



UNIVERSITY OF
ARKANSAS

Department of Mathematical Sciences

Pre/Post Analysis of the Change in Learning
Objective Competency of College Algebra Students

FY 17 (Fall 2016, Spring 2017)

Data

Data were collected on all students enrolled in College Algebra (MATH 1203) from the fall semester of 2016 through the spring semester of 2017. During these terms students were given a Pre-Assessment (pre-test) of ten items at the beginning of the semester which were also included in the final exam (post-test) at the end of the semester. These items measured one or more of the following learning objectives:

- (MATH LO 1) Demonstrate an understanding of college-level mathematical concepts and tools.
- (MATH LO 2) Be able to analyze and critique logical arguments.
- (MATH LO 3) Develop models to solve real-life problems.
- (MATH LO 4) Formulate and solve a problem in mathematical terms, using appropriate tools and methods.
- (MATH LO 5) Demonstrate fluency with the language and notation of mathematics.
- (MATH LO 6) Express quantitative and logical ideas with precision.

Course

- MATH 1203 face-to-face: Three credit hour course which meets three days per week for students scoring at least 23 on the math section of the ACT (or 540 on the SAT math section)

Student Numbers

All students were to be required to take both the pre-test and post-test, though some, due to extenuating or unusual circumstances, did not. In addition, students who withdrew from the course did not take the post-test. In total, 1192 students took both the pre-test and the post-test during these semesters.

Analyses

Paired t-tests were conducted on each item of the pre-test/post-test. These results are included in the table below. This table contains which learning objectives are measured by the items, the t statistic, p-value, Cohen's d effect size, the percentage of students who answered the item correctly in the pre-test, and the percentage of students who answered the item correctly in the post-test. With ten statistical analyses, the overall alpha value is set at 0.05 for the course and $0.05/10 = 0.005$ for each item within the course. For MATH 1203 face-to-face, the effect size was small for one item, medium for five items, and large for four items.

1203 Face-to-Face FY17 (Fall 16-Spring 17)

Question Number	Learning Objectives	t	p-value	Cohen's d	Pre-Test Percentage Correct	Post-Test Percentage Correct
1	LO1, LO4	14.5	<0.0001	0.42	70.5%	91.2%
2	LO2, LO3	20.1	<0.0001	0.58	33.7%	66.9%
3	LO1, LO4	20.2	<0.0001	0.59	29.3%	65.4%
4	LO4, LO5	21.7	<0.0001	0.63	36.4%	73.7%
5	LO2, LO3, LO5	45.2	<0.0001	1.31	12.0%	78.2%
6	LO4	20.9	<0.0001	0.60	11.6%	42.3%
7	LO1, LO3	38.0	<0.0001	1.10	5.7%	62.2%
8	LO1, LO4	18.7	<0.0001	0.54	3.6%	27.3%
9	LO2, LO5	33.8	<0.0001	0.98	25.3%	79.2%
10	LO1, LO4	34.3	<0.0001	0.99	38.5%	90.6%

Note: As suggested by Cohen: $d=0.2$ is a "small" effect size, $d=0.5$ "medium", and $d=0.8$ "large"