How Can We Reshape GIS Education to Serve Future Needs?

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Outline

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  o Geographic information science
  o Geospatial technologies
  o Web / Spatial 2.0
• Spatial literacy & spatial thinking
  o Fundamental concepts & linkages
• A spatially infused university
  o Teaching spatial science
  o Teaching spatial applications
  o Teaching spatial literacy
  o Workforce development
• Conclusions

Geographic information science

Geospatial technologies

Web / GIScience 2.0

Multiple shortcomings

• Focus on what is or what has been
• Focus on terrestrial environments
  o Both reflect geography contributions
• Most of the world has been ignored
  o Oceans – cover 70% of Earth’s surface
  o Buildings – people spend 85% of their lives indoors & dense urban areas have more interior space than land area
• Not well aligned with the non-expert user (& everyday places)
• Not connected to sketch & recording needs of design disciplines
Geography & Spatial Sciences?

(Source: NSF 2008)

Spatial literacy & thinking

- Spatial literacy
  - Ability to use properties of space to communicate, reason, and solve problems
- Spatial thinking...
  - A cognitive skill that can be used in everyday life, the workplace, and science to structure problems, find answers, and express solutions using the properties of space
  - It can be learned and taught formally to students using appropriately designed tools, technologies, and curricula
  - A properly positioned GIS could be used to foster spatial thinking across the curriculum

Spatial concept terms

- Spatial structures
- Spatial properties
- Space-time context
- Positioning
- Spatial dynamics
- Spatial relations
- Spatial interaction
- Spatial transformation
- Representation
- Spatial principles
  - object
  - field
  - surface
  - network
  - region, etc.
  - spatial autocorrelation
  - spatial heterogeneity
  - spatial association
  - distance decay
  - access
  - availability
  - isotropy
  - congruence

Geography from a spatial perspective

Spatial / science teaching standards

- Teaching spatial science – Maps & spatial reasoning, principles of geographic information science, etc.
- Teaching spatial applications – Promoting and enabling spatial thinking across multiple disciplines
- Teaching spatial literacy – Promoting and facilitating spatial approaches to thinking and reasoning about the Earth
- Managing universities as spatially enabled enterprises – Facilities management, fund raising, public safety, etc.

A spatially infused university

Source: UCSB Center for Spatial Studies

Source: TeachSpatial (teachspatial.org)
B.S. in GeoDesign ... as one example

- **Goal**
  - To identify the best and most sustainable designs that take into account livability (people), environmental impact (the planet) and efficiency (profit)
- **Relies on an expanding foundation consisting of**
  - An enabling technology (and science)
  - An emphasis on collaboration
  - An interest in interdisciplinary approaches
  - A renewed interest in livable cities and sustainability

Teaching spatial literacy ...

- **Target audience**
  - The entire student body?
- **Possible vehicles**
  - A spatial studies minor
  - A single “spatial” GE course
  - A single “spatial” course for non-majors
  - A series of “small” courses focused on specific technologies and application domains ...

Geographic information infrastructure

- **Contains knowledge describing natural and human environments on Earth**
- **Includes multiple components**
  - Data
  - Data models that provide structure to the data
  - Models and analytic tools that show predictions or suitability
  - Geospatial workflows
  - Metadata, which describes the aforementioned components, and is key to sharing, discovery and access

Spatial applications ...

- **Relies on web & mobile environments to make these ways of thinking about the world more accessible**

Workforce development

- **Geospatial Technology Competency Model**
  - Positioning and data acquisition
  - Analysis and modeling
  - Software and application development
- **UCGIS GIS&T Body of Knowledge**
- **Los Angeles County**
Questions ...

Project for Public Spaces

Placemaking plans

City-wide strategic plans

Capacity building and cultural change

Placemaking 101
Lighter
Quicker
Cheaper
http://www.pps.org

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