Title: GIS Live: Crossing Boundaries through the Power of Technology

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ABSTRACT

GIS Live is a live, interactive, Web-based conference that partners GIS professionals with educators to implement Geographic Information System and Global Positioning System (GPS) technologies as curriculum-learning tools. It is the collaborative effort of many government agencies, educational institutions, and professional organizations including NC A & T State University, NCSU, Wake County GIS, Mecklenburg County GIS, NC Council of Geographic Information and Analysis, NC Urban and Regional Information Systems Association, NC Department of Health and Human Services, NC DENR, and NCDPI's Distance Learning. Our research focuses on how we can use distance learning technologies to cross the boundaries that have traditionally made school learning artificial and contrived rather than real-world and relevant. Problem-based learning challenges that engage teachers and students in the use of real-world tools and the research, publishing, and presentation of their work for a real audience is one promising solution.

GIS Live is a dynamic, interactive experience that everyone in the world can share. Through the immense power of the Web and two-way videoconferencing, we focus on ways we can create partnerships among GIS professionals, educators, and students to use GIS to improve our everyday lives.

Each year's events feature a different focus (see Table 1 at end of article). For example in 2003 we hosted a two-way videoconferencing, Mike Watkins, Manager of Navigation and Mission Design for the Mars Exploration Rover Mission, who joined us from NASA's Jet Propulsion Lab in Pasadena, California, to explain how navigation works when the destination is out-of-this-world. Also, related to the Mars exploration, students of Holly Hanrahan at Carnage Middle School presented their work on The Tumbleweed Project, a partnership of NASA, NC State University, and the middle school students that involves designing a wind-driven sensor device with the goal of discovering life on Mars.

Additional partnerships included problem-solving using GIS (disease transmission), urban and regional planning, crime analysis, forestry, politics, the integration of local-state-federal data for easy viewing with NC OneMap, school bus routing, and a special focus on careers in GIS with college students and their mentors.

We also featured a special daylong demonstration by students from the Saturday Program for Academic and Cultural Education (SPACE) who collected and analyzed data in a GIS activity with live updates on their progress. The day closed with an electronic forum for educators from 4 to 6 p.m. The theme was how to create partnerships and obtain funding and resources. Teachers experienced with GIS gave advice on obtaining funding (Carolyn Moser and Pat Schweigert, Leesville Road Middle School) and designing student internships (Laura Webb Smith, Centennial Campus Middle School). NC State University professors from the Colleges of Natural Resources and Education (Larry Nielsen, Dean of the College of Natural Resources; Hugh Devine, Director of the Center for Earth Observation; Harriett Stubbs, Director of Sci-Link, and Marsha Alibrandi, Curriculum and Instruction) shared their vision for future professional development and support for teachers. NC State University's special partnership with Brazil brought us a presentation from Christiane Gioppo and students at Federal University of Parana.

In 2004 the highlight of the conference was the Autumn Breeze: Hurricane Zeus Scenario that challenged student teams to engage in inquiry-based problem-solving to research, design, and then role-play how emergency response teams in their communities might respond to the threat of a Category 3 hurricane. This emergency response scenario was inspired by Summer Breeze – a highly successful emergency response scenario played out in the summer of 2003 by the City of Charlotte & Mecklenburg County Government and surrounding counties. Andy Goretti, Land Use & Environmental Services Agency and Mapping Project Manager for the City of Charlotte and Mecklenburg County Government, led our Charlotte/Mecklenburg team in the planning of the Autumn Breeze scenario. Wynn Mabry, Health/Homeland Security Emergency Response Director for the City of Charlotte & Mecklenburg County Government, joined us to describe Summer Breeze and introduce our Autumn Breeze scenario.

Schools participating in the Autumn Breeze scenario included Christine Balga's eighth grade class at East Columbus Magnet Academy, Columbus, GA, and Marla McLeod's class at Holmes High School in Edenton, NC. Students from the Science House's Bennett's Mill Pond Project and the Chowan County 4H's Big Sweep Project also presented.

Additional presentations included a variety of GIS uses to cross boundaries: "Climate Change and GIS," "Public Health and GIS," and "3-D Visualization of Downtown Raleigh and GIS." We also featured more general presentations that described GIS, GPS, and shared information about GIS careers.

