Educational levels in the USA:
a closer look

Lesson Overview

Educational achievement varies throughout the United States. Data about educational achievement can be analyzed by using the American Community Survey (ACS) data. ACS data is an ongoing survey that provides information on a yearly basis about the United States and its people. The ACS layer used in this exercise contains education levels by tract, county, and state boundaries. For this exercise academic achievement will be analyzed by the following categories:

- No high school diplomas
- High school diplomas
- Bachelor's degree

The National Education Association is interested in patterns and trends of academic achievement in the United State. The association has asked for maps that illustrate academic achievement at a county, and tract level.

Builds skills in

- ➤ Manipulate ACS data
- ➤ Map by quantities
- ➤ Filter
- ➤ Use predominant mapping
- ➤ Describe trends and patterns

Software requirements

- ➤ ArcGIS Online account (get a free trial)

Estimated time

- ➤ 30 minutes to 1 hour

Exercise

Step 1: Add ACS Educational Variable and Save the Map

1. Sign into your ArcGIS Organizational account.

2. Click the **Map** tab.

3. Click the **Add** button and click **Browse Living Atlas**.

4. Search for *ACS educational levels*.

5. Find the Educational **Attainment Variables – Boundaries layer** owned by esri_demographics and click and **Add** button.
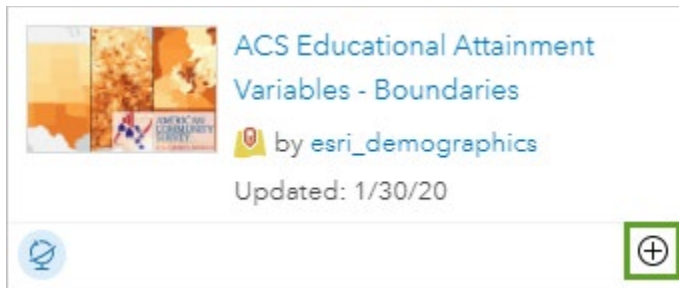
6. Click the back arrow and click **Content**.

7. No analysis is to be done with the State Boundaries. Point to **ACS Educational Attainment Variables – Boundaries – State** and click the **More Options** button (three dots). Choose **Remove**.
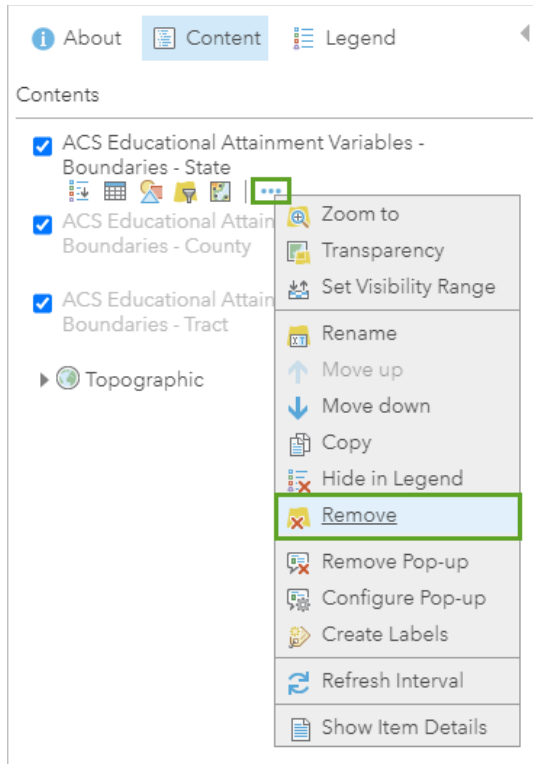
8. Click **Yes, Remove Layer**.

9. The **County** layer is not visible because it has a visibility range set so it can only be seen at certain

scales. Click the **More Options** button for this layer and click **Set Visibility Range**.
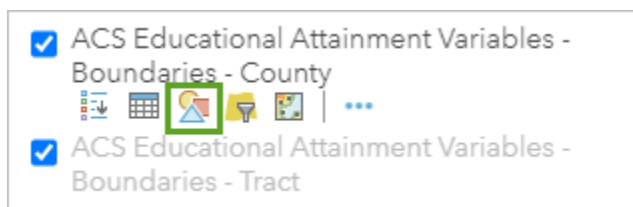
10. Expand the visibility range to span between **World** and **Room**.

