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Influence of a Compressed Semester on Student Performance in a Construction Science Course

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Abstract

Compressed semesters, also known as minimesters, are offered in some educational institutions in the United States. They are offered during the two-week break period between a regular semester (Spring or Fall) and summer. A minimester makes it possible for a student to complete a course on a shorter schedule. The author offered a course on Mechanical, Electrical, and Plumbing Systems at a state university in Texas at the end of Spring semesters, both in 2015 and 2016. He offered the same course in Spring semesters, 2015 and 2016.

The purpose this study is to find out whether there is difference in performance in the course between students taking the course in a regular semester and those taking it in a minimester. Total number of students enrolled for the course was 225 in Spring semesters and 50 in the minimesters. An analysis of the data, using Chi-square statistic, indicates that students in minimesters performed significantly better than those who took the course in Spring semesters.

Keywords:
Academic, Chi-square, Minimester, MEP, Student Performance

Introduction

Statement of the Problem

Like many institutions in the United States, the university where the author teaches follows the trend of offering accelerated courses. The idea is to help students focus on a singular class by offering it in a shortened two-week format, meeting every weekday for four and a half academic hours. Student engagement can be augmented through exclusive attention on the subject matter, and motivated students can thereby succeed.

Instructional challenge, however, with this type of course is incorporating all the materials that are covered in 15-17 weeks. The class has to be charted clearly so that time is capitalized and expectations are evident. Every day is precious, and because there are so few of them, pedagogical changes, due date changes, or reading assignment changes are near impossible to make. The instructor needs to be well-prepared and make all the materials available to the students for successful completion of the course, starting from the first day of classes.

The author offered a Mechanical, Electrical, and Plumbing (MEP) systems course in a minimester in 2015. Structuring the minimester course involved planning of readings, quizzes, discussions, home works, and exams. Quizzes were given every day, home works had to be turned in every other day, and major exams were given every three days. The students seemed to be motivated. Their performance using all three types of evaluation measures (exams, home works, and quizzes) seemed to be better than the students who took the same course offered by the author in a regular semester in the previous Spring.

Hypothesis

This study was conducted in order to find out whether the performance of students taking the course in a minimester had a statistically significant difference than the performance of those taking the same course in a regular 15-week course.

Review of the Literature

Every academic institution operates according to an academic calendar with terms indicating the start and end of each session of classes. Most universities offer two regular semesters in an academic year, Fall and Spring, each with a duration of 15 to 17 weeks. Some universities also offer a summer session and minimesters; these terms fall within the group of compressed semesters.

Compressed term courses, even though they include same number of contact hours with students and contain the same materials as a regular semester course, are generally regarded as less effective than those taught in a full-length semester course and, hence, lead to poorer student performance[1]. Some studies, however, indicate that students both in the compressed and regular courses perform basically the same. A study by Caskey[2] shows that student performance in accounting and algebra, taken either in a regular or summer semester, did not have any statistically significant difference. Similar findings are reported by Ray & Kirkpatrick[3] on a course on human sexuality.

Contrary to the findings of the studies cited above, a longitudinal work by Logan & Geltner[4] supports the idea that students perform better in compressed sections of classes than they do in full semester sections. The study was conducted using database from Fall 1994 to Summer 1999 consisting of 446,000 student enrollments in Santa Monica College. The findings also indicate that the percentage of students dropping a course in a compressed semester was less than that in a full semester, in inverse relationship to the success rate. Similar findings are reported by Adrian & Gustafson[5] in a study conducted from database of over 45,000 observations. After controlling for student demographics and other characteristics, the authors confirm that intensive courses result in better student performance than full-length semesters.

In order to understand the impact of a condensed semesters, it may be a good idea to identify the long and short term objectives of accelerated and regular semesters. This will pave the way to understand the benefits and disadvantages of short-term versus long-term length vis-à-vis student outcomes[6].

Social presence of student is more predominant in a compressed course than one taken in a regular semester[7]. Because of this reason, the learners have to interact with one another as well as with the instructor on a continuous basis, almost without any break, probably leading to deeper learning[8]. Some students become actively engaged in the course by becoming active participants. A study by Ferguson & DeFelice[9] indicate academic participation by students taking courses in a compressed semester is more than those attending courses in a regular semester.

Student satisfaction with perceived learning is deemed to be higher in a short semester compared to a long one. Ferguson & DeFelice[9] report a higher degree of contentment and delight among students with their courses taken in a compressed semester. This results in better performance[1]. Ho & Polonsky[10], in their study, provide evidence of student preference for short semester courses. When the student perception of learning is one of positive nature, they enjoy taking the course and work hard to make a good academic performance[6].

