitive as well as productive and responsible citizens in a global economy. In response to this desire for a geographically literate society, the National Geography Standards were developed. The function of the standards is to help students and teachers develop a clear understanding of what geography is and how to effectively apply that understanding to life (National Geography Standards Project, 1994).

The effective teaching of the National Geography Standards has been the focus of K-12 social studies curricula throughout the nation. It has been identified that in order to effectively teach the standards, teachers require a clear understanding of a geographic information system (Bednarz, 1995; Bul, 1995). A geographic information system (GIS) is software that allows a user to store, retrieve, manipulate and display geographic data about any place in the world (Environmental Systems Research Institute, 1999). Even though such an understanding of GIS is necessary, it has not been adopted in the K-12 American classrooms at a rate that the National Science Foundation, Environmental Systems Research Institute (ESRI), and geography educators had once hoped (Environmental Systems Research Institute, 1999; Fitzpatrick, 2002). Fitzpatrick (2002) noted that (ESRI’s) goal in 1992 was for K-12 educators to be the largest single group of users by 1996, a goal still not achieved. The key reason for this slow pace of GIS integration, according to Bednarz and Azeit (1999), is that no “exemplary models for integrating GIS into preservice teacher preparation programs exist” (p. 65).

In response to this lack of exemplary models for teaching GIS, the purpose of this study is to develop and research the effectiveness of three GIS instructional models for university-level instructors to use within preservice teacher education courses.

Rationale for the Study

The geography education reform movement of the 1990s had three principal goals. The first was to forge a consensus among geographers, educators, and the general public regarding the goals of geography education. The second was to examine technology use by geography educators. The third was a revision of geography curricula that would combine current issues in geography technology to enhance student achievement (Phillis, 1994).

In response to the first goal, Geography for Life: National Geography Standards 1994 was written outlining eighteen standards that K-12 students should meet to become geographically literate. The National Geography Standards have been described as a “vital contribution” toward helping students “use their minds well” so they may be prepared for responsible citizenship, further learning, and productive employment in our Nation’s modern economy (National Geography Standards Project 1994). Unfortunately, the second and third goals
Subject GIS in Education: An Examination of Pedagogy

Message no. 10177 Posted by Cathleen Nichols (v_cnichols) on Sat Mar 01, 2003 10:24

Hello all: A Week 3, boy does time fly. This week I chose to read the article titles “GIS in Education: An examination of pedagogy”. The study was designed to provide a successful model for implementation of GIS training into the pre-service teacher education programs. Hopefully, this training would result in the use of GIS software in the classroom as an additional tool to be used by students as the investigate Geographic Themes. The use of this technology could allow students to meet all 18 National Geography standards (1994) that all K-12 students should meet to be considered geographically literate. This topic really interests me since I graduated from Eastern Michigan University in 1995 with a major in Group Science and a minor in Social Science and never used GIS during my study. I am surprised that I never had any experience with GIS because I had several geography and earth science courses. Since I am new to GIS, I was interested in looking at the approaches that Universities may introduce GIS to perspective teachers.
In fifth grade our students learn about plate tectonics. You could just turn on the plates layer and then superimpose the country borders to have a good visual aid to the discussion. Now you could ask the students, "based on what you see and what you know about the shifting of the plates, where do you predict to see earthquakes?" Now turn on the earthquake layer. Pretty impressive.

Now what countries (continents) are most affected by earthquakes? Remember the country layer is off. This gives the students a chance to check their memory of where the countries are. Turn on the country outline and use the identify tool to check on country names. "Ever hear of earthquakes in these countries?" Discussion possibilities are endless. With just the plates and earthquakes on, query to find out the location of earthquakes > 6. Any hypotheses of why they are mostly around the pacific plate? Now let the students explore: is there a relationship with the magnitude and the depth, look at the faults………

Another direction is to have the country layer, rivers and lakes on and turn on the volcano
Hi everyone!

I was really interested in Cathleen's comments regarding the article on GIS in Education. Her comments about having "graduated from Eastern Michigan University in 1995 with a major in Group Science and a minor in Social Science and never used GIS during my study" really struck me, as I had a similar experience. I feel somewhat cheated for not having been introduced to this tool before graduating in 96, or at least during my master's courses which I finished last spring. Getting this tool out to classroom teachers is a critical step, that seems to have been overlooked until recently. I greatly appreciate the VISIT program!

Laurie

I am surprised that I never had any experience with GIS because I had several geography and earth science courses. Since I am new to GIS, I was interested in looking at the approaches that Universities may introduce GIS to perspective teachers.
Subject Re: GIS in Education: An Examination of Pedagogy

Previous Thread  Next Thread  Close

Reply  Reply Privately  Quote  Download

Message no. 10229 Branch from no. 10177 Posted by Theodore Younglas (v_younglas) on Sun Mar 02, 2003 22:03

In her last posting, Cathy states...