11. On the top ribbon click **Save** and **Save As**.

12. For Title, type *Educational Levels in the USA*, followed by your name or initials. Add appropriate tags

and a summer and click **Save Map**.

Step 2: Represent data by quantities

1. Point to the **County** layer and click the **Change Style** button.

2. Open the **Choose an attribute to show** menu. There is a lengthy list of attributes to choose from. You

may want to enlarge the content pane by grabbing and dragging its right edge.

3. Choose the attribute **Percent of Population 25 Years and Over whose Highest Education Completed is Less Than High School**.

4. Click **Done**.

5. Under the **County** layer, click the **Show Legend** button.

The counties that have a darker color have a higher percentage of population that has not completed high school. The map would be easier to interpret if state boundaries were shown.

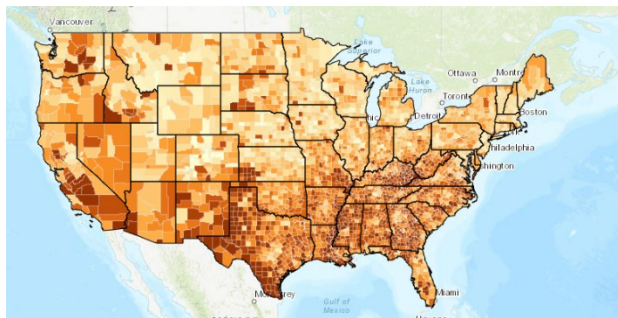6. Click **Add** and choose **Browse Living Atlas Layers**.

7. Search for and add the **USA States (Generalized)** layer owned by Esri.

8. Click **Change Style** and click **Options**.

9. Click **Symbols** and for **Fill**, click **No color**.
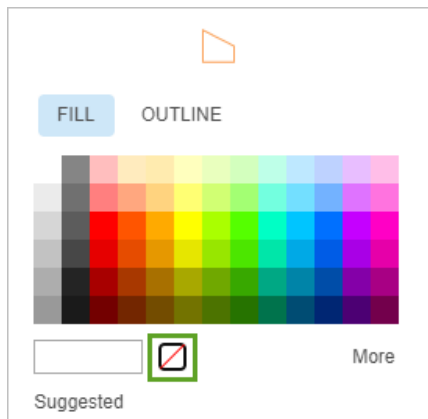
10. Change **Outline** color to black.

11. Save the map.

Q1. What states have the highest percentages of students with no degree?

Q2. Do you see any regional trends?

Q3. What pattern do you see represented along the border between Arkansas, Louisiana, and Mississippi?

12. Change the style for the County layer to the attribute **Percent of Population 25 Years and Over whose Highest Education Completed is Bachelor's Degree or Higher**.

Q4. What is the spatial distribution of counties with the highest percentage of college degrees? Lowest?

Q5. Do you see any regional trends?

Step 3: Filter the data

It would be interesting to know in which counties more than 40% of the population have completed a Bachelor's Degree or Higher.

1. Under the **Counties** layer, click the **Filter** button.

2. Construct the expression **Percent of Population 25 Years and Over whose Highest Education Completed is Bachelor's Degree or Higher is greater than 40**.

3. To see the results better, on the top ribbon, click **Basemap** and choose **Light Gray Canvas**.

Q6. Describe the spatial distribution of counties where more than 40% of their population have a bachelor's degree.

Step 4: Create a predominance map of academic achievement

A predominant category map allows you to compare multiple related attributes to show which attribute is prominent—that is, which has the highest value in each area—and the degree of its predominance

compared with the other attributes. In this example, you'll map the percentage of people with a bachelor's degree or higher, the percentage of people with a high school diploma, and the percentage of people with less than high school. Each of these three attributes will be represented with a different color, and transparency will show the relative strength of each attribute.

1. Remove the filter from the **County** layer.

2. For the **County** layer, click the **Change Style** button. The attribute **Percent of Population 25 Years and Over whose Highest Education Completed is Bachelor's Degree or Higher** should already be selected.

3. Click **Add attribute** and choose **Percent of Population 25 Years and Over whose Highest Education Completed is High School (includes equivalency)**.