To see the conference programs, photographs, and view the webcast of the each year, visit www.GISliveNC.net.

GIS Live as a live, interactive, online conference began with the 2002 celebration of GIS Day when North Carolina's GIS professionals in business, government, and university research partnered with educators to bring the celebration to schools across the state and the world.

Who Participated in 2003 and 2004?

Onsite Participants in 2003

The 2003 event was produced at the North Carolina Department of Public Instruction's (NCDPI) Education Building in downtown Raleigh. NCDPI's Distance Learning Systems produces most of the presentations from its Videoconferencing Center with video of the outdoor sessions microwaved back to the Center from the Butterfly Garden of the Museum of Natural Sciences.

At least 75 participants worked onsite to produce the event. This total includes twelve students from the Saturday Program for Academic and Cultural Education, a program sponsored by NC State University to give minority students a boost in core subjects, graduate students from NC State, GIS professionals from state and local government, including the Town of Cary, the City of Raleigh, North Carolina Center for Geographic Information and Analysis (NCCGIA), North Carolina Urban and Regional Information Systems Association (NCURISA), NC Division of Environmental Health, NCSU College of Natural Resources, NCSU Center for Earth Observation, NCSU Libraries, and educators from NCDPI's Distance Learning Systems, NC Partnership in Mathematics and Science (NC PIMS), NC DENR Office of Environmental Education, NCSU College of Education, and NCSU Sci-Link.

Cathy Cole, President of NCURISA, also joined us from UNC-Charlotte to announce new resources NCURISA has developed to help teachers find GIS professionals for partners and other educators for mentoring and partnering.

Web Participants for 2003 event

David Kaye, NCDPI Technical Consultant, reported that the average number of streams during the day was 35 with a peak of 37 at one point. This is considered excellent participation and near the high end of streams recorded on the NCDPI server.

From the eleven evaluations or close to 33 1/3 %, we see that 64 % of the participants identified themselves as educators. When we reviewed the forms, we found that actually all were in some area of education except for one high school student and one GIS professional who completed evaluations.

These educators represented schools in Greenville, Raleigh, Southern Pines, and Whiteville, North Carolina. Knox County Schools in Tennessee and Pottsville School District in Arkansas were represented. Rounding out our educators in this country were a member of the EAST Consortium in Arkansas and an adjunct professor at the College of Charleston, Charleston, South Carolina. We also had the director of Lyndon B. Johnson School in Barranquilla, Columbia, participate.

Total number of student participants reported is 208 and one participant reported that ten members of her US government agency watched throughout the day. If we consider that we have approximately one-third of the participants completing evaluations (11 of 35), then we could easily project that over 600 students participated in the event. With Web events such as this one though, the number could easily be far greater or smaller.

We think it does help us understand our audience better if we also analyze our registration data. From the 87 individuals who registered for the conference, we have estimates of 1310 students who would participate. This number of registrants included 28 students from Arkansas.

Of the 70 adults who registered, 10 were GIS professionals and the rest were educators representing at least 25 public schools, 3 charter or private schools, 20 school systems and nine colleges/universities from eight states: North Carolina, Arkansas, Florida, Georgia, South Carolina, Massachusetts, Tennessee, and Virginia. Special consortia or educational non-profits represented included Massachusetts Marine Educators, EAST (Environmental and Spatial Technologies) Education Initiative, Ohio Aerospace Institute, and the N.C. Wildlife Resources Commission.

Interactive Videoconferencing Participants from 2004 event

The event was produced at the North Carolina Department of Public Instruction's (NCDPI) Education Building in downtown Raleigh. This year we added three additional production sites, including East Columbus Magnet Academy, Columbus, GA; NC A&T University in Greensboro, NC; Holmes High School, Edenton, NC; and Mecklenburg County Health Department, Charlotte, NC. Our NC A&T University site hosted several university science classes.

Approximately 50 students from East Columbus Magnet Academy and Holmes High School participated.

Web Participants of 2004 event

Our total number of streams was higher than last year, reaching a peak of 55 and averaging around 42 compared to last year's peak of 37 and average of 35. We had two other states represented, a technology director from North Dakota participated, as well as our school in Georgia.