I still believe GIS is valuable in allowing students to develop life skills and not just basic knowledge.

It is quotes like this that keep me going. I have always believed that our job is to help teach students life skills that they can use every day of their adult life. I am glad to hear that there are others out there that feel the same way. Keep up teh good work!

Ted

Previous Message  Next Message

Previous Thread  Next Thread  Close
Subject: GIS in Education: An Examination of Pedagogy

Message no. 10243 Branch from no. 10177 Posted by Lisa McCray (v_lmccray) on Mon Mar 03, 2003 13:32

You make a good point about learning styles. GIS is another tool for us in education to try to reach all students.

To comment on another of your remarks, "I still believe GIS is valuable in allowing students to develop life skills and not just basic knowledge." I understand that GIS/GPS technology is now being used in many different careers and jobs. The knowledge of the technology is not necessarily outlined in the job description but it is assumed.

I'm not sure I have this "quote" thing right but it worked.
Al Doyle>> I was wondering, I'm in a very urban environment, what kind of projects could we get involved with?
Alew>> Good question, Al. What content area?
Al Doyle>> I like to do something with neighborhoods, which would complement a map unit I do. I teach Technology which I integrate other curricula, my choice
Steve >> There are a lot of things you can do with census blocks and tracts that center on specific areas.
Al Doyle>> That sounds like it could work
Alew>> How large is your actual school site?
Al Doyle>> We are in Manhattan, near Central Park
Steve Wanner>> Most cities and counties now use GIS. I have had a great response from these people when I have wanted local data.
Al >> I have a contact in planning for the NYC Mass Transit Authority. I wonder what software they use to create their maps.
Alew>> it would be interesting to hear what they're using.
Al >> I will look into it.
Steve>> That would be perfect. They could probably have access to information on other topics as well.
Alew>> And when you do Al, post a short message, successful or not, telling the rest of us what you tried to do.
Al>> Where is that (TIGER data), I know I've seen it somewhere
Alew>> You can also go to the ESRI K-12 site and get a complete set of directions for accessing the 1995 TIGER data, I'll post a message tomorrow with URL's to all of this stuff.
Al>> You da man
Alew>> Not really, you're pushing my envelope, but I'll do what I
Alew>> Next, choose <how to use the atlas>
Alew>> then click on the little esri magnifying glass at the top.
Pam>> OK I did that
Alew>> Great. Are you looking at the map, or a page of text?
Pam>> map
Alew>> welll, then you're home free.
Alew>> you can display or turn off themes by clicking
   in the check box in front of the name
Pam>> Thanks for your help. I don't know if I'll be
   home free, but it will give me something to play around with
Alew>> You add new layers by clicking on the green
   "+" sign in the upper left hand corner
BEV>> I wish teachers would say something about what they think they are learning when the post up their lesson results in the GIS class

RON>> Maybe we can give them the goal and always come back to it in our responses; How to use it in their classroom

AL>> I'm begun asking how individuals intend to apply the ideas in their practice

BEV>> yes. every time. what is point of the exercise results if they do no thinking about what to do with it?

RON>> Right from day one ...How can kids look up gis data to the last day, “here is my unit…”

BEV>> i think after they post their lesson they dont come back till they have another one to post so there is no interaction, reflection, inquiry going on. have to change that!

RON>> We could scale back and say part of the grade is to post then we hook them with great conversation on the craft
Alew>> Hello Pam.
Pam>> Hi Al, I've got the disc in, but I can't find show me. Where do I look for it?
Alew>> OK....go start, programs
Alew>> and you should find either voyager, or arcvoyager.
Pam>> OK let me try that.
Alew>> that should keep opening until you come to the actual program icon (a little boat!)
Pam>> I have arc voyager
Alew>> Sound like an astronaut!
Alew>> ok, now, choose show me, its the third choice, I believe.
Pam>> Thanks! I found it.
Below is the proposed agenda for our teleconference scheduled for Wednesday, Dec 18. As you can see, once again we have a full plate. I’d like us to be able to address all the items on the agenda. I’d also like to start on time and end on time, and so we’ll follow the procedure. I will set a time limit on each item. Each participant will be asked to contribute a single statement on each item. We’ll vote until the time for the item expires. We will start with your posting any additional comments in the moderator’s forum as a response to the notes of the meeting, which will be posted the following day.

