SDLC Strengthening Data Literacy across the Curriculum

Investigating Immigration to the U.S.

Module Overview and Sample Lessons

The *Investigating Immigration to the U.S.* module focuses on describing, comparing, and making sense of categorical variables. Students investigate questions such as: Are there more immigrants in the U.S. today than in previous years? Where have immigrants to the U.S. come from, now and in the past? Are immigrants as likely as the U.S. born to be participating in the labor force, after adjusting for education?

This module was developed for 12th grade non-AP mathematics and statistics courses and contains seven lessons and one final team data investigation. The module is designed for two to three weeks of instruction.

This sample document contains 1) an overview of the module lessons and learning objectives and 2) the team data investigation.

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Investigating Immigration to the U.S.

Lesson Overview and Learning Objectives

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Investigating Immigration to the U.S. Module

Lesson Overview and Learning Objectives

1. **Who are immigrants in the U.S.?**
   This lesson introduces the overarching themes of the module: Who has been immigrating to the U.S., and how have immigrants shaped U.S. society over time? The lesson also introduces some myths about immigrants that the module seeks to dispel through data analysis. This lesson also explores some infographics that show the contributions of immigrants in variety of sectors of the U.S. economy.

   Learning Objectives
   Students will be able to:
   - Identify questions about U.S. immigrants that can and cannot be answered with data.
   - Summarize key information about immigrants that is collected by the U.S. Census Bureau on the American Community Survey (ACS) questionnaire.
   - Explain how the 4-step Data Investigation Cycle can support exploration of questions and help break down myths, misconceptions, and stereotypes about immigrants to the U.S.

2. **What percentage of the U.S. population were immigrants in 2017?**
   In this lesson, students begin to examine the following myth: *The U.S. is being overrun with immigrants like never before*. They do so by examining data from the ACS to determine the percentage of the U.S. population who were immigrants in 2017. The lesson discusses the concepts of sample proportions and percentages; how they are used to analyze categorical variables/attributes; and the approximate margin of error around sample estimates.

   Learning Objectives
   Students will be able to:
   - Use a sample proportion or percentage to estimate the population proportion or percentage.
   - Explain why sample proportions will vary from sample to sample.
   - Explain what the approximate *margin of error* means and why it is important to include this calculation when reporting findings.
   - Use 2017 data to comment on whether or not the U.S. is overrun with immigrants.

   Focus CODAP Skills:
   Students will learn to:
   - Create a binary attribute from a quantitative attribute.
   - Take screenshots and create links to share graphs.

3. **Are there more immigrants in the U.S. in 2017 than in previous years?**
   This lesson continues to use data to explore the following myth: *The U.S. is being overrun with immigrants.* Students will investigate how levels of immigration to the U.S. have changed over time by examining the percentage of immigrants in the U.S. population in 1920, 1970, and 2017.

   Learning Objectives
   Students will be able to:
   - Describe the distribution of a categorical attribute using percentages and proportions.
   - Compare two different percentages and write a conclusion about whether or not the difference is larger than the approximate margin of error.
   - Interpret a timeplot using background information.

Focus CODAP Skills:
Students will learn to:
- Recode a quantitative attribute into a categorical attribute.
- Use CODAP to calculate sample percentages.

4. **Where have immigrants to the U.S. come from, now and in the past?**
The goal of this lesson is to have students examine the changing world origins of immigrants over time, and to reflect on causes behind these changes. In this investigation, students will gain experience generating and comparing percentages of categorical data from different years.

Learning Objectives
Students will be able to:
- Create and interpret a segmented bar chart that displays conditional percentages.
- Produce conditional proportions and percentages to compare categorical attributes.
- Summarize the relationship between two categorical variables using graphs and numerical summaries.

Focus CODAP Skills:
Students will learn to:
- Use the Fuse Dots feature to compare categorical data at two points in time.

5. **Where have immigrants settled in the U.S.?**
The goal of this lesson is to have students examine variation in immigrants' geographic settlement patterns. Through this investigation, students will gain further experience generating and comparing percentages of categorical data.

