STEM Teacher Workshop
Engaging Students in STEM

Hands-On Learning and Real World Applications

June 26, 2018
Using GIS in the Classroom: Engaging Students in Real World Problem Solving
In an era where we are connecting billions of data-producing products, assets, buildings and devices to the Internet, a logical entry point for understanding the digital architecture is “location data”

aka ~ GIS - The Science of Where
What does GIS stand for?

• Geographic - the physical Earth
• Information – tied to the physical Earth
• System - the technology and methods used to analyze and display the information tied to the physical Earth.
What is GIS

• Technological tool for comprehending geography and making decisions through visualizations and analysis
GIS is Being Applied Around the World
Across Many Disciplines, Professions and Organizations

GIS Fuses All Types of Physical and Temporal Data

Becoming an Instrument of Evolution...
Problem Based Learning Approach

• A Question
• Data Collection and Analysis
• Making Decision
• Sharing
GIS - Process Flow, SAMPLE

Data Collection → Data Processing → Data QC/Validation → Analysis

Data Product/App → Visualization Report

Real World
GIS is Visualizing Data


GIS is Analysis

- Demo Population Density

- [http://www.arcgis.com/home/webmap/viewer.html?webmap=9ddd19fa70e4a92a0578666c57ac272](http://www.arcgis.com/home/webmap/viewer.html?webmap=9ddd19fa70e4a92a0578666c57ac272)
GIS is Analysis

• Demo – Median Household Income

• http://www.arcgis.com/home/webmap/viewer.html?webmap=ef204768b4cf48629527ff298689e3f5
Sharing GIS Data – Interoperable - CAD
Sharing Information: Demo Portland Vision Zero

- [https://pdx.maps.arcgis.com/apps/MapSeries/index.html?app_id=47c2153a3fa84636bb63e25b451372d0](https://pdx.maps.arcgis.com/apps/MapSeries/index.html?app_id=47c2153a3fa84636bb63e25b451372d0)
Sharing GIS Data – Story Maps – A place-based narration

- **DEMO**
  - Stanford University Campus
    - [https://stanfordgeo.maps.arcgis.com/apps/MapTour/index.html?appid=2def2cafb835405faa366aff1939bf0c](https://stanfordgeo.maps.arcgis.com/apps/MapTour/index.html?appid=2def2cafb835405faa366aff1939bf0c)

- Antelope Island State Park: Annual Bison Round Up
  - [https://utahdnr.maps.arcgis.com/apps/MapTour/index.html?appid=2f1d62f4c2f946ebab8c3c103a313dc8](https://utahdnr.maps.arcgis.com/apps/MapTour/index.html?appid=2f1d62f4c2f946ebab8c3c103a313dc8)

**STORY MAPS GALLERY**
IoT / Connected Devices – DEMO

- **Demo – Santa Clara – Traffic Feeds**

- [http://missioncity.maps.arcgis.com/apps/MapTour/index.html?appid=3ec86d70fb1f4839a1f249b0176a8f54](http://missioncity.maps.arcgis.com/apps/MapTour/index.html?appid=3ec86d70fb1f4839a1f249b0176a8f54)
Real Time Operations – Any Device, Any Time, Any Where -- DEMO

- **Demo – Iowa Track a Plow**

- [http://pm.map.s.arcgis.com/apps/webappviewer/index.html?id=3d5bc4ec8c474870a19c7e8f44b39c9c](http://pm.map.s.arcgis.com/apps/webappviewer/index.html?id=3d5bc4ec8c474870a19c7e8f44b39c9c)
Value of Visualizing Numbers

• Representing numbers: raw/percentages/ratios
• Understanding patterns, relationships
• Ability of communicate and share

• Data can be explored using GIS tools and methods
Many Forces Are Converging

Enabling a Pervasive Geospatial Platform

Computing & Networks
- Mainframes
- Mini's
- Workstations
- PC's
- Internet
- Mobile

Measurement
- GPS
- Geocoding
- Sensor Networks
- Crowdsourcing
- 3D
- Usability

GIS Software
- Data Models
- Data Management
- Mapping
- Modeling
- Patterns
- Temporal

Geographic Science
- Relationships
- Spatial Analysis
- Visualization
- Processes

Open Data Policies
- Standards
- Data
- Collaboration
- Portals

Collective Geographic Understanding
GIS – Where are we Headed?

