Objective

By the end of this lesson, the student will understand how to create and interpret box plots (box-and-whisker plots) using data related to bee pollen counts. They will also learn about the contributions of Mary Eleanor Spear and John Tukey to data visualization, and how citizen science can impact our understanding of pollinators.

Materials and Prep

- Access to Desmos or similar data visualization software.
- Data set on bee pollen counts (can be generated or found online).
- Basic understanding of statistics including mean, median, and quartiles.
- Research materials about Mary Eleanor Spear and John Tukey (can be found online).

Activities

- **Introduction to Box Plots:**

  Begin with a brief lesson on what box plots are and how they represent data. Use examples to explain how to read and interpret box plots, focusing on the concepts of median, quartiles, and outliers.

- **Data Collection:**

  Engage the student in a mini citizen science project where they can collect data on local bee pollen counts. They can observe flowers in their area and record the number of bees visiting each flower over a specific time period.

- **Create Box Plots in Desmos:**

  Using the data collected, guide the student through the process of inputting their data into Desmos to create a box plot. Discuss the features of the plot as they create it, highlighting the importance of visualizing data.

- **Exploring the History:**

  Have the student research Mary Eleanor Spear and John Tukey, focusing on their contributions to statistics and data visualization. They can create a short presentation or infographic summarizing their findings.

- **Reflection and Discussion:**

  Conclude the lesson with a discussion on the importance of data visualization in understanding scientific data and the role of citizen science in environmental studies. Encourage the student to share their thoughts on how they can contribute to citizen science.

Talking Points

- "Box plots are a great way to visualize data! They show us the distribution, central tendency, and variability at a glance."
- "Did you know that the median is the middle value in a data set? It helps us understand where most of our data points lie."
- "Quartiles divide our data into four equal parts. The first quartile (Q1) is the median of the lower half of the data, while the third quartile (Q3) is the median of the upper half."

- "Outliers are data points that stand out from the rest. They can tell us interesting stories about our data!"
- "Mary Eleanor Spear was a pioneer in studying pollinators. Her work helps us understand the vital role bees play in our ecosystem."
- "John Tukey introduced the box plot as a way to visualize data effectively. His work has influenced how we present and interpret statistics."
- "Citizen science allows us to gather data that can lead to significant discoveries. Every observation counts!"
- "When we visualize data, we can see trends and patterns that might not be obvious from raw numbers alone."
- "Using tools like Desmos makes it easy to create professional-looking graphs and plots."
- "Understanding data visualization is a critical skill in today's data-driven world."
- "How do you think bee populations affect our environment? Let's think about the connections!"
- "What other ways can we collect data about the environment? Brainstorming ideas is the first step!"
- "Reflect on your findings: What surprised you about the bee pollen counts you collected?"
- "Data tells a story. What story does your box plot tell about the bees in your area?"
- "How can we use the knowledge of box plots in real-life situations, like public health or environmental studies?"
- "Remember, every scientist starts somewhere. Your observations and data collection are essential!"