<table>
<thead>
<tr>
<th>Discussion Item</th>
<th>Goal/Key Question</th>
<th>Action Steps</th>
<th>Person(s) responsible / due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collecting additional elements for Third Module – After Hunter Message #8637</td>
<td>Q: What additional tools should be available for participants as part of Developing GIS lessons module?</td>
<td>Contributions of various pieces from moderators to the moderator forum posting</td>
<td>Moderators submit elements to moderator forum by 12/8 VISIT leaders prepare useful tools for distribution to participants on an “as needed” basis</td>
</tr>
<tr>
<td>2. Topical Group Issue Moving additional participants into the topical forums</td>
<td>Q: Who (or how many) are not yet participating in topical forums? Q: What can each of us do to move these folks into a topical forum?</td>
<td>Personal email contact? Further Chat session scheduling Leaders identify individuals for contact? Primary moderators send emails to topical forum candidates</td>
<td></td>
</tr>
<tr>
<td>3a. Content Item 1: Earth Science Forum, David Doe Geomancy of northern NY</td>
<td>Q: What sort of positive advice/action steps can we recommend for this project?</td>
<td>Post individual responses to project development discussion in the Earth Science forum Individual moderators each post a response to this (and/or) other “featured” projects</td>
<td></td>
</tr>
<tr>
<td>3b. Content Item 2: Land Use Impact on Watershed, Stacey Vance. Houston Area Watershed Project</td>
<td>Q: What sort of positive advice/action steps can we recommend for this project?</td>
<td>Post individual responses to project development discussion in the Earth Science forum Individual moderators each post a response to this (and/or) other “featured” projects</td>
<td></td>
</tr>
<tr>
<td>4. Suggested Changes for February (Announcement)</td>
<td>A renewed call for recommendations for changes to be posted to the “Changes for February” thread. A review/verification of dates for process continuation</td>
<td>At close of submission period, moderators will be surveyed to prioritize items posted. An attempt to implement top priority items will be undertaken before beginning of February session</td>
<td>Post suggestions/recommendations by 12/21 Survey available by 12/31 Implementation team operational 1/6/03</td>
</tr>
<tr>
<td>5. Posting/Grading for items 1a, 1b, 4a, 4c (Announcement)</td>
<td>Q: Is there general agreement with this decision?</td>
<td>Status report from Leadership team None</td>
<td></td>
</tr>
<tr>
<td>6. Virtual Workshop for Leaders</td>
<td>Q: Would it be possible to schedule an extended Virtual Workshop prior to the start of the February session</td>
<td>Organize and schedule a virtual leader workshop</td>
<td></td>
</tr>
</tbody>
</table>
Greetings all,

Below is the proposed agenda for our teleconference scheduled for Wednesday, July 6th. As you can see, once again we have a full plate. I’d like us to address all the items on the agenda. I’d also like us to be as honest and as open as we can, and so will follow the procedure I will set out below for each item. Each participant will be asked to contribute a single statement on each item. We’ll move around the room as a group, as necessary, to address the need for the items on the agenda.

We would greatly appreciate your giving any additional comments to the moderator’s forum as a response to the need for the meeting, which will be paced for the following day.

<table>
<thead>
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<th>Discussion Item</th>
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</thead>
<tbody>
<tr>
<td>I. Review of Participant List</td>
<td>Do you recognize any teachers from earlier sessions, especially teachers with whom you’ve interacted in the past? Do you see a teacher who stands out from all others? Do you see any patterns, problem areas, or general issues that you should be aware of in order to help things run more smoothly?</td>
<td>Assume personal responsibility for supporting one or more of these past participants. Assume leadership role for one or more projects of special interest. Share your insights with the team.</td>
<td></td>
</tr>
<tr>
<td>II. Review Leaders’ Area of Responsibilities</td>
<td>Review message #9671 in the moderator’s forum. (Facilitators’ areas of responsibility for Spring, 2003.) Are these responsibilities workable within the context of the Summer, 2003 session?</td>
<td>Affirm assigned tasks or request modification or changes in your area of responsibility.</td>
<td></td>
</tr>
<tr>
<td>III. Facilitator personal development plan</td>
<td>Continue to develop efficacy as online facilitators. Review the Facilitator’s Development Guide doc (message 9677 in Moderator Forum) Do you have a personal goal for the spring you’d like to share with the group?</td>
<td>Review personal facilitation goal and Moderator Development Goals short form and define a personal development goal for the semester.</td>
<td></td>
</tr>
</tbody>
</table>

The phone # for the July 6 Leader’s Teleconference is 1.877.817.6222; the access code is 923546.
Gis Lessons for Classroom Integration
Race and Ethnicity Lesson
I really enjoyed reading the thoughts I’ve compiled below and I’m looking forward to reading more!