4. Click **Add attribute** and choose **Percent of Population 25 Years and Over whose Highest Education Completed is Less Than High School**.

5. For **Select a drawing style**, choose **Predominant Category**.
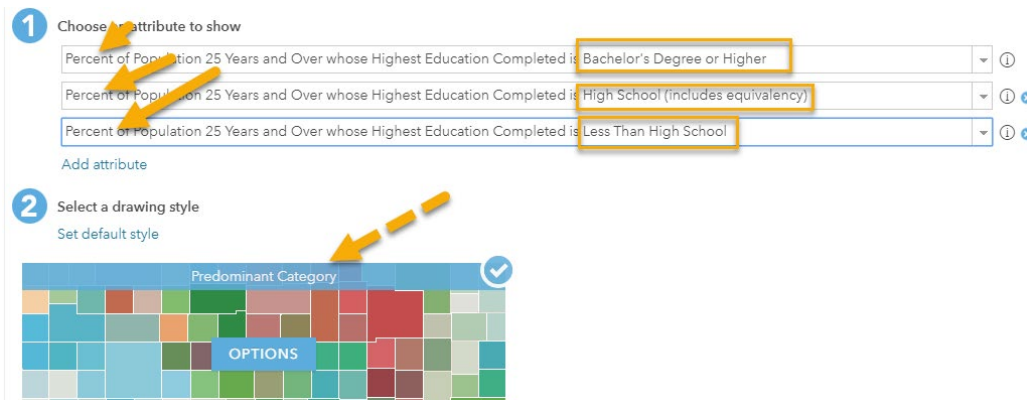
6. Feel free to change the colors to a palette that you think represents the data bes.

7. Click **Done** and save the map.

Step 5: Create a predominance map of academic achievement by category and size

Predominance can also be shown by category and size. Color shows the predominant category and size shows the sum of the categories. Transparency shows the relative strength of the predominance.

1. Under the **County** layer, click **Change Style**.

2. For **Select a drawing style**, choose **Predominant Category and Size**. Click **Options**.

3. Click **Specify size range** and set the **Min** and **Max** to *5* to *20*.

This is a sophistical visual if you are looking at one state.

4. Create a filter with the expression **STATE is Texas**.

Q7. Describe the spatial distribution of academic achievement within Texas.

In this lesson, you have displayed academic achievement data by counties using quantities, predominant categories, and predominant category and size style methods.

Assessment

Select a county and using the same procedure, look at academic achievement patterns by census tracts. Census tracts are small, relatively permanent statistical subdivisions of a county. Census tracts average about 4,000 inhabitants per tract.

Exercise Answers

Q1. What states have the highest percentages of students with no degree?

A1. Texas, Kentucky, Louisiana, Mississippi, and Alabama have a high percentage of students with no degree.

Q2. Do you see any regional trends?
A2. The southern part of the United States seems to have the lowest percentage of students with no degree.

Q3. What pattern do you see represented along the border between Arkansas, Louisiana, and Mississippi?
A3. There is a band of students with no degree along this region.

Q4. What is the spatial distribution of counties with the highest percentage of college degrees? Lowest?

A4. Vermont, New Hampshire, Connecticut, Massachusetts, New Jersey, Maryland, and Colorado all have high concentrations of college degrees.

Q5. Do you see any regional trends?

A5. The northeast has a high concentration of college degrees.

Q6. Describe the spatial distribution of counties where more than 40% of their population have a bachelor's degree.

A6. There are pockets of counties in Virginia and Maryland, the northeast, parts of Colorado and Southern California.

Q7. Describe the spatial distribution of academic achievement within Texas.

A7. The southern border of Texas has a low rate of academic achievement.

Esri License

380 New York Street

Redlands, California 92373 – 8100 USA

Copyright © 2020 Esri

All rights reserved.

Created in the United States of America.

About the author

This lesson was written by a K-12 educator with support from the Learn ArcGIS team at Esri.

Support

If you have any questions about the lesson or need more support, please post them on the GeoNet community forum. We will reply with a possible solution.

Share your work

You can share your lessons and any other educational resources with us through our Learn ArcGIS Contributor program. Contact us with your idea.

https://learn.arcgis.com/en/educators