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Research Brief
MATH-952 Course Success Rate by Accuplacer Arithmetic Cut-Score
Fall 2011 and Spring 2012

Background: In April of 2011 the Crafton Hills College math department lowered the arithmetic cut-score on the assessment test for MATH-952, Pre-Algebra, from 52 to 43. Accordingly, in Fall 2011 and Spring 2012 students were able to enroll in MATH-952 if they had a score on the assessment of 43 or higher. The following illustrates the relationship between cut-score, how students met the prerequisite for MATH-952, and student success in MATH-952.

Findings:

- Students with an Arithmetic cut-score from 43 to 51.99 on the Accuplacer Assessment had an 82% MATH-952 course success rate
- Students who had a cut-score from 43 to 51.99 had a statistically significantly ($p < .001$) and substantially higher ($ES = .65$) higher MATH-952 course success rate (82%) than students who placed into MATH-952 with a cut-score less than 43 (50%)
- Students who had a cut-score from 43 to 51.99 had a substantially higher ($p = .062$, $ES = .65$) higher MATH-952 course success rate (82%) than students who placed into MATH-952 with a cut-score of 52 or higher (61%)
- Of the 342 students who earned a grade on record (GOR) in MATH-952 in Fall 2011 and Spring 2012, 214 or 63% placed into MATH-952 with an Accuplacer Arithmetic score less than 43
 - 40% of the students who scored below 43 had a score of 20 to 26
 - Students who successfully completed MATH-952 with a cut-score from 20 – 42.99 had a statistically significantly ($p < .01$) and substantially ($ES = .40$) higher average cut score ($M = 30.4$) than students who did not successfully complete MATH-952 ($M = 27.9$)
 - Students with a cut-score from 30 – 42.99 had a statistically significantly ($p < .05$) and substantially ($ES = .28$) higher MATH-952 success rate (58%) than students with a cut-score that was less than 30 (44%)

Table 1: New Cut-Score Range, How a Student Met the MATH-952 Pre-requisite, and MATH-952 Course Success Rate for Fall 2011 and Spring 2012 MATH-952 Students.

| How Student Met MATH-952 Pre-Requirement | Cut Score Range | | | | | | | | | Overall Success Rate | | |
|--|-----------------|------------|-------------|--------------|-----------|-------------|--------------|-----------|-------------|----------------------|------------|-------------|
| | 20 - 42.99 | | | 43 - 51.99 | | | 52 or higher | | | | | |
| | Success Rate | | | Success Rate | | | Success Rate | | | | | |
| | # | N | % | # | N | % | # | N | % | # | N | % |
| Did not meet prerequisite | 2 | 3 | 66.7 | 0 | 0 | 0.0 | 0 | 0 | 0.0 | 2 | 3 | 66.7 |
| Placed into MATH-952 or higher | 107 | 214 | 50.0 | 28 | 34 | 82.4 | 19 | 31 | 61.3 | 154 | 279 | 55.2 |
| Successfully Completed Prerequisite | 32 | 53 | 60.4 | 3 | 4 | 75.0 | 3 | 3 | 100.0 | 38 | 60 | 63.3 |
| Total | 141 | 270 | 52.2 | 31 | 38 | 81.6 | 22 | 34 | 64.7 | 194 | 342 | 56.7 |

Note: “#” refers to the number of students who successfully completed MATH-952, “N” refers to the number of students who earned a GOR in MATH-952, and % is the success rate (i.e. #/N).

Table 2: Distribution of Accuplacer Arithmetic Scores for Students who placed into MATH-952 and Scored below the Cut Score of 43.

| Cut Scores | Frequency | Percent | Cumulative Percent | Cut Scores | Frequency | Percent | Cumulative Percent |
|------------|-----------|---------|--------------------|--------------|------------|--------------|--------------------|
| 20 | 23 | 10.7 | 10.7 | 32 | 8 | 3.7 | 69.2 |
| 21 | 5 | 2.3 | 13.1 | 33 | 8 | 3.7 | 72.9 |
| 22 | 6 | 2.8 | 15.9 | 34 | 11 | 5.1 | 78.0 |
| 23 | 15 | 7.0 | 22.9 | 35 | 6 | 2.8 | 80.8 |
| 24 | 15 | 7.0 | 29.9 | 36 | 7 | 3.3 | 84.1 |
| 25 | 10 | 4.7 | 34.6 | 37 | 4 | 1.9 | 86.0 |
| 26 | 12 | 5.6 | 40.2 | 38 | 5 | 2.3 | 88.3 |
| 27 | 9 | 4.2 | 44.4 | 39 | 8 | 3.7 | 92.1 |
| 28 | 13 | 6.1 | 50.5 | 40 | 8 | 3.7 | 95.8 |
| 29 | 9 | 4.2 | 54.7 | 41 | 5 | 2.3 | 98.1 |
| 30 | 15 | 7.0 | 61.7 | 42 | 4 | 1.9 | 100.0 |
| 31 | 8 | 3.7 | 65.4 | Total | 214 | 100.0 | |

Note: Frequency refers to the number of students who earned the referenced cut-score, percent refers to the percent of students who earned the referenced cut-score (e.g.: 23/214 = 10.7%), and cumulative percent refers to the percent of cut-scores up to the specified cut-score. For example, 40% of the students scored 28 or less.

Methodology: Accuplacer Assessment cut-scores and placements were merged into a grades database from Datatel. A student’s most recent test score was used. In addition, some students had both an Arithmetic and Elementary Algebra test score; however, only the Arithmetic scores were used in the analysis. Moreover, even though some students had taken both the arithmetic and elementary algebra assessments, these students received the same placement. Grades on Record (GOR) are similar to being enrolled at census and refer to students earning one of the following grades: A, B, C, D, F, I, P, NP, or W. MATH-952 course success rate is defined as the number of A, B, C, or P grades divided by the number of GOR.

Effect Size (ES) and Statistical Significance. The effect size statistic is commonly used in meta-analyses. A meta-analysis uses quantitative techniques to summarize the findings from a number of studies on a particular topic to determine the average effect of a given technique. One method of interpreting effect size was developed by Jacob Cohen. Jacob Cohen defined “small,” “medium,” and “large” effect sizes. He explained that an effect size of .20 can be considered small, an effect size of .50 can be considered medium, and an effect size of .80 can be considered large. Effect size is calculated by dividing the difference of the two means by the pooled standard deviation. It is important to mention that the number of students in each group does not influence Effect Size; whereas, when statistical significance is calculated the number of students in each group does influence the significance level (i.e. “p” value being lower than .05). Accordingly, using Cohen as a guide, a substantial effect would be .20 or higher.

Limitations: A limitation to using the cut-score range is that the scores are weighted and the score may include how students responded to the educational background questions as part of the Accuplacer assessment process.