

LEARNING MODULE 2

Draw Conclusions from Statistical Data Using the
Measures of Central Tendency

GRADE 8



3

DRAW CONCLUSIONS FROM STATISTICAL DATA USING THE MEASURES OF CENTRAL TENDENCY

WELCOME, LEARNERS!

In this main course, we're diving into a fascinating skill: drawing conclusions from data using measures of central tendency. Sounds complex, right? Don't worry! We'll break it down step-by-step. Get ready to explore how we make sense of numbers and what they tell us about real-life situations. We'll unlock the secrets of mean, median, and mode. So, buckle up and get ready to become statistical superheroes!



LEARNING OBJECTIVES

- 1 Critically evaluate diverse data sets, discerning patterns and anomalies, to create and defend conclusions based on measures of central tendency
- 2 Develop proficiency in applying statistical techniques, manipulating datasets, and visually represents through charts, and graphs
- 3 Appreciate the significance of statistical measures in decision-making, interpreting and justifying conclusions drawn from real-world data.



Understanding **measures of central tendency**—mean, median, and mode—empowers individuals to draw meaningful conclusions from statistical data across various scenarios.

Here's an in-depth look at how these measures help in interpreting data and making informed conclusions.

Real-World Examples



1. Salary Data: Consider a company's salary data. The mean salary provides an average wage, which helps understand the overall compensation. However, if there are a few highly high salaries (outliers), the median better represents what most employees earn. Mode could indicate the most common salary range.

2. Exam Scores: In a classroom, mean scores reveal the average performance. The median can show a more typical version if a few students scored significantly higher or lower. Mode might indicate the most common score.



3. Sales Figures: In business, mean sales figures might indicate the average revenue generated. Median can highlight a typical sales value, especially if there are outliers (e.g., unusually high or low monthly sales). Mode could represent the most common sales range.

Several ways of Drawing Conclusions

Inference Building

Inference building is the process of deriving insights and making informed conclusions from data. It involves posing targeted questions that prompt learners to think critically and reason through their findings based on statistical observations.

Consider a simplified example using hypothetical data about plant growth under different sunlight conditions over four weeks. Here's a dataset with plant heights (in centimeters).

| Week | Low Sunlight | Medium Sunlight | High Sunlight |
|------|--------------|-----------------|---------------|
| 1 | 10 | 12 | 15 |
| 2 | 11 | 14 | 18 |
| 3 | 13 | 16 | 20 |
| 4 | 15 | 18 | 22 |

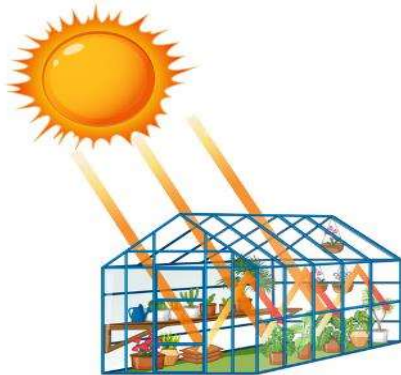
Guiding Questions with Answers:

1. What Patterns Do You Observe?

- There's a clear trend: as sunlight exposure increases, plant heights tend to increase over the weeks.

2. How Do Measures of Central Tendency Apply?

- Mean heights:



- Low Sunlight: $(10 + 11 + 13 + 15) / 4 = 12.25$ cm
- Medium Sunlight: $(12 + 14 + 16 + 18) / 4 = 15$ cm
- High Sunlight: $(15 + 18 + 20 + 22) / 4 = 18.75$ cm

The mean heights illustrate an ascending trend as sunlight exposure increases.

3. Are There Outliers or Anomalies? Why?

- No apparent outliers. However, in Week 1, the Low Sunlight group seems slightly lower, possibly due to acclimation to the new environment.

4. Can You Formulate Hypotheses?

- Hypothesis: Increased sunlight exposure positively correlates with increased plant growth. The data supports this, as higher sunlight leads to higher mean plant heights.



5. What Conclusions Can You Draw?



- There's a consistent positive relationship between sunlight exposure and plant growth. The more sunlight plants receive, the taller they tend to grow, as evidenced by mean height calculations.

6. How Would You Apply These Conclusions?

- These conclusions suggest that for optimal plant growth, providing higher sunlight exposure could be beneficial. It could guide gardeners or farmers in managing sunlight exposure for different plants to maximize growth.

Decision-Making Scenarios

Choosing the appropriate measure is critical in statistical analysis because it affects the conclusions made from the data. Decision-making scenarios allow students to critically evaluate circumstances in which alternative measures can lead to different decisions.



Create a scenario using a dataset representing the prices of a specific item sold by a clothing company over a week:



Prices of the item: \$25, \$28, \$27, \$30, \$500



Guiding Questions with Answers:

1. Which Measure is More Appropriate? Why?

- **Mean Calculation:**

- Mean = $(25 + 28 + 27 + 30 + 500) / 5 = \122
- The mean price is greatly affected by the extreme value of \$500, making it skewed and not representative of the typical price.

- **Median Calculation:**

- When arranged in ascending order: \$25, \$27, \$28, \$30, \$500
- Median = \$28
- The median, \$28, is less influenced by the outlier (\$500), providing a more accurate representation of the typical price.

2. Implications of Each Decision:

- **Mean's Implication:** Using the mean of \$122 might misrepresent the typical price, leading to potential pricing strategies that don't align with the majority of sales.
- **Median's Implication:** Opting for the median of \$28 offers a more realistic depiction of the typical price, allowing the company to set prices that align better with most customer purchases.

JUSTIFICATION

Mean Justification: The mean is significantly affected by extreme values, like the \$500 price in this dataset. Therefore, in this context, the mean does not represent the typical price and could misguide decision-making.

Median Justification: The median, \$28, represents the middle value and is less impacted by outliers. It accurately reflects the typical price and is more suitable for decision-making in scenarios where extreme values might distort the average.



Real-World Application

Statistical misinterpretation can lead to incorrect conclusions, influencing decisions and perceptions. Presenting case studies or news items enables students to critically assess data, discover flaws, biases, or misinterpretations, and comprehend the ramifications of statistical errors.

Example using a hypothetical case study about a survey conducted to evaluate the effectiveness of a new teaching method in improving test scores.

Example Case Study:

A study compares the test scores of students before and after implementing a new teaching method. The report claims a significant increase in average test scores after the new method was introduced.



Data:

- **Before Teaching Method** (Test Scores): 70, 72, 68, 75, 71
- **After Teaching Method** (Test Scores): 78, 82, 79, 85, 81

Guiding Analysis:

1. Critical Analysis:

- Were the same students tested before and after? Were other factors controlled, like test difficulty or student demographics?



2. Identification of Misinterpretation:

- Does the increase in average scores solely attribute to the new teaching method, or could there be other reasons?

3. Exploration of Flaws:

- Were there assumptions made that might have led to incorrect conclusions?

4. Discussion on Impact:

- What influence might incorrect findings have on educational decisions or perceptions of the new teaching method?