edTPA General Lesson Plan Template

Grade Level: Junior/Senior **Number of Students:** 13 **Instructional Location:** Probability and Statistics (Remote) **Date:** 10/7/2020

Lesson Goals

Central Focus of Lesson:
To understand, apply and analyze box and whisker charts in consideration of the statistical models and approaches learned to date.

Standard(s) Addressed:
New Jersey Student Learning Standards For Mathematics | High School—Statistics and Probability
   (SID) Interpreting Categorical and Quantitative Data: (A) Summarize, represent, and interpret data on a single count or measurement variable
    1. Represent data with plots on the real number line (~~dot plots, histograms, and~~ box plots).
    2. Use statistics appropriate to the shape of the data distribution to compare center (median~~, mean~~) and spread (interquartile range~~, standard deviation~~) of two or more different data sets.
    3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Lesson Objectives and Demands

Content Objectives:
SWBAT understand the background and purpose of a box and whiskers plot through an interactive presentation and discussion of the definition, history and reasons why this plot was developed.
SWBAT understand the anatomy of a box and whiskers plot by identifying the five-number summary and the outliers and locating each related component on the box and whiskers plot.
SWBAT apply this understanding by developing box and whiskers plots by hand and use of a graphing calculator.
SWBAT will begin to analyze box and whiskers plots by describing and differentiating a variety of real world data sets..

Language Objectives:
To recall and employ terms related to statistics to describe and analyze data sets and visual representations..

Key Vocabulary in Lesson:
Box and whiskers plots, outliers, median and quartiles, mean and standard deviation, shape, spread, variability of distribution, symmetrical, skewed, five-number summary, interquartile range (IQR), 1.5IQR, range, hinges, central tendency.

Lesson Considerations

Materials:
"Do Now" problem.
TI-Smartview CE Software (PC Emulation of the TI-CE 84 Calculator)
Graphic Organizer (To complete with the learners in describing the anatomy of a box and whiskers chart.)
Google Slides Presentation (To share and describe real-world examples of box and whiskers plots)
Google Form (Exit Ticket)
Zoom Annotate with Wacom Pencil (For real-time problem solving on whiteboard)
Whiteboard (Backup if Wacom Pencil fails)
Homework set of real problems.

Prior Academic Learning and Prerequisite Skills:
To know how to calculate the five-number summary.
To know how to calculate 1.5IQR.
To know the language used to describe a visual representation, such as symmetrical, skeyed, spread, range, central tendency (or centrally located).

Misconceptions:
Note: As Statistics is a less familiar area of math, I will be discussing typically misconceptions with the teacher and including these in my next iteration.

Lesson Plan Details:

Lesson Introduction/Anticipatory Set:
- *Do Now Activity* - Key question reviews the five-number summary and 1.5IQR (on screen with answers shared on group chat.)
- *Introduction* - Box and whiskers plots will be introduced as the lighter (yet powerful) side of statistics. Today we will understand the components of a box and whiskers chart, learn to read and describe these.
- *History* - Tukey developed the box and whiskers plot here in NJ. He is a pioneer in statistics, and the reason that I bring this to the learners attention is that he was a pioneer in statistics who understood the power of envisioning information. He developed box and whiskers plots, and other statistical tools, to sharpen the resolution and clarity of data - to simplify its complexities.
- *Connection to prior work* - We will revisit some of the datasets we used to build dotplots, histograms and boxcharts and see what we see when we use box and whiskers plots. We will rely heavily on five-number summaries and 1.5IQR.

Learning Activities/Procedures - "During": *Active engagement in meaning making, explicit instruction, and practice (you should be checking for understanding throughout the lesson).*
- *Anatomy of the Box and Whiskers Chart* - A graphic organizer that will be completed together in class to model the components of this plot type.
- *Discuss examples* - Data sets used in prior classes will be shared in box and whiskers format and discussed. Examples will include a model that exemplifies this plot type, that works better with bar charts are dotplots and has missing outliers.
- Present a real world problem and data set - learners choose between two teams to solve the problem and present to the class:
  - Team A will work on reading and describing the results of a "Droplet Transmission Through Face Masks" bar and whiskers plot. This will involve describing the components and using statistical language to describe the results. One of two teachers will guide this practice activity.
  - Team B will develop a box and whiskers chart of racing speeds of an F1 racing event. The graphing calculator will be used to get the five-number summary and learners will draw the box and whiskers chart. Teachers will guide this activity.
  - Alternative: If learners are not engaged with this activity, the group will choose from the two and the class will work through one problem together as a guided practice activity.
- Match the bar chart to the box and whiskers chart activity. (note: this activity will be dropped if the class runs out of time.

Lesson Closure - "After": *Restate teaching point, clarify key points, extend ideas, check for understanding.*
- *Exit Ticket* - Key concepts will be reviewed in an exit ticket.
- Homework - Learners will choose 2 problems from a set of levelled box and whiskers problems.
- Voice of the Student - Learners discuss how they rate the class from 1-10 and briefly share what worked and what didn't work.

Rubric as the Assessment Component

	0 = No Mastery	2 = Partial Mastery	4 = Complete Mastery
I can describe the purpose of a box and whiskers plot and differentiate it from other graph types.	I can differentiate this if provided with options.	I can describe the purpose using key language.	I can describe this and the other graph types, the components and each type's strengths and weaknesses.
I can identify the components of a Box and Whiskers Chart	I can do this with a graphics organizer.	I can identify the components and draw this.	I can describe to a peer the components and how to draw this.
I am comfortable using a graphing calculator.	I can calculate relevant data and graphs when provided with guidance.	I can calculate relevant data without assistance and use frequency lists..	I can describe to a peer how to calculate statistics data with frequency lists and create graphs.
I can create Box and Whiskers Plots.	I can do this with a graphics organizer and graphing calculator.	I can take data and create box and whiskers plots using a graphing calculator.	I can describe how to create a box and whiskers chart using either a graphing calculator or formulas.
I can read Box and Whiskers Plots	I can describe and analyze this with guidance.	I can describe, analyze and compare box and whiskers plots unassisted, but may miss 1-2 points.	I can clearly and thoroughly describe, analyze and compare box and whiskers plots.

Re-engagement Statement

In a follow-up lesson to the first observation, I will involve students more and assess skills as we progress through the lesson to improve pacing and maintain motivation. My cooperating teacher discussed how pacing and questioning are the most essential components to teaching mathematics and the most difficult.   A teacher shared that she converses with students over the initial three minutes to help establish trust, which is key to engagement, but noted that student engagement is a process that occurs over time and that initially the pace will be slow. In my follow-up lesson, I will slow down the pace and focus on asking engaging questions, bringing the questions up a level until the students are comfortable and confident to respond.

The second part I see changing is to include a summary at the end and ensure the lesson timing allows for its coverage. Per my supervisor, I will continue incorporating real-world problem solving as it helps the students make the connection to why learn mathematics. However, I will carefully control the lesson timing to leave time to summarize and assess what the students have learned that day, which will help me better prepare for the next lesson.