Discipline / Department based

GIS is for All

Data Driven
New trends in GIS

- Web GIS
- Cloud vs. On-premise
- BIG Data Analysis
- Event Processing
- Web 3D
- New Generation software
Any to Any—Enabling the Spatial Enterprise

**Any data**
- Population
- Energy
- Building

**Any Server**
- Cloud
- On-Site/ Internal

**Any Client**
- iOS
- Android
- Windows
- Web

**Anybody**
- No formal training
- Intuitive User Interface

**Anytime**
- Online /Offline
Geospatial Technologies: Towards Creating a High Value Impact

**HIGH**
- Transportation
- Construction
- Utilities
- Retail & Logistics

**MEDIUM**
- Agriculture
- Manufacturing
- BFSI

**LOW**
- Citizen Services
- Forestry
- Fisheries

Source: GeoBuiz-18
Go to WWW.ESRI.COM>Industries>Education

https://www.esri.com/en-us/industries/education/overview

Schools
Interactive maps make learning come alive in mainstream subjects—like environmental science, math, history, and literature—and beyond.

Learn more

Higher Education
Students, faculty members, and campus administrators apply The Science of Where for better decision-making and a more sustainable future.

Learn more

Lifelong Learning
GIS users of all ages and stages of professional development are actively involved in learning, teaching, and mentoring. Esri embraces lifelong learning every step of the way.

Learn more
Resources for you

- [http://k12.maps.arcgis.com/home/index.html](http://k12.maps.arcgis.com/home/index.html)

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ArcGIS Online Org for GIS in Schools & Clubs. Scroll left-right for more. Request software or see current map. See the ArcGIS Online Competition for HS+MS. Send email to schools@esri.com.
Schools Mapping Software Bundle

The ArcGIS for Schools Bundle is available at no cost for instructional use to individual US K-12 schools, school districts, and states direct from Esri. Beyond the United States, the bundle is available to schools worldwide through Esri's network of international distributors. Every public, private, home school, and youth-serving club is eligible.

What's Included?

- ArcGIS Online organizational and user accounts
  ArcGIS Online is a collaborative, cloud-based platform.
- Ready-to-use web and mobile apps
  Extend your GIS with special purpose applications.
- ArcGIS Community Analyst licenses
  Use this online mapping solution to support decision-making.
- ArcGIS Desktop Advanced licenses
  ArcGIS Desktop includes both ArcMap and ArcCatalog.
Teach with GIS
An Implementation Guide for Teachers, Schools, and Districts
Our Offerings & Outreach

- **Annual STEM High School Summer Program**
  - 3 days, 7 hours each day (9am – 5pm with 1 hour for lunch), July 23 – 25
  - We expect 20 – 30 students
  - Each day we will group the departments together
    - Monday: Architecture/Interiors/Structural
    - Tuesday: Civil/GIS/Bridges/Transportation
    - Wednesday: Fire Protection/Mechanical/Electrical
  - Panel/Networking event for the current college students
  - Trivia game to allow them to demonstrate what they have learned

- College level collaboration and support/ Internships
- Richmond Joint Engineers Council (RJEC) - Sponsor
GIS Changes How We Think and Act
Integrating Geographic Science into What We Do

Plan
Prepare
Predict
Analyze
Measure

Design
Evaluate
Decide
Act
Manage

We Need to Embrace This Approach... Making It Pervasive Involving Our Organizations and All of Us
Q & A
Thank You

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