Instructional Day: 10

Topic Description: Points of view: Telling a story with data

Objectives: The students will be able to:

• Explain how different views of data can tell a different story.

• Recognize that data is an incomplete record of reality.

• Describe the limits of measurement (what can and can’t be captured in data).

Outline of the Lesson:

•Journal Entry (10 minutes)

•Room Activity (45 minutes) Student Activities:

•Complete journal entry.

•Groups complete first part of Room Activity.

•Groups share responses with another group.

•Groups complete second part of Room Activity and share responses.

Teaching/Learning Strategies:

 Journal Entry: What do you think about when you hear the word data? Where can it be found? Where does it come from?

o Class discussion of journal entries

 Write down ideas from students.

 Emphasize that this lesson is meant to stretch their thinking about data.

 Room Activity

o Assign various groups different versions of the Room Activity.

 Depending on the amount of time available and the size of the class, you can have some students work with the picture (in the Supplemental Materials) and some work with the entire word list OR you can assign different subsets of the word list to different groups of students.

o When each group is finished with their first 4 instructions, have them compare with a group that has a different version.

o Have groups share their answers to #2 with the entire class. o Show groups the different versions of the room.

o Have groups complete questions 5-7.

o Have some groups share their answers for 5-7

o Emphasize that the appearance of the data and amount of data collected inform the inferences that can be made.

 Homework: Complete Communications Methods and Data Chart and Data Journal

o Explain that they will be adding to the Communications Methods Chart of the previous day by adding information about data.

o Introduce the Data Journal.

o Both of these assignments will be due on the first day of Unit 2.

o Clarify questions.

Resources:

•Room Activity Picture (Supplemental Materials)

•Room Activity Picture Instructions (to go with the picture)

•Room Activity Entire Word List

•Room Activity Possible Word Subsets

•Communications Methods and Data Chart

•Data Journal

Room Activity Picture Instructions

Look at the picture displayed on your computer or on the handout provided.

1. Make a list of the objects in the picture.

2. What does this data tell you about the person who lives in this room? What does it not tell you?

3. What are most of the items in this room related to?

4. How many toy soldiers are there?

Now compare with the other group.

5. Are there any advantages to one representation or another?

6. Do you think different representations can tell different stories?

7. What do you think came first the drawing of the room or the list?

Room Activity Entire Word List

Look at the following list of items found in someone’s room.

 Laptop

 Nintendo DS

 Mobile phone

 IPod with ear buds

 PS3

 Radio (2)

 Television

 Toy Car (3)

 Calendar

 Ribbons (3)

 Sprite Can

 Plaques (3)

 Gold Medal

 Phone

 Mug

 Trophy

 Picture Frame

 Posters (8)

 Harry Potter poster

 Lava lamp Glasses

 Violin Globe Person Paintings (2)

 Shoe

 Burger

 Books (75)

 Pizza

 Guitar

 Sandwich

 Goldfish

 Toy soldiers (3)

 Pringles can

1. What does this data tell you about the person who lives in this room? What does it not tell you?

2. What are most of the items in this room related to?

3. How many Radios are there?

Now compare with the other group.

4. Are there any advantages to one representation or another?

5. Do you think different representations can tell different stories?

6. What do you think came first (the drawing of the room or the list?)

Room Activity Possible Word Subsets

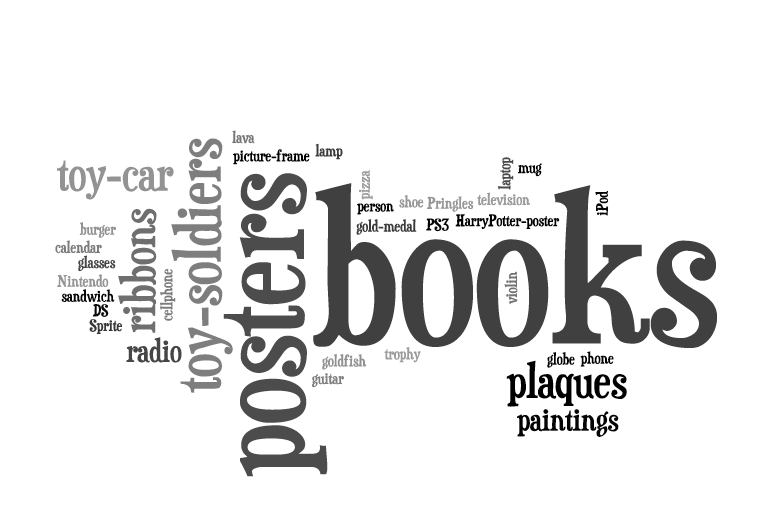
1. Lava lamp, Books (10), Burger, Cell phone, Pringles can, Television, Calendar, Glasses, Lava lamp, Sandwich, Pizza, Paintings (2), Person, Sprite Can