We also had GIS professionals from Chowan County's NCSU Extension, NC Division of Water Quality, City of High Point, USDA; and educators from NC A & T University.

An analysis of the "Instant Message Board" or interactive component of our webcast, indicates that we had participants from our two schools post responses (a total of four responses) and GIS professionals and/or educators posted 28 responses – eight of which were content-related and twenty were either messages of encouragement or to let us know they were participating. We also had two tech advisers posting to the board to advise us on technical difficulties.

What Was the Response?

Interestingly, the most positive responses we received came from participants who either wanted to join us and present at next year's GIS Live or were interested in using our model to create their own online conference. We are encouraged by these responses:

From our participating school in Columbia:

Thank you for a wonderful experience. We have had all our teachers and some high school students present at one time or another during the day and for us in Barranquilla, Colombia it is a great opportunity to explore these learning opportunities.

Please let us know when you have other conferences available and in this way we will be improving our system so that maybe, for next year we can participate in videoconferencing with you too (Email communication from director, Nov. 19, 2003).

From an "admirer" in Georgia:

Will these sessions be archieve [archived] somewhere? They were wonderful... Would love to try some similar activities here... But I need to see/hear them again to catch the "how to's"!!!

Thanks again for the tremendous amount of effort and education that occurred today! (Email communication, Nov. 19, 2003).

We also received an email from an instructor at NCSU who wrote us about the value his engineering students found in the event:

If anything the online conference gave the students an opportunity to learn about GIS, and to realize engineers can create some important tools that have a positive impact on their own lives through GIS (Email communication, Nov. 19, 2003).

Our most gratifying affirmation came from Isiah, one of our SPACE students, who declared that "GIS should be a core subject."

To learn about the experience level with GIS as a teaching tool that our registrants brought to the event, we adjusted for the 28 high school students who completed the registration form (Interestingly, 13 of the students reported that they were at Level 1 or "Duh," while 10 were at Level 2 and 2 were feeling obviously a little over-confident at Level 4 or "Experienced and excited about using GIS in my classroom . . . a real advocate").

That adjustment means that only 5 or 6% reported that they were in Level 1 or "Duh? What is GIS," 21 or 25% considered themselves at Level 2 or "Just beginning to understand what GIS is and its potential as a learning tool," 20 or 23% chose Level 3 with the descriptor: "Entry level with some experience using GIS as a learning tool." 16 or 18%) indicated that they were "Experienced and excited about using GIS in my classroom . . . a real advocate."

Of the 11 who completed evaluations, 55% considered themselves to be in Level 4 with an even distribution across Levels 2 and 3 and a single respondent still at Level 1. Although we are sure that GIS Live was a tremendous professional development experience for our participants, we suspect that the most loyal and pro-GIS educators were likely to complete our evaluation.

Goals of Participants?

The goals that our registrants identified can briefly be summed up as 1) to learn more about GIS as a teaching and learning tool, 2) to network and see what colleagues are doing with GIS, and 3) to learn about resources and grant opportunities.

Most Popular Topics in 2003?

Most popular sessions during the day proved to be Problem-Solving and Disease Transmission (70% of those who completed evaluations), School Bus Routing (70%), The Tumbleweed Project (60%), What Is GIS? (50%), GIS Careers in Forestry (50%), NC OneMap (50%), Mapping and Predicting the Weather (50%), GIS Careers in Crime Analysis (50%).

Troublesome is the fact that our eForum session for teachers seemed to be poorly attended. Only one participant completed an evaluation. We had four participants at

Holmes High School in Edenton but these were involved with the presentation scheduled for Colleen Karl, NCSU's Science House consultant for that area. We did have eleven streams going out for our webcast and two viewers posted to our Instant Message Board.

The data leads us to reconsider offering our professional development session (eForum) from 4 to 6 p.m. It is simply too long and too late in a teacher's day. One model that seems promising is to offer a one-hour (3:15 p.m. to 4:15 p.m.) session three to four weeks prior to the big event to help teachers learn about valuable pre-GIS Live activities for their students. A second, follow-up session, perhaps from 3:15 p.m. to 4:15 p.m. immediately following GIS Live may serve as a chance to debrief, hear from teachers who participated, and plan some post-event activities. Plans for developing individual professional development plans for C.E.U. renewal credit could be encouraged.