Message no. 9856  Theodore Younglas (t_younglas) on Fri Feb 14, 2003 15:00

Before I began the lesson, I had some vague ideas as to where the populations of Native Americans would be found. Through westward expansion of the “whites” in the 1800’s, I figured that states in the southwest and the Black Mountain regions would be the most populated.

Like Cathy mentioned in her response, I was shocked to discover the native populations in New York, North Carolina, and Michigan. I am curious as to the reasons behind this.

Message no. 9878  Steven Owens (s_owens) on Sat Feb 15, 2003 17:10

I could see some questions surfacing as I worked through the visual parts of the lesson. For example, why would Illinois be a focus of settlement by Asian/Pacific Islanders and Hispanic groups.

Message no. 9813 posted by Jean Hammonds (j_hammonds) on Wed Feb 12, 2003 18:05 Subject Assignment #1 Race Lesson

As far as the actual lesson goes, it was very interesting to see where the ethnic differences were in the US. The Southwest was about what I guessed based on reviewing the state reading standards for another class. It was interesting to see how observations we assumed about the area were verified with the data.

Message no. 9833  Cathleen Nichols (c_nichols) on Thu Feb 13, 2003 09:22

When I changed the parameters to look at the actual Native American population I was surprised by my findings. Michigan, New York and North Carolina were now part of the top 10. Living in Michigan I knew that there was a large population of Native Americans however I never imagined that we would be in the top ten. As
Message no. 9900 Posted by Al Lewandowski (v_alewandowski) on Sun Feb 16, 2003 18:28

Well, I certainly found your comments on lesson one interesting! I’ve compiled and edited all the messages I could find related to Lesson one on Race and Ethnicity. As a group, I’d say you threw out some mighty interesting ideas. I’ve broken them up into two groups: Predictions/findings and Classroom applications.

In the text below I’m including all the responses I categorized as including participants’ observations about classroom observations as you worked through the lesson.

I’d like to encourage all of you to read these posts and share any thoughts, reactions, or elaborations that occur to you as you read them. Finally, I’d like to remind you that, from my point of view, no insight is too small or any thought too inconsequential to share. I really enjoyed reading the thoughts I’ve compiled below and I’m looking forward to reading more.

Message no. 9833 Cathleen Nichols (v cnichols) on Thu Feb 13, 2003 09:22

Well, this lesson really demonstrated to me how statistics can be manipulated. As a person who evaluates data I realized that I need to look at various pieces of data in order to draw conclusions. For instance, when I was looking at the map of US with the percentage of Native American theme showing, I was not surprised to see the states at the high end.

Message no. 9855 Theodore Youngglas (v tyoungglas) on Fri Feb 14, 2003 15:09

What a great tool to use/incorporate into the classroom. I was amazed at how much information I had just at the touch of a mousepad!

Message no. 9879 Steven Owens (v sowens) on Sat Feb 15, 2003 17:10

What impressed and inspired me the most was the sheer volume of data associated with the theme tables. While I am not a social studies teacher, I can see where having this much data available could lead to the design of a multitude of questions for students to explore.
U.S. Landforms Lesson
Subject: GIS and MEAP Objectives - after Younglas

Message no. 10204 Posted by Al Lewandowski (v_alewandowski) on Sun Mar 02, 2003 11:47

In message 10039 on Sun Feb 23, 2003 20:38, Theodore Younglas (v_tyounglas) writes:

> I enjoyed the section with the continental divide. It immediately brought me back to a question that was asked on the state mandated MEAP test a few years ago. The students were given a map of the Amazon River and South America. The question asked them to decide in which direction the river flowed. I was amazed to see how many students got the question wrong!

Ted raises an interesting and important point about MEAP and GIS. I wonder what some of the rest of you are thinking right now about how using inquiry-based learning experiences with GIS will effect efforts to address state standards and/or improve scores on high stakes tests such as Michigan's MEAP test?
Subject Re: GIS and MEAP Objectives - after Younglas

Message no. 10208 Branch from no. 10204 Posted by Laurie Wahlstrom (v_wahlstrom) on Sun Mar 02, 2003 12:20

As a Geography teacher who agonized myself over many student's responses to that same MEAP question, I have since spent a deal of time looking for ways to help them understand that concept. I would definitely agree that using GIS is a step in the right direction.
Message no. 10161
Branch from no. 10017
Posted by Alan Sills (v_asills) on Fri Feb 28, 2003 16:48

Charlie:

Regarding seeing your wife in ny or ca... consider this: with the right data sets in arcview, you can see whether those high aids rates are universal to all ethnic groups or whether they're concentrated within specific minorities or groups with specific sexual prefs -- from what I understand, and I live in the ny area, they are -- that is: while aids rates are high in the area, it's generally isolated to blacks, hispanics (of low economic status) and homosexuals.

