

Interactive Homework vs. Traditional Homework

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Abstract

Is doing homework more effective when using an interactive method or when using a traditional method? Through the use of statistical tests, answering this question if possible. By measuring the probability of a certain level of success or failure, statistical tests can offer insight into the effectiveness of two different homework styles. The results in this study are based on the grades of three semesters of Developmental Math students. Students who were assigned traditional homework were given random in class quizzes to test their comprehension of class material. In contrast, students assigned to interactive homework were not given random in class quizzes. Instead, interactive homework was assigned so that the students could receive immediate feedback on the accuracy of their homework. Are these differences enough to cause a significant gap in the final averages of the two groups of students and what predictions can be made concerning the success levels of these students? To achieve a practical answer, three statistical measures were used: the 1 proportion z interval, t interval, and the 2 sample t test.

Introduction

Success in collegiate mathematics courses has been the topic of debate for many years. Most discussion involves national or regional data sets that leave individual students wondering about themselves [2]. In this study, we are attempting to discover if there is a homework technique that works best for two-year college developmental mathematics students. Our measurement for success will simply be the final average of each student. The developmental mathematics courses in which students in this study were enrolled focused on pre-algebra algebra concepts and introductory algebra concepts. These topics are traditionally found in high school curriculums. Topics include: adding, subtracting, multiplying, and dividing all types of numbers; exponents; polynomials; factoring; rational expressions; the Cartesian coordinate system; and problem solving. In general, the instructional form consisted of lecturing followed by numerous examples and was consistent in all sections.

Procedures and Outcomes

We took 3 semesters of students taught by the same instructor and recorded each student's final average. Those students who dropped, or earned less than a 30% final average were removed from the study. The students were put into groups based on how the class was expected to do homework: traditionally, or interactively using internet software. We used three statistical methods to calculate current and future success. We used the 1-Proportion Z-Interval, the T-Interval, and the Two Sample T-Test. All tests and processes were computed using a standard TI-84 calculator.

Summary numbers:

•Students who worked homework traditionally:

1. n = 52
2. Mean Grade = 70.2013
3. Grade Standard Deviation = 17.7939

•Students who worked homework interactively:

1. n = 64
2. Mean Grade = 67.1719
3. Grade Standard Deviation = 16.1791

1-Proportion Z- Interval:

This test gives an interval of possible class success rates based on our previous observations.

Interactive	Traditional
No. who passed = 36	No. who passed = 35
No. who finished= 64	No. who finished= 52
Confidence Level = 0.95	Confidence Level = 0.95
(0.44096, 0.68404)	(0.54558, 0.80057)
Previous Pass Rate= 0.5625	Previous Pass Rate = 0.6731

Conclusions:

1. From this test, it is expected that between 44.096% and 68.404% percent of students who perform homework interactively will pass their math class with a C or higher.
2. Between 54.558% and 80.057% of students who perform homework traditionally are expected to pass their math class with a grade of C or higher.

T-Interval:

This process was used to determine a developmental math class's final average.

Interactive	Traditional
Mean Grade = 67.1719	Mean Grade = 70.2013
Grade Std. Dev.= 16.1791	Grade Std. Dev. = 17.7939
n = 64	n = 52
Confidence Level = 0.95	Confidence Level = 0.95
(63.13, 71.21)	(65.25, 75.16)

Conclusions:

1. For students who had interactive homework, it can be said with 95% confidence that the overall average of any developmental math class should be between 63.13 and 71.21.
2. For students who had traditional homework, it can be said with 95% confidence that the final average of any developmental math class should be between 65.25 and 75.16.

2 Sample T-Test:

The 2 Sample T-Test is the most important because it determines if there is a statistically significant difference in the final averages of the students using the two homework methods.

Null Hypothesis: Final averages are equivalent M1 = Final Average of Traditional Homework M2= Final Average of Interactive Homework		
Alternative Hypothesis: M1 ≠ M2	Alternative Hypothesis: M1 > M2	Alternative Hypothesis: M1 < M2
Test Statistic = 0.95896	Test Statistic = 0.95896	Test Statistic = 0.95896
p = 0.3396	p = 0.1698	p = 0.83019
df = 113.8	df = 113.8	df = 113.8
66.04% Confidence	83.02% Confidence	16.98% Confidence

Conclusion: Since all of the confidence levels are less than 95%, we fail to reject the null hypothesis. Thus, based on the results of our small sample, it seems there is no statistically significant difference in final averages of students based on the method of homework.

Future Work

This small study was an exercise to determine which statistical methods would work best to find the homework method that creates the most success. We feel that the three methods used in this study give us the information that we need.

Our next step is to enlarge this study by including final grades from all instructors teaching developmental math classes at Louisiana State University, Eunice. We hope, by enlarging the study, to definitively find which homework method works best for our developmental students. This information will help all of our instructors to serve the needs of the developmental students better.

The next step will be to reach out to other two year colleges in the region and ask them to join us in our endeavor. We believe that we can find a regional trend regarding developmental mathematics courses and homework methods.

Our final stage will be to study the results in college algebra courses at Louisiana State University, Eunice and our regional counterparts. We hope to find the best method of homework to give our students current success in college mathematics and also success after graduation.

Acknowledgements

1. We would like to thank the Undergraduate Research Summer Institute and the LSUE Foundation for funding.
2. We would also like to thank the LSUE Library for their assistance in printing.

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