Learning Objectives
Students will be able to:
- Read and interpret percentages from bar graphs.
- Attend to what is the "part" and what is the "whole" when calculating a percentage.
- Use data to analyze where U.S. immigrants were most likely to live in 2017, and how the settlement patterns of U.S. immigrants compared to those of U.S.-born individuals in 2017.

Focus CODAP Skills:
Students will learn to:
- Choose between displays of row or column percentages to make appropriate comparisons among categorical attributes.

6. **Are immigrants as likely as the U.S. born to be employed or looking for a job?**
In this lesson, students explore the following myth: *Immigrants don't pay taxes and are a drain on society and the economy.* To do so, students investigate the differences in labor force participation between U.S.-born individuals and immigrants. Through this investigation, students will gain further experience generating and comparing percentages of categorical data where there are more than two possible categories. They will also gain experience with data cleaning and subsetting.

Learning Objectives
Students will be able to:
- Determine percentages based on what is the "part" and what is the "whole."
- Interpret percentages, and use them to compare and contrast groups.
- Describe how, if at all, U.S. immigrants differ from U.S. born individuals in 2017 with regard to whether they are employed, looking for jobs, or unemployed.

Focus CODAP Skills:
Students will learn to:

- Identify attributes of individual cases in a graph by selecting and finding the cases in the data table.

7. Are immigrants as likely as the U.S. born to be participating in the labor force, after adjusting for education?

This lesson builds directly on Lesson 6 and continues to address the following myth: *Immigrants don't pay taxes and are a drain on society and the economy.* The lesson aims to develop students' understanding that the association between two variables may change after accounting for a third variable. Specifically, students investigate what happens to labor force participation rates of U.S.-born individuals and immigrants when adjusting for education levels. Students will also gain further experience generating and comparing percentages from categorical data using attributes with more than two possible categories. They will also gain experience with data cleaning and subsetting.

Learning objectives
Students will be able to:

- Determine percentages based on what is the "part" and what is the "whole."
- Read and interpret percentages from bar graphs.
- Describe what may happen to the association between two attributes when adjusting (or controlling) for a third attribute.
- Describe whether U.S. immigrants are as likely as the U.S. born to participate in the labor force, after adjusting (or controlling) for whether or not people have a college degree.

Focus CODAP Skills:
Students will learn to:

- Create multiple graphs (such as in a side-by-side layout) to examine the relationship between two attributes when adjusting (or controlling) for a third attribute.

8. Team Data Investigations

Students will work in teams to choose and investigate a new question related to immigrants in the U.S. They will apply their understanding of the 4-step Data Investigation Cycle as well as statistical concepts to address their chosen question. Specifically, they will identify a question to answer, assemble a data set using ACS and/or decennial census data, use graphs and tables to analyze the data, and justify conclusions based on the data. After investigating patterns between two attributes, students will examine how the relationship between two attributes may change when adjusting for a third attribute. Students will be encouraged to share their work and findings with their peers.

Questions for further investigation of immigrants in the U.S.:

1) What types of occupations are immigrants most likely to hold compared to U.S.-born individuals?
2) How does the typical wage of immigrants compare to the typical wage of U.S.-born individuals?
3) Are immigrants in 2017 less likely than immigrants in 1980 to speak English well?

Possible third attributes:

- Sex, race/ethnicity, education, age, marital status, U.S. region, a different year (an option for question 1 only), birthplace (an option for question 3 only).