My point? Seeing a "hotspot" in an area of the nation (for anything -- aids, earthquakes, etc.) can prompt a more "in-depth" look to gain insight as to what is *really* going on.

Another example: have kids plot earthquake activity in the northeastern states -- there's lots of events! Should we worry? Not once you realize that most are around a magnitude of 2 or 3!!

Alan Sills

In message 10017 on Sat Feb 22, 2003 18:14, Donald Walrath (v_dwalrath) writes:

I also enjoyed this activity. A part that you didn't mention and that I found interesting was the ability to see the states with the largest AIDS percentages. This makes me glad that I didn't meet my wife found NY or Ca.

I am not sure about incorporating this lesson into my curriculum but looking over the lesson on earthquakes and related processes, this lesson will make it. Have fun with the rest of your lessons. Charlie Varath
VISIT
GIS-based Science Inquiry Lessons

Consist of short activities with:
• an interesting science topic
• Clearly defined curriculum objectives
• pre-compiled data set(s)
• hands-on exercises with step by step GIS instructions
VISIT
GIS-based Science Inquiry Lessons

Consist of short activities with:
• Student worksheets promoting science inquiry
• Use GIS visualization capacities
• Requires spatial reasoning/analysis
VISIT GIS-based Science Inquiry Lessons

It is intended that teachers will learn to use these lessons; then bring the activities to their own classrooms!
ArcView Lessons

Science Inquiry Lessons: (selected from the ESRI K-12 Education GIS Sources, see the Lesson Synopsis for detail)

- Climate Graphs
- Earthquakes Around the World
- Blown Away
- BCancer
- Mapping pH in the Rouge River
- Evolution
- Mapping GLOBE Temperature Observations
- Hurricane Floyd
- Mapping the St. Lawrence Seaway
- Hawaii Island
- Michigan Bedrocks
- Michigan Glaciers
- Cancer Rates and Cement Plants
- Where to Stock Trout? Ecological Classification of Streams and Rivers
# Synopsis of ArcView Science Inquiry Lessons

<table>
<thead>
<tr>
<th>Curriculum Subject:</th>
<th>Physical/Earth Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics Covered:</td>
<td>Temperature and precipitation data</td>
</tr>
<tr>
<td>Comments:</td>
<td>Shows how to create climate graphs from monthly temperature and precipitation data. Climate graphs are linked to map, making it easy to compare climate</td>
</tr>
</tbody>
</table>

## Climate Graphs Lesson

- Read [review about this lesson](#)
- **GIS Technique:** Beginning level, graphics, spatial joins, summarizing tables
- **Geographic Scale:** National
- **Software Used/Needed:** ArcView or ArcVoyager

## Developed by:
ESRI Schools and Libraries from ESRI

## Source:
[ESRI Schools and Libraries](#) from ESRI

## Adapted by:
Mark Schaap and Yichun Xie

## Edited by:
Eastern Michigan University - CEITA
Developing Inquiry Lessons

do we need a list of inquiry topics, I..e, water, environmental science geography historical GIS Earth Science, etc. Then the next two slides as examples of the sorts of investigations in those two catagories?
VISIT Teachers’ Water Investigations

- Ecological classification of streams in Michigan
- Phosphate levels in Maine lakes
- Visualizing parameters of water quality
- Mapping Passaic County streets and streams.
VISIT Teachers’ Environmental Investigations

• Cancer rates and cement plants
• Environmental Justice
• Forest management
• Economic development and ecological footprints
• Ozone monitoring in New Jersey
Calculating Your Ecological Footprint
YOUR RESULTS:

<table>
<thead>
<tr>
<th>Footprint</th>
<th>2.5 hectares or 6.2 acres</th>
<th>4.5 hectares or 11.2 acres</th>
<th>1.5 hectares or 3.6 acres</th>
<th>3.1 hectares or 7.8 acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Footprint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Footprint</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Housing Footprint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Footprints</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Total Footprint per person  11.6 hectares or 28.8 acres

IN COMPARISON:

Your Eco-Footprint measures **114.1** % of an average American Footprint.

Worldwide, the biologically productive space available per person is 2.2 hectares or 5.4 acres.

Now, choose:

How much of the biosphere should be set aside for other species?

[25% Calculate]
### Quiz Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>6.9</td>
</tr>
<tr>
<td>Mobility</td>
<td>2.7</td>
</tr>
<tr>
<td>Shelter</td>
<td>5.4</td>
</tr>
<tr>
<td>Goods/Services</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Total Footprint</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>

In comparison, the average ecological footprint in your country is 24 acres per person.