How Did We Reach People in 2003?

Particularly helpful in getting the word out were the EAST Program in Arkansas, CAST at the University of Arkansas, the KanGIS listserv, NCAETC Meeting, SECOSEE (the new SouthEast Center for Ocean Sciences Education Excellence), NCSU's Science House, and the Georgia-Maine Educators. According to data from registration and our evaluations, Arkansas had the highest number of schools participating. We should explore the networking they used to encourage their schools to participate.

What Was the Response in 2004?

We had more luck this year engaging teachers in our scenario than we did in encouraging teachers to participate in the webcast with their classes. There is no indication that any other schools participated.

Our two classes that presented in the Hurricane Zeus Scenario won outstanding recognition from their schools and school systems.

Here's an excerpt from an email from Nelle Hyatt, Technology Director from Edenton-Chowan County (November 17, 2004):

> I really enjoyed watching our students represent John A. Holmes so very well over the NCIH on GIS Live day, Nov. 17. They did an outstanding job with the Hurricane Zeus project and the Millpond Project. I learned so much during the short time I was able to attend to broadcast. It was also a honor to know that Chowan County was a "premier" county in this project. It was also wonderful to see us be able to broadcast to and to be able to receive a broadcast from Columbus, Georgia.
>
> I was also glad to see community members in attendance of the broadcast and our students behaved so well. I was very proud of them and all the hard work they put in the project.

Christine Balga, who was our "star" teacher from Davis Drive Middle School in Raleigh last year, worked hard to bring videoconferencing equipment to her new school in Columbus, GA. She wrote to thank us for the renewed interest in learning that their participation had engendered in her school:

> The kids enjoyed it so much – the whole school watched and it seems like a different school. My classes seem to have a new confidence and other kids are looking forward to being a part of something like GIS Live. The atmosphere is changing – it is a bit hard to describe but nearly all of the kids, even those who just watched are much more interested in learning. No longer do they come in and just want to socialize. I know it sounds hokey but they have been telling other people about how much they are learning and how fun it is. I hope this lasts.

How Did We Reach People in 2004?

We added three new tools for reaching and preparing teachers for GIS Live participation –a PreConference held on October 6, a GIS Live listserv, and a presence at the NC Science Teachers Association Conference (NCSTA) (November 10-12).

For the PreConference, we had five teachers from Hillside High in the Durham Public Schools participate. Other participating teachers were Eric Walker from Alexander Central High School and Marla McLeod from Holmes High School.

We currently have between twelve to fifteen public school teachers registered on our listserv who received at least two notices about GIS Live and the teachers on NCSU's MEGA listserv were also invited.

Diana Hales organized an NC OneMap booth at the NCSTA Conference and distributed information about GIS Live.

Bonnie Brown, the director of the EAST Program, a national project that involves many schools in Arkansas and California, was responsible for our Arkansas school participating last year. She was to send out information this year, and we have written to learn anything about her schools participating but have heard nothing left.

We have also written to our GIS Live listserv to ask if any teachers "tuned in" and, if not, what suggestions they may have for making our project more attractive for teachers. We have received no responses from our listserv, but Christine Balga has suggested more professional development that awards CEU credits to help teachers learn about GIS so our project will seem more valuable.

We did receive an email from a film and multi-media producer in the Northeast who wrote:

> I watched during the morning and was very impressed with

students and the work you all have done.

I am a film and multi-media producer with a project that could set up GIS activities in informal community settings, in the Northeast/upper Great Lakes. I would welcome your suggestions of colleagues in CT, NY or OH whom we might contact for feedback, field testing, and consulting as GIS education planners.

I am also interested in feedback about whether this project, if realized and piloted in the Northeast, would then be of any interest in other regions. (I rather think not, except as a comparative, collaborative Internet project - but would welcome your thoughts.)

Another email from an educator in New Zealand wrote of sampling some of our archived sessions and said that, regrettably, the 16-hour time difference and winter exams made participation difficult for educators and students in her country.

What Else Will We Do to Evolve GIS Live?

