Highlights of Using GIS in Teaching

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Integrating technology into your teaching

Designing and Refining Our Teaching

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GIS Highlights

- Disclaimer
- What is GIS?
- Teaching GIS in a go-go learning environment: the social work experience
- GIS Resources at Washington University
- Reflections/Discussion
What is GIS?

Estimated that 70-80 percent of all data have a spatial component

Geographic Information Systems
- Geospatial Information Science

A tool to link representations of space to data

A method of inquiry utilizing spatial data

A technique for presenting spatial information
What is GIS?

“Analyses that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programs for capturing, storing, checking, integrating, analyzing and displaying data that are spatially referenced”
What is GIS?

GIS technology ranges from simple to complex

- A paper Atlas
- Mapquest
- Google Earth
- ArcGIS

GIS can be tailored to suite needs of teaching, research, and presentation
What is GIS?

The Database View: A GIS is a unique kind of database of the world—a geographic database (geo-database). It is an "Information System for Geography."

Fundamentally, a GIS is based on a structured database that describes the world in geographic terms.
What is GIS?

The Map View: A GIS is a set of intelligent maps and other views that show features and feature relationships on the earth's surface. Maps of the underlying geographic information can be constructed and used as "windows into the database" to support queries, analysis, and editing of the information.

What is GIS?

**The Model View:** A GIS is a set of information transformation tools that derive new geographic datasets from existing datasets. These geo-processing functions take information from existing datasets, apply analytic functions, and write results into new derived datasets.
What is GIS?

http://nationalatlas.gov/dynamic/dyn_zm.html#
Chaco Canyon, NM

http://bbs.keyhole.com/ubb/showthreaded.php/Cat/0/Number/129659/page/
Teaching GIS in a go-go learning environment: the social work experience

A GIS Curriculum Application
Adoption in Social Work Education

- Ph.D. Program (no current, plans for modeling course)

- MSW Program
  - Research Methods – introduction (initial tests)
  - SW Practice: Organization & Community) - application (module design)
  - Community Development - advanced application (initial tests)
Learning Environment Characteristics

- Professional practice
- Field-classroom integration
- Social work student’s style context-dependent (Cartney, 2000)
Learner Characteristics

- International, diverse (sociopolitical)
- Low geek – high go
  - Activists (hands-on, here-and-now)
  - Pragmatists (practical problem-solving, action)
  - Reflectors (cautious adoption through observation)
  - Theorists (integrate observations, logical coherence)
Initial Tests

Spring 05  Two sections (2:6)

- Conceptual tool approach
  - Read three articles – applied research
  - Brief slide show (Intro to ArcView – 6 slides)

- Analytical tool approach
  - No readings
  - Expert lecture and extensive slide presentation (31 slides) with key concepts, key elements, practical application (STL homeless, N=400, personal information and service use history), links to GIS WUSTL
Initial Tests

**Conceptual Test Feedback**
- Too abstract
- Insufficient real-life relevance/anchors
- Not actionable learning for assignment

**Analytical Test Feedback**
- Actionable learning
- Variability in assignment integration/uptake depending upon designated group member aptitude and interest
Summer School

- Summer introductory course (one-day) mapping your community (ArcGIS)

- Layers, basemaps, shape files, stacked data, mapping: good and bad

- Sides: artistic and technical
Summer School

Striking similarity to SPSS training a kind of underlying structure

Blues music: 12-bar structure, syncopated 4/4 rhythm
“...I can see from my position in Space the inside of all things that you considered closed. For example, I see in yonder cupboard near which you are standing, several of what you call are boxes (but like everything else in Flatland, they have no tops or bottoms) full of money...” (Flatland, Section 16, E.A. Abbot, 1884)
Lessons Learned

- ‘Naming’ and Meaning More Salient:
  - What map colors mean is not strictly aesthetic or technical (i.e., ‘Red’ or ‘Blue’ States)
  - Interpretation of data are not strictly objective (i.e., ‘blighted land’ for Eminent Domain) nor strictly subjective (i.e., the boundaries of Parkview Neighborhood)

- World of GIS is non-Linear and Lumpy
Lessons Learned

- Shift from linear thinking about reporting data to non-linear perspective on problem topology
- Balance technical/procedural knowledge with grounded knowledge of phenomenon
- De-emphasize importance of the internal logic of the software applications
- Begin with a good appreciation for the question and the rationale for approach
- Make appropriate investments in GIS design, training, course design and instructor knowledge
Lessons Applied

Distribute GIS training over three class sessions

- **Session one**
  - GIS Day (ESRI) video (~30 minutes)
  - Discussion of applied articles (30 minutes)

- **Session two**
  - Introduction to GIS: SW-relevant GIS applications, GIS Capabilities, Methodological considerations, Concrete example (45 minutes)

- **Session three**
  - Real-time application of GIS to problem-framing and analysis. Identification of WUSTL & ESRI resources (45 minutes)
Lessons Applied

- GIS trainer/consultant designs module for cross-section application (one common module for all 8 sections)
- GIS trainer/trainers for all 8 sections
- Basic training for all instructors
GIS Resources at Washington University

- [http://gis.wustl.edu/](http://gis.wustl.edu/)
- EPSc Library (EPSc room 301; 935-5406)
- [Social Sciences Computing](http://www.ssc.wustl.edu/)
- WU GIS Coordinator (coming soon!)
- ESRI Virtual Campus (http://campus.esri.com/)
- ESRI Library (http://campus.esri.com/campus/library/)
Reflections/Discussion

- Doing it badly is the worst thing that you can do
  - Negative consequences of make-work mapping to both creativity and critical thinking
  - Button-frenzied brain freeze (BFBF Syndrome)
- Lead with good, well-framed questions
- GIS is a tool for the imagination – makes possible new connections, not just about getting answers
- GIS is a growing initiative—interdisciplinary student and faculty interest will generate novel cross-cutting applications