Worldwide, there exist 4.5 biologically productive acres per person.

If everyone lived like you, we would need 5.1 planets.

---

**Ecological Footprint Quiz 2002**

**Ecological Footprint Campaign**
- Join the Campaign!
- Who are we?
- More about the Footprint

**Email**
- Email a Friend
- Email Results to Yourself

**What You Can Do**
- Involve Others

**Comments and Questions**
- Comment on the Footprint Quiz
- Frequently Asked Questions (FAQ)
- What about other species?
- What about population?
- Features to come

---

**Take Action!!**

**Support This Campaign**
Ecological Footprint
Human Development Index
Stack Development by
Al Lewandowski

Be Gentle With the Mother
Alew222@yahoo.com
A Series of VISIT Science Curriculum Materials

GIS-based Science Inquiry Lessons (ready-to-use, short, subject-specific science lesson plans for classrooms)

VISIT Investigations (Water Quality, HazMat, Radon, Watershed Management, River Eco-Studies, Benthic)

Adaptation of other educational or curriculum materials from,

- the Work/Site Alliance Training Manuals and Cases Studies
- LATE (Look At Environment) GIS Lessons
- MFteach Lessons
- IDRISI Lessons
Who Can Participate in VISIT?
• Educators teaching science in middle and high schools
• Educators teaching geography, social science, math, engineering, and technology
• Other middle and high school personnel

Benefits to the Participants
• Classroom-ready lesson plans
• Professional development as teachers and teacher leaders
• Collaboration with peers and working scientists
• Develop technical skills
A Series of VISIT Science Curriculum Materials

1. VISIT Investigations (Water Quality, HazMat, Radon, Watershed Management, River Eco-Studies, Benthic)
2. GIS-based Science Inquiry Lessons (ready-to-use, short, subject-specific science lesson plans for classrooms)
3. Adaptation of other educational or curriculum materials from,
   - the Work/Site Alliance Training Manuals and Cases Studies
   - ESRI K-12 Educational Materials
   - LATE (Look At Environment) GIS Lessons
   - MFteach Lessons
   - IDRISI Lessons
Procedures Conducting VISIT Investigations

Every VISIT investigation takes a different form based on the nature of the problem under study, the curriculum purposes of the teacher, availability of relevant and adequate data, the amount of time and other resources available to invest, and many other factors. However, most investigations follow a common framework or series of steps.

First, the teacher constructs a draft Scenario. The scenario reflects that teacher’s curriculum, his students’ interests, issues of interest and importance in the local community, and the teacher’s interests. The investigation ends with a published product, which might take the form of lesson plans, student presentation to a local community organization, or a teacher presentation at a professional meeting.

The Investigation Wheel below illustrates that the steps we take in conducting an investigation are not always done in a linear sequence. As the wheel turns, some steps may be repeated. In our real-world investigations we are continually learning. As we learn more about a problem or situation, we may revise our scenario, seek new data, adjust curriculum objectives, recruit a new team member, try a different analysis method, or change our means of assessing what we are learning.
The Wheel-Diagram for Conducting VISIT Investigations
GIS-based VISIT Science Inquiry Lessons

1. The GIS-based VISIT science inquiry lessons are short science lesson plans, with:
   • an interesting science topic,
   • clearly defined curriculum objectives,
   • pre-compiled science data sets,
   • hands-on exercises written with step-by-step instructions based on a GIS software
   • student worksheets promoting science inquiries,
   • using GIS scientific visualization capacities (thematic mapping or graphics),
   • using spatial reasoning/analysis or database analysis functions, and
   • intention for teachers to learn, and to bring them back to teach in classrooms.

2. Every VISIT science inquiry lesson may take a different form based on the nature of the topic under inquiry, the form of data sets analyzed, and the curriculum objectives. However, they are constructed for one lesson hour and at most for two lesson hours.

3. A VISIT science inquiry lesson may be one of the products developed from a VISIT investigation, for instance the pH lesson from the Water Quality Investigation. A science inquiry lesson may also be an independent lesson plan motivated by interesting science topics or curriculum objectives.
## List of the VISIT Lessons

