

## Building Insights through Observation - Data Sketches: Making Data Visual Hands-on Exercise

Age group: middle school

Lesson time:

Part 1 - 50 minutes

Part 2 - 50 minutes

*This exercise borrows from the Design Thinking Process in a way that gets students engaged in group collaboration, hands-on creation, and critical thinking. Through the active process of sketching, students are asked to grapple with what they're learning and reconstruct it in a way that makes sense to them.*

The goal of this activity is to build skills in understanding the language of data. By carefully representing data in a new way, observation skills are honed, the basic framework of mapped data is learned and understanding of subject matter strengthened.

In the "Data Sketches" activity, students will work to put what they are learning into action by creating their own representations of data from a set of mapped data. Students will work independently and collaboratively (3 at a table) during this process.

Students will practice spatially processing maps that aren't the same scale and may contain distortions, using design tools to represent a set of data across a map; and layering maps to discover what inferences can be made. While the drawing of the map is a key component, it is equally crucial that the students collaborate within their group and have teacher-guided discussion to help support them through what may be a new learning experience.

Students will:

- read and understand a set of mapped data
- follow directions to use the data to create a their own map
- develop and agree on design components for their mapped data visualizations
- select their drawing tools
- support each other to learn how to use the template, interpret data, develop conclusions, and give feedback
- create a written and visual example of what they are learning

Materials needed:

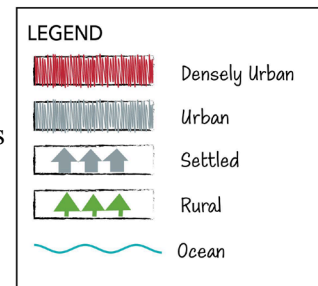
- Teacher's selection of 3 mapped representations of data (this can be screen displays or printed, static images that relate to the lesson topic. This includes the original dataset with legend used in the VTS - SOS section, along with 2 other related datasets.)
- Handouts:
  - Data Sketches worksheets (1 and 2)
  - Design Tools reference sheet
  - Map Template
- 11" x 17" vellum tracing paper
- scratch or note paper
- colored pencils and regular pencil
- markers (thin line)
- paper clips
- eraser
- ruler

## ACTIVITY

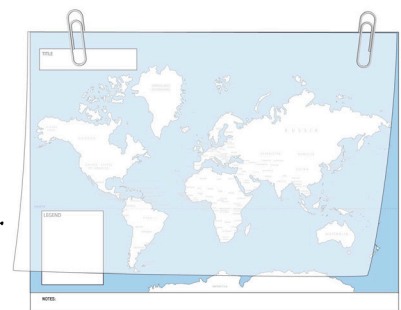
### Part 1

1. Give each student a printed copy of the original mapped data (with legend) from the VTS-SOS Session along with the “Design Tools” handout.  
*Note: By now the students should be familiar with both the original map and the design tools. It is important to keep referring to the design tools card so students become familiar with using them.*
2. Explain: “Remember how we looked at the different mapped data representations and how we used the Design Tools to come up with our own symbols to answer the questions in the Fencepost Activity? Today we are going to discuss mapped data further and practice using these tools ourselves by creating our very own map legends with symbols, colors, marks...”
3. First, let’s remind ourselves about our map from earlier in this lesson. *Invite discussion about the following questions regarding the printed map you have handed out (10 minutes):*
  1. What design tools were used to draw the data on this map?
  2. What is included in the legend?
  3. Why do you think they chose this particular design tool for this set of data?
  4. While some tools are better for representing sets of data, there is no right or wrong tool. Are there different design tools we could use to represent this data? *Look through the card and discuss what some good choices might be for this topic.*
4. Give each group two additional mapped datasets related to the topic so that each table of three students has a total of three maps to work with. Include the source of the data on each map.
5. Invite students to silently observe their maps for a few minutes. (5 min.)

6. Ask the students to decide within their group how they might represent the data in each of the three maps in a different way than it is currently while using three distinct design tools (ie. color, symbols, scale) from their Design Tools sheet for the three maps. Have students work on developing new legends for each map using scrap paper, pencils, and markers (10 minutes)



7. Ask each student to choose one of the maps. Hand out the Data Sketches Student Worksheet 1 and the map template.
8. Have students paperclip a sheet of tracing paper over the map template and follow the prompts on worksheet 1 (*please show an example of what they are being asked to do*). This worksheet will guide them through beginning their map. *The map template provided to be used as a guide under the tracing paper is important because it forces each student to create a map that is on the same scale as the others so that these maps can be easily layered together in the second part of this exercise. The order of steps on the worksheet is important to follow because it allows the student to create the legend prior to getting involved in the task of drawing. You, as the teacher, can walk through each step one at a time, if needed, or have the students follow the instructions independently. (10 minutes)*



9. “Sketch” - the final task of this worksheet asks for the student to use their new legend as a guide to sketching



out their mapped data in a new way. Students are also asked to note important features. *Students may begin by tracing the outline of the countries and, although it is not necessary and sometimes time-consuming, it is a way that they can begin to process the map spatially. For that reason, the timing of this component is variable and left up to the teacher. Students should have a minimum of 20 minutes to respond or the teacher may choose to break here and allow the students to complete their mapped “work of art” at home overnight and wrap up the next day with Part 2. (20 minutes – 2 hours)*

## Part 2

1. Looking at the maps they have sketched, ask students to write a one or two sentence summary of what their sketched data represents and then answer the three following prompts (worksheet 2). (10 minutes)

My sketch represents \_\_\_\_\_.

a. I see...

b. I wonder...

c. This data is interesting because...

2. Have the students share their answers with their group. (5 min.)
3. The group then works together to layer two maps at a time and look carefully at the paired maps, noting any patterns and correlations they can find and hypothesizing about what the correlations mean and giving each other feedback. (15 minutes)
4. Have students report out as a group to the rest of the class about their maps. Why did you choose that design tool? Was there anything interesting you discovered when you mapped the data? What correlations were you able to find when you layered your maps? What do these maps tell us about \_\_\_\_\_ (topic)? *Remember that in this exercise, the teacher can guide the discussion, correct the course, and introduce information about the topic as the lesson unfolds. (20 minutes or until your lesson is over).*

Return to the questions students had throughout the process that were saved in the “Parking Lot”.

How many of these questions can we now answer? What do we need to research?