CUSP Test: Student Summary Report

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STUDENT DEMO (demo@psu.edu)

The Capstone Undergraduate Statistics Program (CUSP) Assessment measures learning outcomes of students in undergraduate statistics programs (e.g. majors) against the competencies cited in the 2014 ASA Guidelines for Undergraduate Programs in Statistical Sciences.[1] The 2014 ASA Guidelines are aligned to 6 major sections, with several subsections.

This assessment also included items from the Comprehensive Assessment of Outcomes in Statistics (CAOS) Test which includes topics accessible to introductory statistics students. CAOS tasks were selected assess common misconceptions that persist even among advanced undergraduate statistics students.

Additional remarks about scoring

Multiple choice items were scored with 2 points possible; multiple select items (i.e. "valid" or "NOT valid") were scored 1 point for each statement/decision task. Items pertinent to more than one competency of the 2014 ASA Guidelines were applied accordingly with diminishing weight credited to secondary or tertiary competencies (e.g. 100%, 50%, 25%). Consequently, some items inform more than one competency aligned to the 2014 ASA Guidelines. This assessment seeks to expose variability among students (like a standardized test) and not to certify achievement against a fixed competency standard (like a driver's license test), so scores near 50% are typical.

CUSP Test Blueprint

By design, some sections of the 2014 ASA Guidelines were given more or less weight than others in the CUSP Test. The development team established the following weights based on (1) priority in the curriculum and (2) feasibility for a selected-response assessment design.

Section	Subsection	Target Weight (%)
Statistical Methods and Theory	Statistical Theory	18.0
Statistical Methods and Theory	Exploratory Data Analysis	6.0
Statistical Methods and Theory	Design of Studies	18.0
Statistical Methods and Theory	Statistical Models	18.0
Data Wrangling Computation and Data Science	Software and Tools	0.0
Data Wrangling Computation and Data Science	Accessing and Wrangling Data	4.5
Data Wrangling Computation and Data Science	Basic Programming Concepts	1.5
Data Wrangling Computation and Data Science	Computationally Intensive Statistical Methods	4.0
Mathematical Foundations	Calculus	0.0
Mathematical Foundations	Linear Algebra	0.0
Mathematical Foundations	Probability	2.5
Mathematical Foundations	Connecting mathematical foundations & applications in statistics	2.5
Statistical Practice	Communication	0.0
Statistical Practice	Collaboration	0.0
Statistical Practice	Ethical Issues	5.0
Statistical Practice	Opportunities for Authentic Practice	0.0
Problem Solving	Complex open-ended problems	2.2
Problem Solving	Scientific method and statistical problem-solving cycle	12.8
Discipline-Specific Knowledge	Discipline-Specific Knowledge	5.0

[1] American Statistical Association Undergraduate Guidelines Workgroup (2014). 2014 Curriculum guidelines for undergraduate programs in statistical science. Alexandria, VA: American Statistical Association. http://www.amstat.org/education/curriculumguidelines.cfm

Penn State University Summary (n = 107 students)

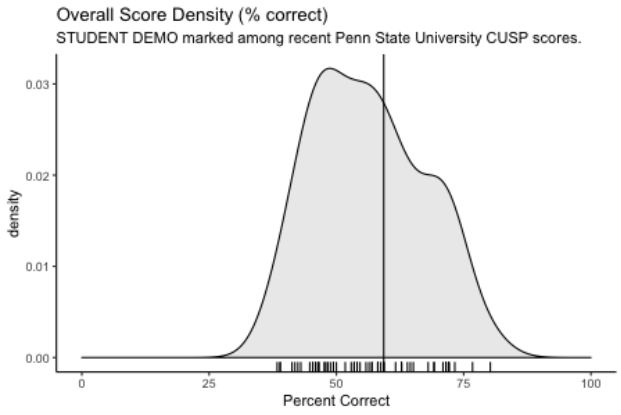
Summary Statistics

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Overall Score (%)	31.98	48.26	56.10	57.01	66.86	84.88
CUSP Score (%; excl. CAOS items)	34.03	47.40	55.56	55.99	64.58	83.33
CAOS Score (%; excl. CUSP items)	7.14	50.00	64.29	62.24	78.57	100.00

Penn State University CUSP Test Outcomes Aligned to 2014 ASA Guidelines

Section Desc.	Subsection Desc.	% Correct	Items
Statistical Methods and Theory	Statistical Theory	64.0	5
Statistical Methods and Theory	Exploratory Data Analysis	33.8	2
Statistical Methods and Theory	Design of Studies	60.5	6
Statistical Methods and Theory	Statistical Models	58.0	11
Data Wrangling Computation and Data Science	Software and Tools	68.0	2
Data Wrangling Computation and Data Science	Accessing and Wrangling Data	53.0	1
Data Wrangling Computation and Data Science	Computationally Intensive Statistical Methods	57.8	2
Mathematical Foundations	Probability	48.3	2
Mathematical Foundations	Connecting mathematical foundations & applications in statistics	72.0	1
Statistical Practice	Ethical Issues	51.4	1
Problem Solving	Complex open-ended problems	21.5	1
Problem Solving	Scientific method and statistical problem-solving cycle	59.2	8

Results: STUDENT DEMO



Description	Result
Overall Score (%)	59
Class rank on test (62 students)	21
Rank among participating institutions (%-ile)	70
CUSP Score (%; excl. CAOS)	57
CAOS Score (%; excl. CUSP)	71

Performance Summary Aligned to 2014 ASA Guidelines (excludes CAOS Items)

Section Desc.	Subsection Desc.	% Correct	Items
Statistical Methods and Theory	Statistical Theory	73.3	5
Statistical Methods and Theory	Exploratory Data Analysis	50.0	2
Statistical Methods and Theory	Design of Studies	92.3	6
Statistical Methods and Theory	Statistical Models	47.1	11
Data Wrangling Computation and Data Science	Software and Tools	66.7	2
Data Wrangling Computation and Data Science	Accessing and Wrangling Data	100.0	1
Data Wrangling Computation and Data Science	Computationally Intensive Statistical Methods	44.4	2
Mathematical Foundations	Probability	0.0	2
Mathematical Foundations	Connecting mathematical foundations & applications in statistics	62.5	1
Statistical Practice	Ethical Issues	80.0	1
Problem Solving	Complex open-ended problems	100.0	1
Problem Solving	Scientific method and statistical problem-solving cycle	60.3	8