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72

Lazari: Does the Number of Lectures a Week Make a Difference?

DOES THE NUMBER OF LECTURES A WEEK MAKE A DIFFERENCE IN THE LEARNING OF CONCEPTS AND RETENTION OF STUDENTS IN COLLEGE ALGEBRA?

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ABSTRACT

One of the courses that attracts attention at the university level is college algebra. It is perceived by the students to be one of the most difficult courses in college. Some students take the class three or four times before they succeed. Universities are introducing new ways of teaching college algebra hoping to improve student success in this course.

At our university we are facing the same problem. We decided to compare a three day lecture class versus a two day. We believe that because of the nature of the material, more class periods with shorter lectures are more successful than fewer classes with longer lectures. We also believe that three day classes have higher student retention rates than two day classes.

Data was collected over a period of four years and analyzed. Our study found that three day classes have higher success rates on the final exam than two day classes. Both the three day and the two day classes have the same retention rates.

INTRODUCTION

College algebra is one of the most enigmatic courses at the university level. Students enter university and are not prepared for college algebra. We can blame the high school, middle school, and even elementary school for this situation. There is a constant pressure from the government to improve student performance at all levels of primary and secondary education (4). Still the fact remains, that our students are not prepared for college algebra.

Universities across the country are introducing new ways of teaching college algebra in order to improve the success rate of students. Some of these new methods are online courses, software based classes (1), using the Supplemental Instructor Leaders (SI Leaders) method (2), graphing calculator and computer based classes (3). Even though these methods are very successful

and help many students succeed, there is still a need for new ways in which to help more students succeed.

In this paper, we decided instead of looking for a new way to improve the success rate in college algebra, to step back and re-examine the current structure of the way we teach college algebra. Typically, we offer three day classes or two day classes and sometimes even a one day class. Because of the nature of the material, we believe that the best setting in which to offer a college algebra course is a three day class whereby the students receive the new material in smaller portions than they would in a two or one day class.

DATA COLLECTION

During registration the students had a choice of which class to register for, a three day class (MWF) or a two day class (TR). The first courses to close are the (TR). I think the reason for this is the student's perception of this course as being difficult (2).

At the end of each semester we collected data and reported the sample size (n), the mean ($\bar{X}$) and standard deviation (sd) on the Final Exam. We also collected the total enrollment for each section in order to compute the retention rate. Table I summarizes the data.

Table I. Data Collected On the Performance of Two Day vs. Three Day Classes.

Method of Content Delivery	Final Exam $\bar{X}$/ sd / n	Number Enrolled	Number Taking the Final Exam	Retention Rate	Semester
Two Day	61.73 / 15.62 / 243	365	243	66.57%	Spr-2002
Three Day	65.03 / 14.70 / 329	482	329	68.25%	Spr-2002
Two Day	57.30 / 16.04 / 281	516	281	54.45%	Fall-2002
Three Day	60.85 / 15.08 / 412	659	412	62.52%	Fall-2002
Two Day	59.62 / 15.91 / 284	469	284	60.52%	Spr-2003
Three Day	62.31 / 14.86 / 356	578	356	61.59%	Spr-2003
Two Day	60.31 / 14.26 / 308	521	308	59.11%	Fall-2003
Three Day	64.76 / 12.95 / 395	683	395	57.83%	Fall-2003
Two Day	54.41 / 16.54 / 217	432	217	50.23%	Spr-2004
Three °Day	54.34 / 15.19 / 361	630	361	57.30%	Spr-2004
Two Day	63.10 / 14.01 / 304	542	304	56.09%	Fall-2004
Three Day	65.94 / 13.19 / 436	678	436	64.31%	Fall-2004
Two Day	55.26 / 15.35 / 288	466	288	61.80%	Spr-2005
Three Day	56.73 / 15.63 / 316	521	316	60.65%	Spr-2005

74

Lazari: Does the Number of Lectures a Week Make a Difference?

Table II shows the hypothesis testing for the means and Table III shows the hypothesis testing for the retention rates.

Table II. Comparison 1- <u>Null Hypothesis</u>: There does not exist a statistical difference between the means on the final examination for the two methods.

Hypothesis Testing for the Final Exam Means between Two Day vs. Three Day Classes.

	Spr-2002	Fall-2002	Spr-2003	Fall-2003	Spr-2004	Fall-2004	Spr-2005
2-day Mean	61.73	57.30	59.62	60.31	54.41	63.10	55.26
3-day Mean	65.03	60.85	62.31	64.76	54.34	65.94	56.73
Test statistic	$t = -2.58$	$t = -2.96$	$t = -2.20$	$t = -4.42$	$t = 0.05$	$t = -2.81$	$t = -1.16$
P-value	*$P=0.011$	**$P=0.003$	*$P=0.028$	**$P=0.00$	$P=0.957$	**$P=0.005$	$P=0.245$

Note: Negative test statistic means the mean for the 3-day class was higher.
  *Means the result was statistically significant at $\alpha = 0.05$.
  **Means the result was statistically significant at $\alpha = 0.01$.

Table III. Comparison II - Null Hypothesis: There does not exist a statistical difference between the retention rates between Two Day vs. Three Day Classes.

Hypothesis Testing for Retention Rates between Two Day vs. Three Day Classes.

Spr-2002	Fall-2002	Spr-2003	Fall-2003	Spr-2004	Fall-2004	Spr-2005
2-day Prop	66.57	54.45	60.52	59.11	50.23	56.09	61.80
3-day Prop	68.25	62.52	61.59	57.83	57.30	64.31	60.65
Test statistic	$Z = -0.51$	$Z = -2.78$	$Z = -0.34$	$Z = 0.44$	$Z = -2.27$	$Z = -2.92$	$Z = 0.37$
P-value	$P=0.604$	**$P=0.005$	$P=0.732$	$P=0.654$	*$P=0.023$	**$P=0.003$	$P=0.711$

Note: Negative test statistic means the mean for the 3-day class was higher.
  *Means the result was statistically significant at $\alpha = 0.05$.
  **Means the result was statistically significant at $\alpha = 0.01$.

Table II shows that there is a significant statistical difference in five out of the seven semesters. Only in the spring of 2004 and spring of 2005 there is no significant difference. If the test statistic is negative it means that the (MWF) mean is higher.

Table III shows that there is a significant statistical difference in three out of the seven semesters. Again, if the test statistic is negative it means that the (MWF) ratio is higher.

CONCLUSION

From the hypothesis testing on the retention rate there is no statistical evidence that the (MWF) classes have higher retention rate than the (TR) classes. However, the hypothesis testing for the means indicates that there is statistical evidence that the mean of (MWF) classes is higher than the mean of (TR) classes.

The suggestion is to offer only (MWF) classes but this may not be practical. The logistics of scheduling classes to accommodate the students may prevent the scheduling of college algebra on (MWF) only.

Future research might examine the morning classes (before 10am) versus the evening classes (after 5:00pm).

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