2. Trophy, Pizza, Guitar, Sandwich, IPod with ear buds, Radio(2), Toy soldiers(3), Person, Shoe, Cell phone, Violin, Harry Potter poster, Ribbons(3), Sandwich, Laptop, Goldfish

3. Books (75), Burger, Globe, Gold Medal, Goldfish, Harry Potter poster, Phone, Paintings(2), Person, Plaques(3), Posters(8), Ribbons(3), Toy soldiers(3), Trophy, Violin

4. iPod with ear buds, Television, laptop, Radio(2), Cell phone, Guitar, Toy Car(3), Nintendo DS, PS3, Burger, Pizza, Person, Pringles can, Sprite Can

5. Word cloud pictured below.



Communication Methods and Data Chart

Let's look at what kinds of data you 'give off' when using the different forms of communication. For each of the following examples, fill in which method you would choose for the given scenario and why (You should already have completed that part.). Keep in mind that “data” here is not just the content you communicate (what you say or write) but could also refer to details like the time of a telephone call and the number.

The methods are:

•Texting

•Phone call

•Talking in person

•MySpace / Facebook

•Twitter

•Email

Scenario to Communicate

1. Breaking up with a significant other (boyfriend/girlfriend)

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

2. Asking parents’ permission to do something when you think they will likely say ‘no’

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

3. Figure out where and when to meet a friend to see a movie

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

4. Gossip about someone who could hear you if you spoke

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

5. Gossip about someone not around you

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

6. Getting help on homework

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

7. Feedback on a big decision (like what color prom dress, what game to buy, what phone to get)

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

8. Announce you met someone famous

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

9. Complain about your parents

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

10. Mourn someone you lost

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

11. Buy something from someone you don’t know well

a. Method:

b. What data is available?

c. Who has access to the data?

d. What can be learned form the data in aggregate?

e. Why you chose the method?

1. How does the type of data being exchanged affect which method you choose?

Data Journal

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

During the next several days, take note of situations when you “generate data”. We’re looking for specific moments when some activity you perform can be observed, recorded and, possibly, combined with similar data from others. Ideally you will carry this paper with you and take notes over the course of your day. To start you off, think about what happens when you ride the bus or make a telephone call or browse a web site!

For each entry, list the time of day and describe what you did to generate data.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

Instructional Days: 11-14

Topic Description: In this lesson, students learn how computers can be used as a tool for visualizing data, modeling and design, and art in the context of culturally situated design tools. Connections between the design of the tools and mathematics will be explored.

Objectives:

The student will be able to:

 Explain how computers can be used as tools for visualizing data, modeling and design, and art.

 Identify mathematical connections in the output of the tools.

 Edit an image using Photoshop or similar tool.

Outline of the Lesson:

• Research on the cultural background associated with the design tool (25 minutes)

• Design tool tutorials (30 minutes)

• Creation of designs using the design tools (65 minutes)

• Online presentation on how to get started using Photoshop (15 minutes)

• Design editing (30 minutes)

• Preparation of presentations (40 minutes)

• Group presentations (15 minutes)

Student Activities:

• Groups do research on the cultural background information associated with the design tools they are assigned and discuss their findings.

• Groups prepare and deliver brief presentations on the cultural aspects of their design tools.

• Students complete design tool tutorials.

• Groups create designs using the design tools.

• Watch an online presentation on how to get started using Photoshop.

• Edit images created with the design tools.

• Groups prepare presentations.

• Groups deliver presentations.

Teaching/Learning Strategies:

•Post the possible design tools:

o Virtual Bead Loom

o Pacific Northwest Basket Weaver

o Navajo Rug Weaver •

Note: You may substitute the Graffiti Art tool if you choose.

•Display the first page of each tool in order to give students an idea of what each does. (http://www.csdt.rpi.edu )

•Students divide into groups to work on the tool of their choice. Group sizes will depend on the size of the class. You may need to have more than one group per tool.

•Each member of the group should go through the entire cultural background section individually.

o Answer any questions posed in the section in their journal. o Look for and write down the mathematical connections.

•All group members discuss the section. o Resolve answers to questions and mathematical connections.