<table>
<thead>
<tr>
<th>Number</th>
<th>Developed by VISIT teacher / staff</th>
<th>Adapted by VISIT teacher / staff from ESRI-K12 sources</th>
<th>Directly from ESRI-K12</th>
<th>Other Sources</th>
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<td>68</td>
<td>39</td>
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<td><strong>Science Inquiry Lessons (ArcVoyager)</strong></td>
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<td><strong>GIS Basic Skill Lessons (ArcView and ArcVoyager)</strong></td>
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<td><strong>Technical Reference Lessons (ArcView)</strong></td>
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<td><strong>Web-Based interactive mapping service (including series of lessons)</strong></td>
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<td><strong>Idrisi Lessons (including series of lessons)</strong></td>
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<td><strong>Teachers’ Investigations (not included in science inquiry lessons)</strong></td>
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<td>Semester</td>
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<td>Software</td>
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<td>Fall 2001</td>
<td>Dennis Newell</td>
<td>Land Usage: Nothing Lost/Nothing Gained?</td>
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<td>Jack Hentz</td>
<td>Severe Weather: Tornadoes &amp; Lightning</td>
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<td>Marilyn McComber</td>
<td>What's draining into the Neosho River</td>
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<td>Win 2002</td>
<td>Margaret Chernosky</td>
<td>Is Global Prosperity and Ecological Sustainability Possible?(Purpose is to examine the global distribution of wealth and ecological impacts of such lifestyles.)</td>
<td>ArcView</td>
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<td>Janelle Kochanski</td>
<td>Cancer Created from Cement? (This lesson will focus primarily on cancer data and toxic releases in the state of Michigan)</td>
<td>ArcVoyager</td>
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<td>Peggy Najarian</td>
<td>Environmental Justice Lesson (The purpose of this lesson is to determine whether there is evidence of environmental discrimination in Wayne and Oakland counties.)</td>
<td>ArcVoyager</td>
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<td>Pamela McDonald</td>
<td>Learning About Chemicals and Their Use In Our Community</td>
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<tr>
<td>Name</td>
<td>Lesson Description</td>
<td>GIS Software</td>
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<td>Clayton McKenzie</td>
<td>Seismic-symphony (Use ArcView GIS technology to evaluate four seismically-active zones for the distribution and depth of earthquake foci, the distribution of volcanoes, the prevalence of high magnitude earthquakes (magnitude 7 and above), and the prevalence of explosive volcanoes (explosivity of 6 and above).)</td>
<td>ArcView</td>
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<td>Lisa Hastings</td>
<td>Headed Toward Midnight: The Underground Railroad in Wayne County, Michigan</td>
<td>ArcView</td>
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<tr>
<td>Eric Swager</td>
<td>To collect information about the layout and rides in Cedar Point Amusement Park.</td>
<td>ArcVoyager</td>
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<td>Erik Martin</td>
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<td>David Armstrong</td>
<td>El Niño’s Chain of Cause and Effect (to have students use data in the form of maps and data tables to see the ocean conditions known as El Niños, the wind conditions that cause them, and the climate changes they produce in Eastern and Western pacific regions)</td>
<td>ArcVoyager</td>
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<td>Win 2003</td>
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<td>Georganne Ehlert</td>
<td>How far is it, really? (help students to find the relationship between air distance and highway distance)</td>
<td>ArcVoyager</td>
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<td>Rebecca Bate</td>
<td>Average teacher salary</td>
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<tr>
<td>Donald Walrath</td>
<td>Classroom try out _using Hawaii GIS lesson</td>
<td>ArcVoyager</td>
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El Niño’s Chain of Cause and Effect

This lesson was created by David Armstrong, a teacher at Stoneham High School in Stoneham, Massachusetts, as a VISIT teacher project. The lesson includes four parts:

a) Teacher’s Notes for Teachers, which states the purpose and objectives, and provides background materials, teacher’s notes, and additional links related to the research;

b) Worksheet For Students, which graphically illustrates four sets of questions on El Niño;

c) Hands-on Exercise Procedure, which provides technical instructions (step by step based on ArcVoyager Software) to explore El Niño’s impacts on ocean temperatures and weather anomaly; and

d) GIS data sets and images that support this lesson plan development.

The lesson provides a complete set of curriculum documents and GIS datasets for both teachers and students to recap a GIS-based lesson plan development. The connections with the curriculum are very strong. The technical instruction is lucid and graphically illustrated, even including all small size “software button icons”. It is easy for others to follow the instructions to complete the exercise. Moreover, this lesson applies GIS functions to explore the associations between El Niño phenomena and ocean temperatures and weather anomaly.
For instance, when comparing the two world map views (the top one is ‘Precipitation Anomaly’ and the bottom one is ‘Sea Surface Temperature Anomaly’ in December 1997), learners can easily identify similarity in the patterns of rainfall and sea surface temperature in the Pacific Ocean (Armstrong, 2003). This comparison can lead to questions, such as, “Do you think that one might cause the other? Which (warmer sea surface or higher rainfall) do you think is the cause of the other? Explain your reasoning (Armstrong, 2003)!”
Another example is visual comparison between precipitation anomaly, sea surface temperature anomaly, and surface-500 meters depth ocean temperature profile in February 2002. The arrows are drawn indicating current strength and upwelling. We can clearly see how the westward current pushes warm water to the West and how cold water “upwells” in the East. This picture helps explain the question, “Shall we expect more humid, rainier weather in the Western Pacific or closer to South America during this month (Armstrong, 2003)?”
State Trends in Teacher Salaries

This lesson was developed by Rebecca Bates, a Math teacher at Opportunity Center, Royal Oak Schools, Michigan, as a VISIT teacher project. The development of this lesson followed a well-organized sequence of five steps for developing a geo-technology based lesson.

