Teaching spatial stratification with geographic information systems (GIS)

Abstract
We all have places in our community where we feel 'home': the park, the school, or perhaps the local congregation. How have we assigned these places a 'meaning' and 'character' that differs from another place, which might not be that different? Exploring how place is created through people, culture, history, and landscapes, this learning activity will introduce geographic information systems as a tool to ascertain both real and imagined boundaries that we draw in our local communities. Taking a human ecological approach, this activity aims to develop a relevant understanding of the many ways that the environment—both built and natural—creates racial and economic stratification, to make students more civically aware of power and capital in their community. As students are involved in the democratized process of map browsing and contextual narrative creation, they would become more aware of capacities and liabilities in their community. Further, they can bring their narratives together, question the visualizations along with their individual patterns of behavior and feelings of belonging, and overall—mature with an increased, civic consciousness.

Key words: Geographic information systems; human ecology; stratification; place-based identity; community

Resource Type: Class Activities

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Subject area: Human ecology
Class level: College 100
Class size: Small/Medium

Language: English

Learning Goals

1. Provide content delivery on geographic information systems and its role in social science research.
2. Identify the many ways that local, state, and federal governments use geographic information systems.
3. From a human ecology perspective, develop an understanding of the many ways that the environment—both built and natural—creates racial and economic stratification.
4. Analyze the micro and macro—specifically, the situation of neighborhood or other place-based identities and how it shapes the student's understanding of the social world and their place-based identities.

Activity Outline

Start of activity

1. A strong way to begin this activity is by providing an open question to the classroom with a discussion strategy such as snowball or Think-Pair-Share. ***"What is your identity and how is it influenced by place?"*** It is likely that responses, at this point will be minimal. Let them know that to answer this question is our goal today. They are likely to be caught off guard with this question. Instead, continue to further probe with questions which could include ***"who are you, and what are you doing here?,"*** or ***"how do you define yourself?"***

2. ***"Do you feel like society creates categories that you live within and if so, what?"***
    a. Responses may include race, ethnicity, nationality, religion, gender, and sexuality.

3. ***"How might these categories, or characteristics of these social constructions be spatially created? Are different races, ethnicities, nationalities, religion, gender, and sexualities likely to self-segregate?"***
    a. From this point, the conversation would be drawn into how place creates and reinforces identity.
    b. Students may talk about an area of town that is where racial minorities live, or gay neighborhoods like Chicago's Boystown or Houston's Montrose.

4. ***"What are some historical examples of how these social constructions occupy different places? Specifically, immigration"***
    a. Chicago neighborhoods. Immigration – the Ancestry.com genotype map.
    b. https://blogs.ancestry.com/cm/files/2017/02/MapMigration1_c.jpg

5. Today, we going to learn more about how place is created through people, culture, history, and landscapes, this learning activity will introduce geographic information systems as a tool to ascertain both real and imagined boundaries that we draw in our local communities. Further, how place influences our personal civic identity.

Activity 1 – How can GIS be utilized for data visualization?

This activity has been adapted from the "Introduction to GIS" engagement activity provided by National Geographic. According to National Geographic, this activity follows a "learning-for-use" teaching approach that encourages cooperative and hands-on learning.
https://www.nationalgeographic.org/activity/introduction-gis/

Materials required for the activity will include rope (orange rope and blue rope). Orange rope should be large enough to make continental US and blue rope should be large enough to make a river.

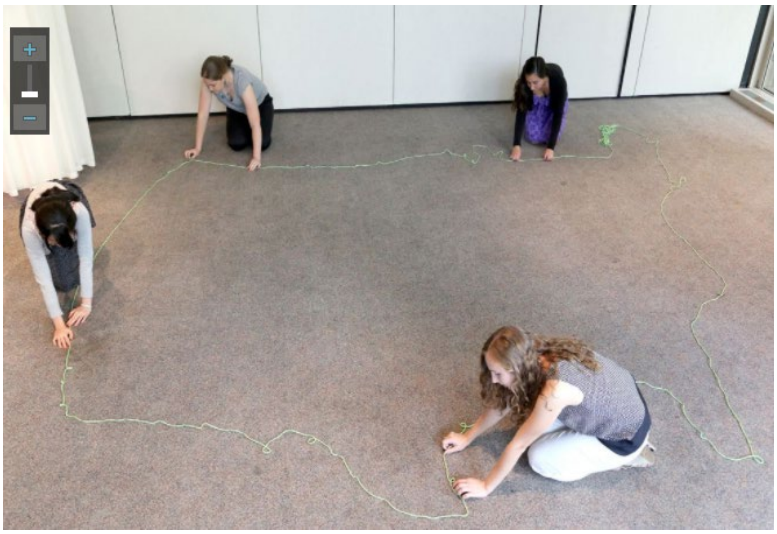
First, let's start by talking about how GIS can be utilized for data visualization in the social sciences.

