Objective

By the end of this lesson, the student will understand how to create and interpret box plots (box-and-whisker plots) using data visualization software. They will also learn about the importance of citizen science in studying pollinators, specifically focusing on bee pollen counts, while exploring the contributions of Mary Eleanor Spear and John Tukey to the field of statistics.

Materials and Prep

- Access to a computer with internet for using Desmos
- Notebook and pencil for notes and sketches
- Basic understanding of statistics (mean, median, mode)
- Familiarity with data visualization concepts

Activities

1. **Introduction to Box Plots**

   Start by introducing the concept of box plots. Use Desmos to create a simple box plot from a set of data. Explain the components: minimum, first quartile, median, third quartile, and maximum. Let the student explore how changing data points affects the box plot.

2. **Bee Pollen Count Data Collection**

   Guide the student in researching bee pollen counts in their local area. They can use citizen science data from online databases. Have them gather data over a week and prepare it for analysis.

3. **Creating Box Plots**

   Using the collected data, the student will create a box plot using Desmos. They will label the components and interpret what the plot reveals about the bee pollen counts.

4. **Exploring the History of Statistics**

   Introduce Mary Eleanor Spear and John Tukey. Discuss their contributions to statistics and data visualization. Encourage the student to write a short biography of one of them, focusing on their impact on the field.

5. **Presenting Findings**

   The student will prepare a short presentation using their box plot and findings on bee pollen counts. They can share what they learned about citizen science and the importance of pollinators.

Talking Points

- "Box plots are a great way to visualize data and understand its distribution. They help us see the spread and identify any outliers."

- "Citizen science is when everyday people contribute to scientific research. Your work with bee pollen counts is a perfect example of how anyone can help scientists!"
- "Mary Eleanor Spear was a pioneer in the field of statistics, focusing on how we can use data to understand the world around us. Her work helps us appreciate the importance of data in our daily lives."
- "John Tukey introduced many concepts in statistics, including the box plot itself. His work has shaped how we visualize data today."
- "When you present your findings, think about how your box plot tells a story. What does the data reveal about the health of pollinators in your area?"