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Lesson in Action

AT A GLANCE

Lesson at a Glance

Launch

- Begin by looking at a visualization created with student survey data.
- Have students discuss their observations, first peer-to-peer and then as an entire class.
- During discussion, take notes using an online tech tool, demonstrating its interactive capabilities.

Learning Task

- Introduce the learning task.
- Have students work in pairs or groups to develop their surveys and analyze results.
- Circulate as groups work, providing guidance as needed.
- Have students create and publish their surveys, then respond to the surveys of others.
- Have students discuss their data in their groups, organizing and analyzing as appropriate.
- Make sure students are adhering to the established group discussion rules.
- Remind students to take notes using appropriate tools.

Closure

- Have students write up individual reports, using appropriate media tools to create them.
- Instruct students to post their reports to the class website, allowing for online class discussion.

Interacting With Peers: Surveying and Analyzing

Context

Mr. Hapt's seventh grade class has started a unit on statistics. In the previous lesson, the class discussed collecting data and making observations about the data. Today they are going to create survey questions, collect their own data, and make interpretations about the collected data. Since some students have had difficulty articulating their thoughts when working with charts and graphs, Mr. Hapt will encourage peer discussion.

Common Core State Standards

- ▶ [7.SP.3](http://www.corestandards.org/Math/Content/7/SP/B/3) (<http://www.corestandards.org/Math/Content/7/SP/B/3>) Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
- ▶ [MP3](http://www.corestandards.org/Math/Practice/MP3) (<http://www.corestandards.org/Math/Practice/MP3>) Construct viable arguments and critique the reasoning of others
- ▶ [MP5](http://www.corestandards.org/Math/Practice/MP5) (<http://www.corestandards.org/Math/Practice/MP5>) Use appropriate tools strategically
- ▶ [MP6](http://www.corestandards.org/Math/Practice/MP6) (<http://www.corestandards.org/Math/Practice/MP6>) Attend to precision

Lesson Objective

Construct and administer a survey with two questions, then compare the data collected.

Technology

- ▶ Interactive whiteboard to communicate visually with the class
- ▶ Surveying tool to collect data (e.g., Google Form)
- ▶ Graphing tool to create histograms (e.g., GeoGebra)
- ▶ Note-taking tool to take and share notes during discussion (e.g., Google Docs)
- ▶ Sharing platform (website or blog) to publish reports

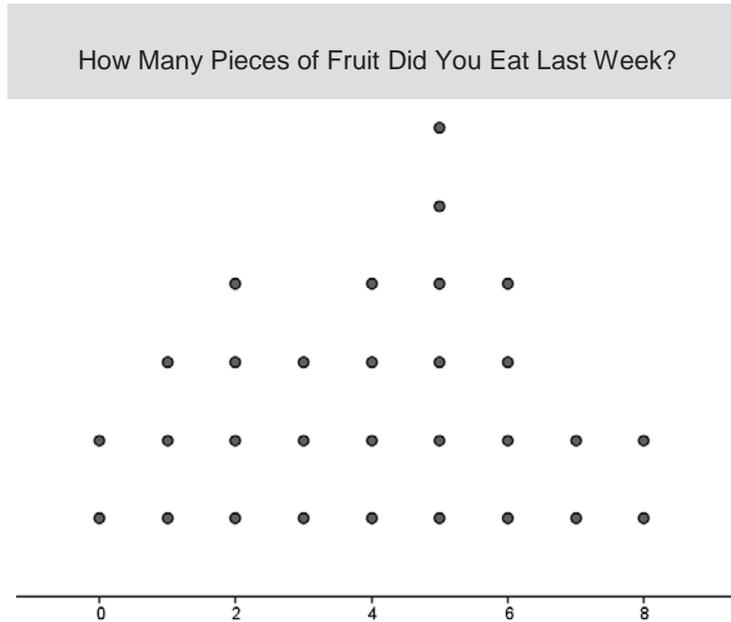
Assessment

- ▶ Development of appropriate statistical questions
- ▶ Group discussion
- ▶ Report, including a representation of data (table, histogram), measures of center/spread, observations

Mr. Hapt's Class in Action

Launch

To begin class, Mr. Hapt displays on the interactive whiteboard a dot plot created using survey data he collected the previous day.



“Take a few seconds to look at this dot plot,” he begins. “Then, turn to your partner and make three observations about the data represented by the graph.”

