



**Lesson Developer:** Lynn Songer, Ph.D.

**Title:** Tutorial for Web-Based GIS

**Subject Area:** General Introduction

**Grade Level:** All grades

**Lesson Description:** This lesson is intended to introduce students to several important geospatial concepts: Scale, data layers, query, buffer, measurement and how to use a Web-based GIS data viewer.

**Recommended Time to Teach:** 60 minutes

**State and National Standards: (CC optional)**

**Education Standards:**

Common Core Standard English Language Arts Standards: English language Arts Standards  
» History / Social Studies » Grade 12

CCSS.ELA-Literacy.RH.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

Common Core Standard English Language Arts Standards: English Language Arts Standards » Science & Technical Subjects » Grade 11-12

CCSS.ELA-Literacy.RST.11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

ITSE National Technology:

3. Research and Information Fluency
  - a. Plan strategies to guide inquiry
  - b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
  - c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
  - d. Process data and report results
4. Critical Thinking, Problem Solving, and Decision Making
  - c. Collect and analyze data to identify solutions and/or make informed decisions
5. Digital Citizenship
  - b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
6. Technology Operations and Concepts



- a. Understand and use technology systems
- b. Select and use applications effectively and productively

### National Geography Standards

- 1) How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information
- 2) How to analyze the spatial organization of people, places, and environments on Earth's surface
- 3) How to apply geography to interpret the present and plan for the future

**Learning Objectives:** The student will be able to:

- 1) Turn on layers of data, locate data legends, and change map scale.
- 2) Locate information using a search tool.
- 3) Generate a Boolean logic query.
- 4) Create a spatial buffer.
- 5) Describe spatial patterns in terms of clustered, dispersed, and random.

### **Materials:**

- Computer(s) with high-speed Internet
- Student activity sheet, one for every two students

**Prerequisites:** None

### **Beginning the Lesson**

Introduce students to GIS and Web-based GIS using one of the media suggestions, the Power Point or a video. Help them make a connection between the coursework they are currently doing and GIS. Discuss how the tutorial is designed to help them know how to use the different tools so they will feel more comfortable with the software when they work-through a GIS lesson designed to address their course work.

Choose your state lesson or a lesson from a state your students might be interested in. The lessons cover the same material, but the geographic focus is state specific.

- 1) Start with showing the Tutorial website on a computer projector. Discuss how each time they click a layer and refresh the map, they are sending a message to a computer (server) at Lane Community College that will return the map and data showing what they requested. Sometimes the messages get hung up or confused and the map freezes or doesn't respond correctly. In this case, they will need to refresh the web link.
- 2) Show students the website and introduce them to “the table of contents – TOC” and the “data and legend” layers. Show them how to use the zoom to layer tool if they get lost. Show them how to draw a zoom square.
- 3) Handout the data dictionary. Show them how the abbreviated field names for the OR city and OR census relate to specific census data. Explain what a Census block is. *The census is used to gather information about the population and is used for important decision-making. These*



*data show census block groups. A block group is a cluster of census blocks (a census block is typically a street block). These data are from the 2000 Decennial Census*

- 4) Assign student partners. One student will read the steps and record the answers while the other student completes the computer steps. After question 8 students will switch roles.
- 5) Hand out the tutorial and ask them to record their answers on a separate sheet of paper.
- 6) Give the extra credit assignment. When you are finished, find and record one interesting piece of information using one of the tools. Tell them they will be asked to show the class how they used the tools to get their information.
- 7) Tell students you are going to work through the lesson and they are to follow along with you as you complete each step. After about three steps tell students that if they are comfortable, they can go ahead, but you will still work though the lesson for students want to follow along. Typically, after about two more steps you can stop the demo work with individual students.

### **Concluding the Lesson**

Ask student to share any information they found that surprised them about the tutorial. Discuss the difference between “And” and “Or.” Ask student to share the extra credit finding and demonstrate to the class how they found their information. As a group discuss how the Web-based GIS is different from and the same as a paper atlas? Ask them what they liked and did not like about using Web-based GIS.

### **References and Citations**

The Geospatial Revolution -Video

USGS What is GIS?- [http://erg.usgs.gov/isb/pubs/gis\\_poster/](http://erg.usgs.gov/isb/pubs/gis_poster/)

ESRI - various education documents - <http://www.esri.com/industries/k-12/education/teaching.html>

### **Tutorial Answer Key**

- 1) 32365 – 49958
  - 2) City Names will vary – there is City Name, State, Housing units and Population for 2000
  - 3) New York has the most housing units there are 3,200,912
  - 4) There are 6 fields – ObjectID\_1, Shape, Name, System, Shape\_length, Length\_miles
  - 5) Distance measurement will change depending on the state measures. Also, scale will impact accuracy of the measurement tools.
  - 6) Distance measurement will change depending on the state measures. Also, scale will impact accuracy of the measurement tools.
  - 7) Polygon tool create an area measurement. It drags the shape along as the mouse clicks are added. Free hand Line allows pencil-like drawing and adds a length measurement.
  - 8) Value will change depending on the state
-

- 9) Yes – If you zoom in enough, the buffer will make contact.
- 10) The states with a low percent of children ages 5 to 17 are clustered in the north east with the exception of Maryland. The middle of the country (Mid-west and northern border have a mid-range population. Utah has the highest, southern states (New Mexico, Texas and Louisiana have the second highest, as well as Idaho, Wyoming and South Dakota).
- 11) Answers will vary depending on State
- 12) Answers will vary depending on State
- 13) 8 States have 20% or more of their population ages 5 to 17. These are in the southern states and in the west - Utah, Idaho, And South Dakota.
- 14) 13 states area selected. Middle of the country north to south, Florida, spotty areas in New England.
- 15) 1 when using **And** - South Dakota.
- 16) 20 states when using **OR**
- 17) When using **AND** the state would have to meet both statements so you limit your selection. When using **OR** they can meet either statement so you selection is expanded.

