**Lesson 3: What’s Your Favorite Dessert?**

**Overview & Big Idea**: This lesson is designed to promote the idea that graphs can be constructed to look for patterns in data and that visible patterns (the shape of the data) can change as category groupings change. The question “What’s your favorite dessert?” is used as a survey question because it provides an opportunity for a large variety of answers. Where some students may give a general answer of “cookies,” others may be adamantly specific and respond “chocolate chip cookies” or “chocolate cookies.” These variations provide the opportunity students with the opportunity to see the structure of the data when each different answer has its’ own category compared to combining answers for broader categories (i.e., cookies, cake, ice cream).

**Tools**: Post-it notes (unlined-all the same color, three sizes), black markers/pens, **un-lined post it chart paper**, student math journals.

*Part 1: Collecting, Organizing, & Displaying Data*

**Activity Structure:** Starting at tables or desks, students will be asked to record their favorite dessert on a post-it note, and then they place the note on a large piece of paper on the board. The teacher will use *questioning* to help students organize the data into an easily readable display. Students will most likely start with a large number of specific desserts because they usually see small differences as separate from one another. Reasoned decisions will need to be made by the students to construct categories in order to sort the desserts. Remember, these ideas and the reasoning about the sort needs to come from the students. It may take several revisions before an easily readable and transportable (*without change- i.e., nothing falls off*) display takes shape.

***Agreed Upon Focal Points for this Lesson:*** It is important to allow/promote the following points during your discussion about structuring the data and make notes on specific details of student thinking on each point.

1. *Student Volunteered Categories*. Allow students to suggest/create categories. Do not suggest any categories. What do the students come up with? How do they group (or not group) the desserts? What will that (the categories) let us see? What will it tell us about favorite desserts? Make note of the different suggestions and categorical iterations and reasoning as they will reveal student understanding of the use of attributes and superordinate /subordinate reasoning to structure the data.
2. *Unit Size*. What will the students think if we propose changing the size of one of the elements? After students have structured the data, take a different sized post it note. Ask the students if it would be alright for you to replace one category worth of responses with that size post it- for example, if one category is “cookies” and it has 4 responses, each written on a square post it, replace each of the square post it notes with a large rectangular post it. Use the following general probes to promote student reasoning concerning the replacement: Can I do this (*change the size of the post it*)? Why? Why not? Explain? Only then move onto more specific probes: Does our display look the same? If not, how does it look different? Is that important? Why? If I were looking at the display now, what might I say about our favorite desserts? After the discussion, change the size back to identical units.
3. *Super Categories*. Here we present students with an opportunity to visualize a change in structure of our data with an “If/then” statement. Ask the students to imagine that you combined several categories. Have students draw a picture in their journal showing what the shape of the data would look like- ask them to use a line to show the new shape of the data (for example, if students have a 3 different cookie categories, say- What if I combined all the different types of cookies into ONE group?) **Please use this phrasing of the question**: If we combine these categories (teacher chooses the categories to put together), what would it look like? Draw it in your journal. Please work on your own. 2/3 students should include a sentence or two that describe the change of the shape they would see in the data.

**Question Clusters:**

*Collecting Data*

* Write your name on the sticky-note and *draw a picture* *and write a label* that shows your favorite dessert.
* Put your post it notes on the poster paper in front of the class.
  + *Notes will most likely be scattered all over the board.*
  + *Ask students to take a minute to look at all the favorite desserts.*
  + *Here the teacher should take note of any differences in the way students initially post their sticky note in comparison to the previous “waking up” activity. Do students make any initial suggestions different from last time? Do you see a change in their thinking?*

*Displaying & Comparing Data*

Point to the posted notes:

* Is this easy to read?
  + *Question Function:* A call for analyzing the organization system
* Can we tell easily which is the most popular dessert?
  + *Question Function:* A specific question about the data that draws our attention to the organization system.
* Why is this so difficult to read?
  + *Question Function:* A request for reasoning about the difficulty with the organization system.
  + *Expect a range if ideas about why the data is difficult to read.*
  + *Record student ideas on a chart to discuss later in relation to the display the class creates. These ideas can serve as a basis for reasoning about organizing information.*

*Motivating the Need for Categories (****Focal Point 1- See Above****)*

* Are there really 20 different favorite desserts?
* Is there anything alike about what we wrote?
* What makes something alike?
  + *Question Function:* A call for categorization
* What makes something different?
* What do we do with something different?
  + *Question Function:* Looking for attributes that can serve as rules for structuring categories.
  + The math idea here is equivalence. Equivalent desserts up are determined by an attribute that certain data points have in common. Attribute structure the rules that help students sort the data into categories.

*Motivating the Need of an Organized Data Display*

* How could we organize our information to make it easier to read?
* How would you like me to place our information on a new piece of paper?
* How would you show our information at a quick glance?

*Developing Audience Awareness*

* If we gave this chart to \_\_\_\_\_\_\_\_\_’s class, would they be able to quickly understand what our data was saying? (Telling us?)
* Did we include all the information on our display that helps other students know what our information is about?
* Did we organize our information in a way that we (and others) can use the data to answer questions?

**Attend to Focal Point 2 Here (*See Above*).**

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*Promoting a Unchanging Display*

* Did we organize our information in a way that we could take it to another class and it will not get messed up?
* How could we use the changes/decision we made to make a display that could be used by other classes? How can we preserve our display?

*Using the Data Display to Answer Questions*

* What did we find out about our favorite desserts?
* What did we find out about the girls favorite desserts? Boys?
* How many different kinds of desserts do we like?
* Which is the most popular dessert? How do you know?
* Which is the least popular dessert? How do you know?
* How many more students like \_\_\_\_\_\_ than \_\_\_\_\_\_? (choose categories to compare)
* Ask students to come up with comparisons of their own and write a story problem to go with that comparison. Write 1-2 problems in the math journals. These can be used as an assessment for student understanding about problem structures.

*Predicting Based on a Sample*

* What do you think other [*your grade-level*] students like for dessert?
* Why do you think that?

*Part 2: Sharing & Comparing Data Displays*

*(Choose 1 or 2 Extensions)*

**Extension 1:** *Comparing Graphs*- Borrow a “Dessert” graph from a classroom that is two grade-level steps away from yours. Compare and contrast the structure of the graphs. Discuss possible reasons for similarities and differences.

**Extension 2:** Use the other grade levels’ graph to answer the questions in the “*Using the Data Display to Answer Questions*” section above.

**Extension 3:** Write a paragraph for each graph that summarizes the findings at each grade level. Draw some conclusions about favorite desserts at your grade level compared to favorite desserts in other grade levels. You may want to compare 2-3 different grade levels. Record any further questions you want to explore about favorite desserts.