•Each member of the group completes the tutorial. o Students should go through the tutorial at their own pace, but discuss with other members as questions arise. (Note: The bead loom tutorial is online; the other two are not. The print versions included here have been adapted from the bead loom tutorial.) o Encourage students to record in their journal points that they want to remember.

•Groups create designs using the design tool software. o Each person should choose one of the goal pictures for practice and discuss any issues with the other group members. o Groups decide whether they want to create one design as a group or have multiple designs for their presentation. o Groups work on design/designs—these should be their own creations rather than a mimic of one of the preloaded designs. •Edit designs with Photoshop (or another photo editor of choice).

o Have students watch the online tutorial and create an account.

o Edit the design. •Prepare presentations to include:

o Culture—an explanation in their own words o Math connections—an explanation in their own words o Demo of software o Display of designs—include a written description of how they created their design

•Groups deliver presentations o Groups respond to questions from other students and teacher. o Specifically ask what did the computer scientists who created the tools need to know?

(computer science, graphics, culture, anthropology, visual arts, language arts, history) •Display of designs—include a written description of how they created their design.

Resources:

• Culturally Situated Design Tools—http://www.csdt.rpi.edu (site and adaptations of tutorials courtesy Ron Eglash)

• Virtual Bead Loom Tutorial

• Pacific Northwest Basket Weaver Tutorial

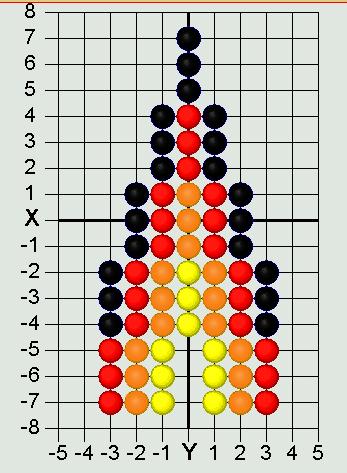
• Navajo Rug Weaver Tutorial

• Culturally Situated Design Tools Project Sample Rubric

• http://www.photoshop.com

• Apps for Blind students

Virtual Bead Loom Tutorial



Part 1

The Virtual Bead Loom simulates the same grid pattern as the traditional bead loom. Users place colored circles in columns (the Y-axis) and rows (the X-axis).

There are several tools for placing beads on the virtual loom. In each case you use the "tab" key or the mouse to move your cursor to the field for entering the coordinates, then you enter them, and then press the button for the shape tool. The point tool places a single bead:

The line tool places lines of beads. You specify the two endpoints of the line. Diagonal lines tend to be jagged, but resizing the grid can help that (see "Options menu" on next page).

The rectangle tool fills in a rectangle of beads. You specify two vertices (lower right and upper left). The rectangles of this tool are always aligned with the axes.



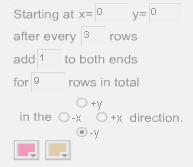


Part 2

The triangle tool fills in a triangle of beads. You specify the three vertices.

The iterative triangle tool: Our first triangle tool made jagged edges, while traditional beadwork has beautifully regular edges. We interviewed some native beadworkers, and found that their algorithms were iterative. The triangle iteration tool reflects this tradition of indigenous mathematics. For example, the triangle in the beadwork at the top of this page was made by adding one bead on each side of the row, every three rows, as you go in the -Y direction.

* "Direction"—determines in which direction your rows will accumulate
* Starting at X, Y—that is the center of the starting row.
* "After every \_\_\_ rows"—lets you determine how many rows you go through before adding more beads to the end.
* "Add \_\_\_ to both ends"—the number of beads that will be added on each side of the center each time.
* "For \_\_\_ rows in total"—how many rows you will bead in this triangle.  Note that this tool has two colors—some traditional bead work shifts color in each iteration. This allows you to select the starting color and ending color; the software does the shifting for you.





Part 3

There are also controls that apply to all the tools. "Clear" deletes everything. Normally "Create" is selected, so that your tools will fill their specified shape with beads. "Remove" will erase all beads in the specified shape, so if you make an error use "undo" not "remove." The color button allows you to select the bead color. Clicking on the little square in the upper right of the screen will give you a list of all the colors you have selected so far. The "Save" menu allows you to save the work on your hard drive and edit the design later. Make sure your file name is only letters, not spaces or numbers, and that you go back to the same computer when you want to edit your work.

The "Options" menu allows you to resize the grid smaller or larger—maximum size is 150 by 150. You can also change the location of the coordinate values, hide the grid, or create a title or notes about your design. You can also switch to Wampum beads, using either traditional 1X2 Wampum or a 1X1 Wampum (which is easier for math teaching—special thanks to Joyce Lewis of the Onondaga Nation for that concept!).