Several factors at work in our state make GIS Live a most relevant and timely project. First, with NCLB legislation, it is more important than ever that reading and literacy be at the center of all curriculum learning. Additionally, North Carolina will soon re-institute the testing of science. It is vital that teachers learn to integrate reading and literacy into their teaching of science. Technology, in general, and GIS, in particular, we believe is an effective vehicle for developing, literacy-rich, interdisciplinary projects. Many teachers in NC are being introduced to GIS in summer staff development institutes. GIS Live serves as an unifying event that helps new teachers share news of this valuable tool, and GIS experienced teachers can easily update their knowledge of the latest technologies and ways of applying these technologies to develop interdisciplinary projects. The event also encourages school, community, and business partnerships.

Each year we hold a steering committee meeting to explore opportunities for gathering feedback on the event from a variety of perspectives. Our committee is made up of many dedicated individuals representing a diversity of GIS professionals and educators. We believe that we have created something unique and valuable in GIS Live. We also believe that we must continue to learn and explore new possibilities if GIS Live is to evolve and make a powerful contribution to our goal of helping teachers and students learn to use GIS as a teaching and learning tool.

Table 1. GIS Live Evolves . . .

Concept: GIS Live is the State of North Carolina's answer to the increasingly important question of how to help educators bring hands-on geography to their students. Harnessing the immense power of the Web, GIS professionals and university researchers team with teachers to share real-world applications of the latest in geotechnologies and explore how these tools can be used for outstanding interdisciplinary, real-world relevant teaching and learning.

Program	GIS Live 2002 10 strands: health, critical incident response, crime analysis, research (remote sensing and wildlife haitat modeling), coastal management, urban planing, meteorology and snow command, Urban Ecological Analyses, and Marine Science	GIS Live 2003 11 strands: disease detectives (epidemiology), GIS Careers, School Transportation, NCOneMap, The Tumbleweed Project, Navigating to Mars; Meteorology; Urban Ecosystem Analyses; Crime Analysis; Redistricting and Campaign Planning, Environmental Justice	GIS Live 2004 Introduction to GIS and GPS; Autumn Breeze: Hurricane Zeus Scenario; Climate Change, Environmental Health; 4-H Club's GIS Project; Bennett's Mill Pond Project; GIS Careers, 3-D Visualization (Raleigh)	GIS Live 2005? Lessons to Learn from: 1.Continue to add state-wide partners to collaboration -- especially those who are providing GIS PD for teachers.. 2. Promote listserv in other listservs and conferences. 3. Continue effort to engage teachers in pre-conference professional development. 4. Explore ways to make curricular links for GIS so teachers will not see it as an add-on. Project-based learning may be the answer. 5. Explore ways to encourage transaction with participants. 6. Consider ways
Highlights	GIS Live Team Challenge -- MOSS Field Demo by middle grades and high school students	Presentation on GIS and Meteorology by WRAL's Greg Fishel; Mars Rover Exploration by Project Navigator and Manager, Mike Watkins; GIS Live Team Challenge	Autumn Breeze: Hurricane Zeus Scenario (Collaboration with Mecklenburg County, Holmes High School, Columbus, GA)	

Participants	Participants from 3 countries (US, Canada, and India); 26 states registered; Actual participation uncertain	35 sustained streams reported; 11 participants completed evals -- NC, Tenn., Ark, SC, and Barranquilla, Columbia; Participation of 208 students reported. 2 schools interacted through Instant Message Board	5 videoconferencing sites: DPI, Raleigh; Mecklenburg County Health Dept., Charlotte; NC A&T, Greensboro; Holmes HS, Edenton; East Columbus Magnet, Columbus, GA; Roughly 40 sustained streams during the day	to obtain more feedback from participants.
Professional Development	eForum for educators from 3 to 5 pm	eForum for educators from 3 to 5 pm (Presenters included Brazilians from University of Parana.)	eForum held on October 6 to help teachers prepare for the event.	
Notes			Effort to go statewide; GIS Live ListServ created; Co-hosted booth at NCSTA	

For more information, please visit our site at www.GISliveNC.net

Other Publications about GISLive

Educational Environmental Projects Using Technology Applications for Middle School Students in Formal and Non-Formal Settings, Harriett Stubbs, *Meridian Online Journal*, http://www.ncsu.edu/meridian/sum2003/gis/index.html (p. 5).

UpClose http://www.enr.state.nc.us/html/upclose.html (January 2003)

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