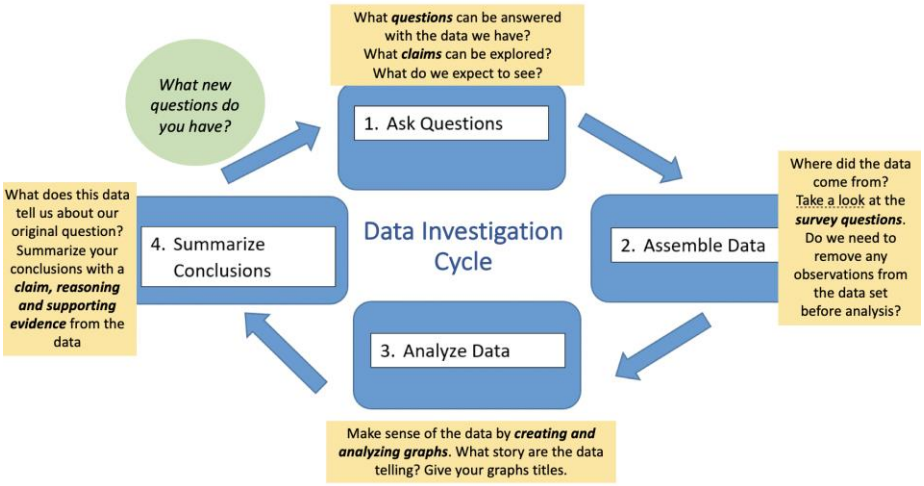
Investigating Immigration to the U.S.

Team Data Investigation

Team Data Investigation: Investigating Immigration to the U.S.

Overview

Work as part of a team to apply your understanding of the Data Investigation Cycle and statistical concepts by completing the cycle for a new question using ACS and decennial census data. You will identify a question, assemble a data set, analyze the data, and draw conclusions. You will share your work and findings with your peers.



Step 1: Ask a Question

Review the suggested list of questions below. Choose a question from Part A that interests you. Then choose a third attribute from Part B to add to your analysis.

Part A. ***Choose one*** *of the bolded questions below to investigate:*

Question 1. What types of occupations are immigrants most likely to hold compared to U.S.-born individuals?

Question 2. How does the typical income of immigrants compare to the typical income of U.S.-born individuals?

Question 3. Are immigrants in 2017 less likely than immigrants in 1980 to speak English well?

Part B. ***Choose a third attribute*** *to extend your analysis. In particular, you will explore how your findings change when you adjust (or control) for this third attribute.*

- Sex
- Race/ethnicity
- Education
- Age
- Marital status
- U.S. region
- Birthplace (Option for Question 3 only)

1. List your question below.

2. List the third attribute you will investigate.

3. Make some **predictions about** what you expect to see in the data.

4. How do you expect the results will differ when you consider the third attribute?

Step 2: Assemble Data

If you chose **Question 1 or 2** in Part A above, you will use this dataset.
If you chose **Question 3** in Part A above, you will use this dataset.

5. What is the sample size?

6. List the attributes (variables) included in the dataset

7. List the attributes you plan to use in your analysis. Reference the data code book and include a description of the attribute.

8. Will you clean the data at all? Record notes here on what you do so that you can describe your actions in your conclusion summary.

9. Which attributes might you want to recode? Why? Record notes here on what you do so that you can describe your actions in your conclusion summary.

Step 3: Analyze Data

10. Make graphs to address your first data investigation question (Part A).
    - Display appropriate counts and percentages on the graph or create a table to display the counts and/or percentages.
    - Give each of your graphs a title.
    - Describe any data-cleaning (setting aside or hiding) that you did and why.

11. Insert screenshots of your graphs and paste a link to CODAP below.

12. What story do you think is told by the data? What patterns do you see?

Next, you will create and analyze graph(s) that incorporate the third variable you have selected.

Step 1: Ask a Question

13. Pose your question(s) involving the third variable here:

14. What do you expect to see? Make some predictions about how the graphs will look or what relationship you expect you might find?

Step 2: Assemble Data

15. Will you recode the third variable? If so, how?

Step 3: Analyze Data

- Create new graphs to investigate your question with the third attribute. Make sure you keep your prior graphs and update your CODAP link to keep all of your graphs.
- Display appropriate counts and percentages on the graphs or create a table to display the counts and/or percentages.
- Give your graphs titles.
- Read *Guidance for the Third Attribute* to get more information on how to work with your third attribute.

16. Describe your new graphs and insert screenshots of them. Update your CODAP link.

Step 4: Summarize Conclusions

17. What story do you think is told by the graphs? What could help explain the relationships you see among variables or other patterns in the data?

18. Pose at least one new question for future investigation.