Printing: after you have your design completed, do a screen capture. In windows you can do that by pressing the "print screen" button on your keyboard, usually located at the upper right above the F10 key. On a Macintosh press shift + apple + 3 at the same time (also shift + apple +4 to select just a portion). That screen capture will save an image of the entire screen to your clipboard. You can then paste the clipboard image into a blank canvas in Word, Photoshop, Imaging (comes free in the "Accessories" folder in Windows) or other image editor.



Pacific Northwest Basket Weaver Tutorial

Part 1

The Virtual Basket Weaver simulates the same grid pattern as the traditional basket weaving loom. Users place colored circles in columns (the Y-axis) and rows (the X-axis).

There are several tools for placing wefts on the virtual loom. In each case you use the "tab" key or the mouse to move your cursor to the field for entering the coordinates, then you enter them, and then press the button for the shape tool. The point tool places a single weft:

The line tool places lines of wefts. You specify the two endpoints of the line. Diagonal lines tend to be jagged, but resizing the grid can help that (see "Options menu" on next page).

The rectangle tool fills in a rectangle of wefts. You specify two vertices (lower right and upper left). The rectangles of this tool are always aligned with the axes.





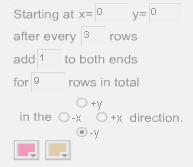


Part 2

The triangle tool fills in a triangle of wefts. You specify the three vertices.

The iterative triangle tool: Our first triangle tool made jagged edges, while traditional basket work has beautifully regular edges. The triangle iteration tool reflects the tradition of indigenous mathematics. For example, a triangle can be made by adding one weft on each side of the row, every three rows, as you go in the -Y direction.

* "Direction"—determines in which direction your rows will accumulate
* Starting at X, Y—that is the center of the starting row.
* "After every \_\_\_ rows"—lets you determine how many rows you go through before adding more wefts to the end.
* "Add \_\_\_ to both ends"—the number of wefts that will be added on each side of the center each time.
* "For \_\_\_ rows in total"—how many rows you will weft in this triangle.  Note that this tool has two colors—some traditional basket work shifts color in each iteration. This allows you to select the starting color and ending color; the software does the shifting for you.



Part 3

There are also controls that apply to all the tools. "Clear" deletes everything. Normally "Create" is selected, so that your tools will fill their specified shape with wefts. "Remove" will erase all wefts in the specified shape, so if you make an error use "undo" not "remove." The color button allows you to select the weft color. Clicking on the little square in the upper right of the screen will give you a list of all the colors you have selected so far. The "Save" menu allows you to save the work on your hard drive and edit the design later. Make sure your file name is only letters, not spaces or numbers, and that you go back to the same computer when you want to edit your work.

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Navajo Rug Weaver Tutorial



Part 1

The Virtual Rug Weaver simulates the same grid pattern as the traditional rug loom. Users place colored circles in columns (the Y- axis) and rows (the X-axis).

There are several tools for placing wefts on the virtual loom. In each case you use the "tab" key or the mouse to move your cursor to the field for entering the coordinates, then you enter them, and then press the button for the shape tool. The point tool places a single weft:

The line tool places lines of wefts. You specify the two endpoints of the line. Diagonal lines tend to be jagged, but resizing the grid can help that (see "Options menu" on next page).

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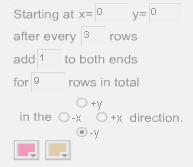


Part 2

The triangle tool fills in a triangle of wefts. You specify the three vertices.

The iterative triangle tool: Our first triangle tool made jagged edges, while traditional rug work has beautifully regular edges. The triangle iteration tool reflects the tradition of indigenous mathematics. For example, a triangle can be made by adding one bead on each side of the row, every three rows, as you go in the -Y direction.

* "Direction"—determines in which direction your rows will accumulate
* Starting at X, Y—that is the center of the starting row.
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Culturally Situated Design Tools Project Sample Rubric

Group Members Names: (up to 4)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Do you have?

Points Possible

Yes No Points Earned

Product

Title with group members’ names

5

Information related to the culture (explanation in own words) 10

Mathematical connections (explanation in own words) 10

Demo of software 5

Display of designs (explanation of how the design was created) 15

Design is original 10

Design has been edited with a photo editor 10

Presentation

All group members participate

10

Present all required parts of project

15

Answer questions from audience 10

Extra Credit

Project exhibits creativity above and beyond Up to 10

TOTAL: 100 + 10