

HERE PRIVATE EDUCATION IS A VALUE INVESTMENT.

Assessing Quantitative Reasoning in Introduction to Probability and Statistics

Robert J. Krueger, Ph.D.

rkrueger@csp.edu

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Responsive. Relevant. Real.



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UNIVERSITY · SAINT PAUL

About Concordia University, St. Paul

- Christian (Lutheran Church – Missouri Synod)
- Inner-city, St. Paul, MN
- Comprehensive (grounded in the liberal arts)
- NCAA Division II Athletics
 - Volleyball: 7 consecutive national championships
- Tuition Reset (dropped tuition \$10,000)
- Head-count: 1300 trad undergrad, 800 cohort degree-completion, 1500 graduate

Traditional Undergraduates

- 35% not Caucasian
 - Small but growing international presence
- 28% first-generation
- 83% Minnesotan
- 30% Lutheran

Quantitative Reasoning

University-wide learning outcomes

- Translates verbal or written assertions into quantitative data
- Reads and analyzes quantitative data
- Interpretation of quantitative data
- Supports conclusion

These are currently assessed in math and physical science courses...130-180 students a year take Introduction to Prob/Stats per year

Collection Instrument



The platform for student outcomes

Request a Demo

HOME

SOLUTIONS

ACCOUNTABILITY

SUPPORT

NEXT STEPS

ABOUT

Learning assessed as it should be

Solving the problem that created the need for assessment in the first place.

Read More »

FOUR-YEAR INSTITUTIONS

FOUR-YEAR INSTITUTIONS

Administrators

Institutional Researchers

Faculty

Assessment Leaders

Student Services

TWO-YEAR INSTITUTIONS

PROFESSIONAL SCHOOLS

Website: elumen.info

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Scale

- 0 – Did not attempt activity or little effort
- 1 – Beginning
- 2 – Developing
- 3 – Accomplished
- 4 – Exemplary
- NA – Default; Faculty didn't enter data
 - Working on faculty communication to minimize number of NA values in the data set

Translates verbal or written assertions into quantitative data

Beginning	Developing	Accomplished	Exemplary
Student develops mathematical expressions and/or operational definitions from verbal or written assertions with significant errors.	Student develops mathematical expressions and/or operational definitions from verbal or written assertions with few errors.	Student develops appropriate mathematical expressions and/or operational definitions from verbal or written assertions.	Student develops appropriate mathematical expressions and/or operational definitions from verbal or written assertions with clearly defined variables and/or units.

Translates verbal or written assertions into quantitative data

Find the probability that a committee of four women and two men are randomly selected from six women and five men. Carefully explain each step of the process and use words.

1 - some attempt at setting up the expression

2 - correct identification as a combination or probability problem

3 - equation correctly identified, some possible execution errors

4 - expression correctly set up, solved correctly, with each step carefully explained

Reads and analyzes quantitative data

Beginning	Developing	Accomplished	Exemplary
Student exhibits ability to differentiate between qualitative and quantitative data.	Student either chooses or properly applies a method of quantitative analysis	Student chooses and properly applies a method of quantitative analysis	Student uses or compares more than one method of quantitative analysis.

Reads and analyzes quantitative data

The average local cell phone call length was reported to be 2.27 minutes with standard deviation of .75 minute. A random sample of 40 phone calls showed an average of 2.48 minutes in length. At $\alpha = 0.05$, is there enough evidence to say a difference was found?

- a) Do all five steps of the hypothesis test.
- b) Find the 95% confidence interval for this problem.
- c) Comment on the relationship between parts a and b. Explain thoroughly.

- 1 - attempts an answer
- 2 - answers a) or b) correctly
- 3 - answers a) and b) correctly
- 4 - answers a), b) and c) correctly

Interpretation of quantitative data

Beginning	Developing	Accomplished	Exemplary
Student interprets the quantitative data with significant errors	Student interprets the quantitative data with few errors	Student accurately interprets the quantitative data with no errors.	Student accurately interprets the quantitative data recognizing the limitations of the methodology used

Interpretation of quantitative data

- The National Football League Commissioner wants to know if the NFC quarterbacks threw fewer touchdowns than AFC quarterbacks so far this season. Given $\alpha = 0.05$, use the sample data and standard deviations below to determine if this is true. **(Do all five steps)**
NFC: 14, 21, 16, 11, 15, 14, 28 (standard deviation is 5.7)
AFC: 24, 12, 13, 18, 19, 23 (standard deviation is 5.0)
 - 1 - some attempt at setting up the five steps with significant errors
 - 2 - some steps correctly identified and executed
 - 3 - all steps correctly identified, some possible execution errors or lack of result summary
 - 4 - all 5 steps correctly identified and executed with thorough summary of the results

Supports conclusion

Beginning	Developing	Accomplished	Exemplary
Student uses no quantitative data to support their conclusion	Student incorrectly uses quantitative data to support conclusion	Student accurately uses quantitative data to support conclusions	Student accurately uses quantitative data to support conclusions and recognizes extensions of the problem and/or conclusion

Supports Conclusion

A teacher gave a math pretest and post-test. The table shows the number each student got right for each test. At $\alpha = 0.10$, did the students score significantly better on the post-test? From the given information, complete the remaining steps with complete justification of the decision and appropriate summary. (We provide hypotheses, test value, and critical value.)

- 1 - some attempt at solving the exercise, but no correct answers
- 2 - steps 4 or 5 correctly identified
- 3 - steps 4 and 5 correctly identified but decision or summary incomplete
- 4 - both steps 4 and 5 correctly identified and executed

Translates verbal or written assertions into quantitative data.

Spring 2013	1.5%	0.0%	10.8%	26.2%	32.3%	30.8%	100% (65)
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Fall 2012	2.6%	0.0%	6.7%	13.3%	57.3%	22.7%	100% (75)
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Reads and analyzes quantitative data

Spring 2013	1.5%	0.0%	12.3%	36.9%	30.8%	20.0%	100% (65)
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Fall 2012	2.6%	0.0%	1.3%	22.7%	60.0%	16.0%	100% (75)
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Interpretation of quantitative data

Spring 2013	1.5%	0.0%	12.3%	23.1%	41.5%	23.1%	100% (65)
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Fall 2012	2.6%	1.3%	9.3%	33.3%	52.0%	4.0%	100% (75)
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Supports conclusion

Spring 2013	1.5%	0.0%	18.5%	24.6%	38.5%	18.5%	100% (65)
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Fall 2012	2.6%	1.3%	8.0%	52.0%	25.3%	13.3%	100% (75)
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Term subtotals:	2.1%	0.7%	12.9%	39.3%	31.4%	15.7%	100% (140)
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