Once students have had a chance to share their thoughts with a partner, Mr. Hapt asks for pairs to share their observations. They discuss what the dot plot can and cannot reveal about the data set. They also discuss the mean (4 pieces of fruit) and mean absolute deviation (1.87 pieces of fruit). He summarizes the discussion on the interactive whiteboard:

- ▶ The dot plot shows the exact number of data points, the range, and the most popular value.
- ▶ The dot plot does not show the mean or the mean absolute deviation.
- ▶ Calculating the mean tells us the average value, but it doesn't tell us the number of data points, the range, or the most popular value.
- ▶ The mean absolute deviation tells us how far away, on average, the data are from the mean.

While students are talking, Mr. Hapt takes notes using Google Docs and displays them on the interactive whiteboard for students to see. He reminds students that the document can be shared, edited, and discussed by multiple people.

Learning Task

Mr. Hapt introduces the learning task. “You're going to work in your groups to develop two survey questions for your classmates to answer using Google Form. The data collected can be organized into two different sets. You should create an appropriate visual

representation for each set, then use your representations, the means, and the mean absolute deviations to make comparisons between them.”

As students move into their groups, Mr. Hapt displays on the interactive whiteboard the list of rules for group discussion the class created at the beginning of the year. He wants to make sure students can reference them while working on their surveys.

Rules for Group Discussion

- Listen carefully.
- Use appropriate mathematical language.
- Give everyone a chance to speak.
- Talk to your group members, not the teacher.

He walks over to Justin and Abigail, who Mr. Hapt decided would benefit from peer tutoring. They have already decided to survey their classmates about the amount of time their classmates spend doing homework, and have constructed a survey draft.

Group A Survey

* Required

How many hours do you spend on math homework? *

How many hours do you spend on English homework? *

Mr. Hapt asks them to pause for a moment. “How would you answer these questions the way they are written?”

Justin responds, “I would say one hour for math and one hour for English, because that’s how much I spent yesterday.” Abigail responds, “Oh, I was thinking about how much time I usually spend on homework in a week. We need to make sure everyone answers the questions the same way.” Justin looks a little puzzled, so Abigail drafts more specific survey questions to illustrate her point. Mr. Hapt stays with the pair for a few minutes, providing guidance so that they remain on task. As needed, he asks Abigail questions to help her express her understanding of question construction. As he walks away, Justin and Abigail have changed the wording of their questions to, “How many hours do you spend on average on math homework each night?” and the same rewording for English.

Mr. Hapt moves on, checking in with each group and verifying that their survey questions are worded to accurately collect data. After each group completes constructing its survey in Google Form, the group publishes it and shares the link. Then the students take the surveys created by other groups.

Once students have responded to all of the surveys they go back to their groups. Mr. Hapt moves to a group that is struggling with how to make sense of their data.

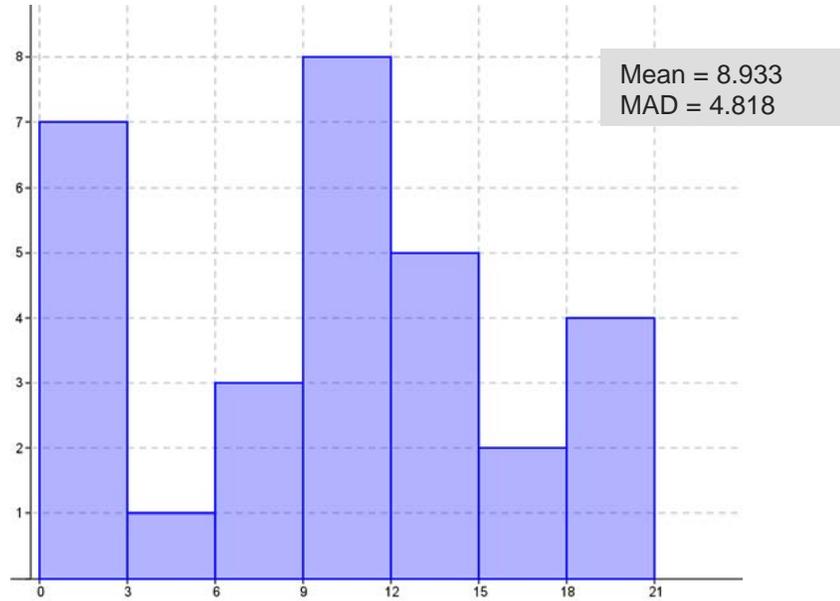
How Many Pairs of Shoes Do You Own?	Are You A Boy or a Girl?
4	Boy
6	Boy
8	Girl
6	Boy
3	Boy
2	Girl
3	Girl
8	Girl
5	Girl
3	Boy
2	Boy
2	Boy
2	Boy
1	Girl
6	Girl
3	Boy
3	Boy
5	Girl
5	Girl
6	Girl
6	Boy
8	Girl
6	Boy
3	Boy
3	Girl
3	Girl
5	Girl

