EDU515 – Measurement and Metrics

Unit 4 Case Study

Due: 11:59pm EST on Sunday at the end of Unit 4
Points: 20

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Mod: EDU515 Term 4 2023

Overview:

This is the second set of Case Study Exercises (CSEs). These exercises are provided to assess your skills and to provide an opportunity to ensure mastery of the content. They should not be attempted until you have read the assigned readings and reviewed the course presentations for Unit 4. When you are ready, please submit the CSEs for review. When you receive your feedback, if everything is correct, you are ready for the Application Quiz #2 in Unit 5! If there are errors, you will be provided with feedback and the opportunity to resubmit the CSEs. No partial credit is applied to the CSEs. Provided that the CSEs were submitted by the unit deadline, the 20 points will be awarded once you have successfully completed the entire exercise. You may retry it as often as necessary until you have strengthened your skills. Since there is a developmental sequence to the acquisition of measurement skills, you must be proficient at each level before continuing to the next unit.

Questions:

Please answer the questions by typing your responses after each question. Save the file when you are finished and submit it using the assignment link in Unit 4.

#4-A. Measures of Central Tendency and Dispersion

You are a math teacher in an elementary school. In preparation for upcoming benchmark assessments, you do a quick probe of your students' math skills. You select ***20*** items from your recent math unit and administer the assessment. Your students earn the following scores:

Student	Score
Leah	10
Donald	18
Nikki	6
Leo	10
Sofia	13
Sam	8
Jody	10
Harrison	9
John	10
Marie	6

You decide to analyze the results so that you have a better picture of the group and individual performance. ***(Please remember to round all answers to two decimal places: ie. 0.00)***

1. What should be your first step?
   Arrange the scores in increasing order (lowest to highest):
   6, 6, 8, 9, 10, 10, 10, 10, 13, 18
2. Which score was obtained by the largest number of people? 10
3. What is this score called? Mode
4. What is the N for this distribution/data set? 10
5. Between what two scores do you need to divide the scores to calculate the median?
   Between 10 and 10
6. What is the numerical value of the median? 10
7. What is the $\sum X$? The sum of the scores is 100.
8. What is the Mean? The Mean is the sum of all values in the data set divided by the N (number of values). In this scenario, the Mean = 10. (100/10=10)
9. What is the range? The range is the distance between the highest and lowest scores in the distribution, which, in this case is 12. (18-6=12)

After reviewing the results you decide to further explore the data and determine the variability within the group.

Complete the following table and then answer the questions below. ***(Please remember to round all answers to two decimal places: ie. 0.00)*** Don't worry if the alignment of the table or columns get a little altered when you type; as long as the numbers that are in the cells can be determined you are fine.

X	X-M (deviation from mean)	$(X-M)^2$ (square each deviation from the mean)
18.00	8.00	64.00
13.00	3.00	9.00
10.00	0.00	0.00
10.00	0.00	0.00
10.00	0.00	0.00
10.00	0.00	0.00
9.00	-1.00	1.00
8.00	-2.00	4.00
6.00	-4.00	16.00
6.00	-4.00	16.00
$\sum X$= 100	$\sum (X-M)$ = 0	$\sum (X-M)^2$= 110 (sum of squares)

1. What is the variance? 12.22
   This assumes that the distribution of scores is a 'sample' (vs. a population).
   Therefore, 1 needs to be deducted from N (in this case, N= 10).
   So: The sum of squares (110) is divided by N-1.
   Answer: 110/9=12.22

2. What is the standard deviation? 3.50
   This is the square root of the variance.

#4-B. Interpreting Your Distribution

1. Using your answers from Part A, complete the table below by calculating the relative performance ranges and then converting them to absolute performance.

Relative Performance Ranges				
Really Worse	**Worse**	**Typical**	**Better**	**Really Better**
Less than 3.00	3.00-6.49	6.50-13.50	13.51-17.01	More than 17.01
Converted to Absolute Performance				
Less than 14.99%	15.00-32.49%	32.50-67.50%	67.51-85.05%	More than 85.05%

2. What is your interpretation of the performance of your class on this assessment?

    - There are two students (Nikki, Marie) who scored below the mean (in the "Worse" range) and may benefit from extra tutoring.

    - One student (Donald) scored above the mean (in the"Really Better" range) and exhibits mastery of skills. With Donald, I would keep an eye on his future scores to see if continues to excel (vs. only having grasped the concepts on this test very well) . If Donald consistently remains above the mean, this may indicate that he is eligible for advance learning or additional challenges.

    - The rest of the class (7 others) performed in a similar fashion and scored in the "Typical" (normal/average) range, which, based on their scores on an assessment of 20 questions, indicates that these 7 underperformed. The teacher should analyze the curriculum and/or specific lessons and assessment to see if it can be improved. An additional approach to consider is if the teacher can make improvements to his/her approach to delivering the learning. Overall, it appears that all students except for Donald (i.e., 9 learners out of 10) need to revisit the learning concepts in order to master them. Following the refresher lesson(s), the teacher should then reassess the students to determine if they have mastered the content.

#4-C. The Normal Curve and Normal Distributions

Assume that you have just received the results of your trainees' performance on a national licensure exam. The exam is a norm-referenced, standardized test with a mean of 200 and a SD of 25.

125-149	**150-174**	**175-225**	**226-250**	**251-275**
SD -2	*SD -1*	*Mean*	*SD +1*	*SD +2*
Worse	Below Average	Typical	Better	Above Average

1. On this exam, 68.26% of the scores would lie between what two scores?
   68.25% would lie between 175 and 225
2. On this exam, 95.44% of the scores would lie between what two scores?
   95.44% would lie between 150 and 250
3. Define the performance range for each of these trainees:

   Barney who earned a score of 233 – Above Average

   Marshall who earned a score of 158 – Below Average

   Sheldon who earned a score of 196 – Average