1. Begin by activating students' prior knowledge
    a. ***When have you used GPS before?*** – Encourage students to share descriptions of using car-mounted GPS devices or GPS on a mobile phone for driving directions, or handheld GPS devices for activities such as geocaching. Explain that GPS technology uses satellites to pinpoint position on Earth with the aid of a GPS device or unit. It's become a part of many people's daily lives.
    b. ***Have you ever used a mobile phone app that allowed you to use maps to explore information?*** – Invite volunteers to share the name and details of relevant apps. Explain to students that many apps today include GPS technology, as well as elements of GIS, which they'll learn about in this activity.

2. Introduce the vocabulary term 'geographic information systems (GIS)'
    a. Explain that GIS is an acronym that stands for geographic information systems. GIS is a system or tool for displaying and analyzing data related to positions on Earth's surface.
    b. Give students a couple of current examples that they are likely to be familiar with, such as using GIS to understand crime patterns in a city or to track wildlife as animals migrate from one area to another.
    c. ***What is the difference between GPS and GIS?*** – GPS provides users with geographic data. GIS allows users to display and analyze that data.

3. Identify ways GIS impacts our everyday lives
    a. Explain to students that many different industries use GIS. *Invite students to identify some examples of how a company, agency, or group might use GIS in their work.* Offer the following examples:
        i. GIS technology supports the design, implementation, and management of communication networks for the phones we use, as well as the infrastructure necessary for Internet connectivity.
        ii. GIS is used in managing and designing road networks and transportation infrastructure.
        iii. GIS is used to help plan efficient routes for medical emergency vehicles to travel between emergency sites and medical care facilities like hospitals.
        iv. Businesses use GIS to decide where to build new stores and restaurants. Marketing companies use GIS to decide to whom to market those stores and restaurants, and where that marketing should be.

Next, we are going to do a hands-on activity that will help understand how GIS works. (The goal of this activity is to provide a natural, critical learning environment where students learn through the use of authentic tasks and by grappling with stimulating and important questions or problems.)



1. Have students create a shape, or polygon.
    a. **Invite a small group of 4-5 students to use the floor and rope to create a map of the continental United States.** Allow students to use reference material if they are not familiar enough with the shape of the country. Make sure students understand they do not have to use all the rope, but it should take up a large part of the floor.
    b. *To create the United States, you created a shape, or a polygon. What are some other shapes you could have created?* (Possible responses: counties, cities)
2. Have students create lines
    a. **Choose 3-4 different volunteers and ask them to create a major river with blue rope.**
    b. Ask: *When you created the river, you created a line. What are some other lines you could have created?* (Possible responses: roads, trails, pathways)
3. Have students create points
    a. Once the floor map is in place, ask each student to stand on a location they either have visited or would like to visit.
    b. *When standing on the place you'd like to visit, you created a point. What are some other points you could have created?* (Possible responses: home, school, grocery store)

Working together, the class simulated a simple, low-tech GIS. Prompt students to think about the simulation as they have a whole-class discussion:

1. *How does GIS help users with data visualization?*
    a. Identify patterns in the data
2. *How does GIS help users with data analysis?*
    a. Identify relationships

Activity 2 – Racial Dot Map

Next, let's look at an example of GIS used for social science research. From this example, we can identify patterns in the visualized data.

http://demographics.virginia.edu/DotMap/

This racial dot map is an American snapshot; it provides an accessible visualization of geographic distribution, population density, and racial diversity of the American people in every neighborhood in the entire country.

The map displays 308,745,538 dots, one for each person residing in the United States at the approximate location they were counted during the 2010 Census. This data was available publicly through the National Historical Geographic Information System and visualized by the University of Virginia's Weldon Cooper Center for Public Service.

Each dot is color-coded by the individual's race and ethnicity. Whites are coded as blue; African-Americans, green; Asians, red; Hispanics, orange; and all other racial categories are coded as brown.

At most zoom levels, each dot is smaller than a pixel, and so the blended colors from afar are "aggregations of many individual dots," with people represented by the color scheme at right. Looking at the entire country, most of the patches that aren't blue correspond to colorfully smudged urban areas. Many of those metro areas look purple from a distance until, like with this picture of Boston, you zoom in closer and colors break apart. The city is diverse from a distance, but quite segregated at the neighborhood and even block level.

Show examples of different cities that students ask to see. Most likely the areas that are relevant to where they are from and can talk about. Also, Gatesville, TX.

Questions for discussion:

1. What academic concepts that we have previously discussed this semester become apparent during this experience?
2. How does using GIS to visualize spatial stratification provide a different perspective to sociology, in comparison to other means. In fact, what other means have we used to visualize racial neighborhoods and stratification?
3. What are some pre-existing understanding of stratification that you feel were challenged or re-enforced by today's activity?

Learning Goals Assessment

1. Students will be able to explain what geographic information system technology is, and how it can be used for social science research
2. Students will learn about the many ways that local, state, and federal governments use geographic information systems, including the City of Waco and McLennan County governments
3. Students can identify how neighborhood or other place-based identities can shape our understanding of the social world (ethnicity, age, socioeconomic status, university communities).

References

https://www.nationalgeographic.org/activity/introduction-gis/
http://arcg.is/0O0jbq

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