**Defining the Learning Unit**
Brief description of the project, driving questions, planned student activities, description of student learning, and needed resources are stated in the learning unit.

**Establishing Curriculum Connections**
School district’s curricular objectives, state’s (mathematics) standards and benchmarks, national (mathematics) standards, key concepts and key words, and enduring understanding initial draft are clarified in this step.

**Metadata Analysis**
This step will determine the list of attributes being analyzed, study (geographical) area, data sources, date of data collection, data collection methods, data format (file type), and the size of data sets.
**Data Processing**

This step will preprocess the data sets to make them ready for analysis, including organizing data sets on a computer for easy management, setting up right projections and scales, and linking geographical feature data with attribute data.

**Organizing and Developing Lessons**

Up to now, it is a good time to revisit previously identified understanding, key concepts and key words, and move from ‘enduring understanding’ to ‘evidence of understanding’, and then to ‘assessment of understanding’. Next it is time to determine lesson details, such as, lecture coverage, field activities, computer-based activities, subject (mathematics) centered activities, and assessment activities. Finally a timetable will be set to conduct and implement these activities.
The lesson, State Trends in Teacher Salaries, is designed to have students create shaded maps (thematic mapping and legend editing) and scatter plots (GIS data graphics) to investigate the differences in average teacher salary from state to state (Bates, 2003). Students are asked to analyze their maps and plots and to speculate on some of the factors related to teacher salary (Fig. 10). This lesson is designed to teach Mathematics for students at Grades 7 to 12.
EASTERN MICHIGAN UNIVERSITY
DIVISION OF ACADEMIC AFFAIRS

REQUEST FOR A NEW PROGRAM
(MAJOR, MINOR, CONCENTRATION, CURRICULUM, CERTIFICATE)

Department of Geography and Geology  January 11, 2003

College of Arts and Sciences

A. PROGRAM DESCRIPTION

1. Program Name: **Geographic Information Systems (GIS) Certification for Educators**

2. Certificate: X

3. Degree Sought: Graduate Certificate: X

4. Provide a brief rationale for the proposed program including goals and objectives of the department, the college, the University, or the professional community that are consistent with those that the program is designed to serve.
The use of GIS by public organizations and private industry has been growing dramatically over the last ten years. Once just a tool to create simple maps, now GIS is used to study complex problems, especially in e-Government, the environment, transportation planning, and community development. At the same time, GIS is being used increasingly in public education as a tool for critical thinking. Most GIS technology producers now offer educational websites and software acquisition incentives especially designed for instructional settings.

Proficiency in GIS provides students with employment opportunities across a broad range of economic sectors and professional paths. Moreover GIS’s use in instruction is part of Computer-assisted instruction (CAI), which plays an important role in contemporary teaching and learning of sciences. The Benchmarks for Science Literacy (American Association for the Advancement of Science [AAAS], 1993, p. 18) specifically state that “Computers have become invaluable in science because they speed up and extend people’s ability to collect, store, compile, and analyze data, prepare research reports, and share data and ideas with investigators all over the world.”

Proposed by Yichun Xie, Al Lewandowski, Randy Raymond, Ron Robinson
Plan for analyzing three years in the VISIT Collaboratory

What does the VISIT Collaboratory corpus consist in? ................................. 2
   I. Archive structure .............................................................................. 2
   II. Participant Records ......................................................................... 5
   III. Main themes .................................................................................. 5
What questions can we address, for what audiences? ............................... 6
   I. What roles do Leaders play in the Collaboratory? .............................. 6
   II. What do teachers want and need with respect to applying GIS in their practice? 6
   III. What does the VISIT Collaboratory experience teach us about providing effective online support for teachers’ professional development, especially in highly technical subject matters where the goal is to help teachers integrate the use of technological tools into the curricula and classroom practice? ...................... 7
What methods can we use to analyze the material with respect to the questions? ........... 7
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   4. Thread analysis ................................................................................ 9
   5. Project analysis ............................................................................... 9
   6. TechHELP analysis ......................................................................... 9
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