Angelo is thinking aloud, “We can take data about the number of shoes and create a dot plot, but I don’t understand what to do with the data about boy/girl. How do you make a graph of that?” He looks at Mr. Hapt questioningly, but Mr. Hapt just points to one of the rules for group discussion displayed on the whiteboard, “Talk to your group members, not the teacher.” Nikki chimes in, “We’re supposed to compare two data sets, so we need to be able to say something like, ‘The average number of shoes students own is greater than the average number of boys.’ But that doesn’t really make sense to me. How do you calculate the average number of boys?”

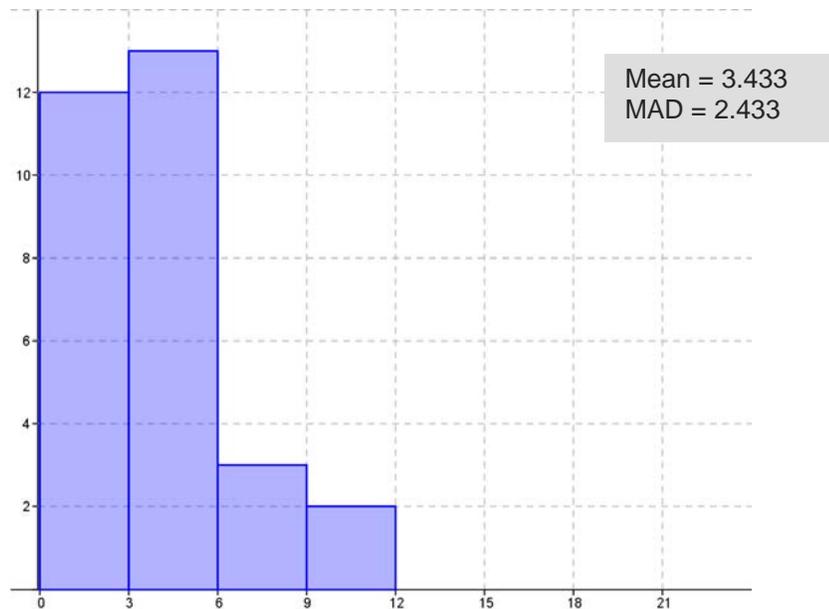
As the group is discussing, Connor reorganizes the data in different ways, taking advantage of the spreadsheet’s ability to sort. He groups the data by gender. “If we sort this way, then we can compare the number of shoes that boys own to the number of shoes that girls own.” Destiny begins constructing two dot plots and the group continues to discuss how to compare the data.

Sarah's group has created histograms for their data and also calculated the mean and mean absolute deviation for each set.

Hours per Week Spent Playing Video Games



Hours per Week Spent Doing Chores



Sarah begins the discussion: “The mean for video game playing is greater than the mean for chores.” The other group members nod in agreement, but no one volunteers additional comments. Mr. Hapt makes his own observation to prompt additional discussion: “I see that the mean absolute deviation for video game playing is also greater than the mean for chores. What does that tell us?” As the group members respond to him and each other, Mr. Hapt continues to participate in the conversation as needed, reminding students to consider the shape of the histogram.

During the discussion, Josh has been taking notes with Google Docs. Mr. Hapt reminds him to share the document so that all group members can access the notes outside of class. He also reminds them that they can continue the discussion by using the chat and video functions or by writing additional notes in the document.

Closure

As the class finishes up, Mr. Hapt instructs students to write up individual reports on their data, building on observations made in their group discussions. Students can choose the report format, so Mr. Hapt expects some to use a multimedia tool like [VoiceThread](#) to provide audio commentary, rather than writing. Instead of emailing him the completed reports, he instructs them to post them to the class website so that they are shared with the entire class.

Reflection

Later that day Mr. Hapt reviews the notes that Sarah’s group took, adding his own comments for group members to read while they are finishing up their reports. He also reviews his own notes from all the student discussions. Abigail and Justin both seemed to benefit from the one-on-one tutoring setup; he’d like to try that with a few of the other students. The individual reports will give him the opportunity to provide private, specific feedback for each student. He’ll also have students critique each other, publicly making their comments through the website and hopefully sparking some additional discussion.

The next few lessons will introduce other visual representations (e.g., box plots) and statistical measures (e.g., median, interquartile range). He’ll continue to use peer discussion to support students in their understanding of these concepts.