One important question that may be raised is whether students taking a course in a compressed semester are able to retain materials learned for future use as well as those who take the course in a traditional format. Van Scyoc and Gleason[11] compared courses in microeconomics taken by students in traditional semester with a compressed semester format. The results indicate better student performance in a compressed semester with no difference in retention, measured several months after the course was taken.

Methodology

Study Population

The study population consists of students who registered for a Mechanical, Electrical, and Plumbing course at an undergraduate level in a state university for minimesters in 2015 and 2016, and Spring semesters in 2015 and 2016. There were 50 students (7 females and 23 males) in the minimesters and 225 students (20 females and 205 males) in Spring semesters, enrolled for this course. The sample size includes the total population of 275 students.

Data Collection

Data related to the study was collected from the instructor's own database. The unit of analysis was the student.

Grading Criteria

Students for both minimester and Spring semester classes were taught the course using the same syllabus. Academic performance for both the groups was done using six assignments ten quizzes and three tests during the semester. The final grade was a weighted average of the assignments, quizzes, and tests. The assignments were worth 30 percent, the quizzes were worth 10 percent, and the tests were worth 60 percent of the total. Total numerical grade obtained by a student was converted to letter grade using the system shown in Table 1.

Table 1: Grading system

Numerical grade in percentage	Letter grade
90 -100	A
80-89	B
70-79	C
60-69	D
0-59	F

The researcher of the study being also the instructor and class evaluator, gives rise to the problem of researcher bias. The problem was recognized and attempts were made to minimize the problem by giving all assignments, quizzes, and tests online.

Variables

Student performance (GRADE). Student performance is the actual academic performance of the student in the class. It was measured by the letter grade (A, B, C, D, or F) obtained by the student in the course. For the purpose of providing a minimum number of observations in every cell in the statistical analysis, the observations for letter grades D and F were collapsed to form a category called OTHER.

Semester (SEMESTER). It indicates academic session in which a student was enrolled. It was a category variable with two levels: minimester (MINIMEST) and Spring semester (REGULAR).

Analysis

A Chi-square test was performed to determine the relationship between student performance and the semester in which the student took the course. It is a non-parametric test of statistical significance for bivariate tabular analysis. A hypothesis tested with Chi-square is whether or not two different samples are different enough in some characteristic or aspect of their behavior that we can generalize from our samples that the populations from which our samples are drawn are also different in the behavior or characteristic. The Chi-square test is also used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories. If the Chi-square value is found to be larger than the critical value at a chosen probability of error threshold, then the data present a statistically significant relationship between variables used in the test.

The formula for calculating Chi-square is:

$$\chi^2 = \Sigma\{(o-e)^2/e\} \quad (1)$$

Where, o = observed data and e = expected data.

Results

The results of the analysis are shown in Tables 2 and 3.

Table 2: Cross tabulation of GRADE vs. SEMESTER

GRADE		SEMESTER		Total
		MINIMEST	REGULAR	
A	Count	31	68	99
	% within SEMESTER	62.0%	30.2%	36.0%
B	Count	15	104	119
	% within SEMESTER	30.0%	46.2%	43.3%
C	Count	4	46	50
	% within SEMESTER	8.0%	20.4%	18.2%
OTHER	Count	0	7	7
	% within SEMESTER	.0%	3.1%	2.5%
Total	Count	50	225	275
	% within SEMESTER	100.0%	100.0%	100.0%

Table 3: Chi-square test

	Value	df	Asymptotic Sig. (2-sided)
Pearson Chi-Square	19.003	3	<0.0001
N of Valid Cases	275		

The Chi-square value (19.003) was found be quite high at a level of significance of less than 0.0001. The results showed that the proportions of students in the minimester classes (MINIMEST) receiving grades of A, B, C, and OTHER were 0.62, 0.30, 0.08, and 0 respectively; and those of the in the Spring semester classes (REGULAR) receiving grades of A, B, C, and OTHER were 0.302, 0.442, 0.204, and 0.031 respectively. The difference in proportions was found to be significant. In other words, the results indicated that overall student performance in the class in the minimester classes differed significantly from that in the Spring semester classes. Students enrolled for the course in minimesters performed better than those enrolled for the same course in the Spring semesters. A graphical representation student performance is given Figure 1.

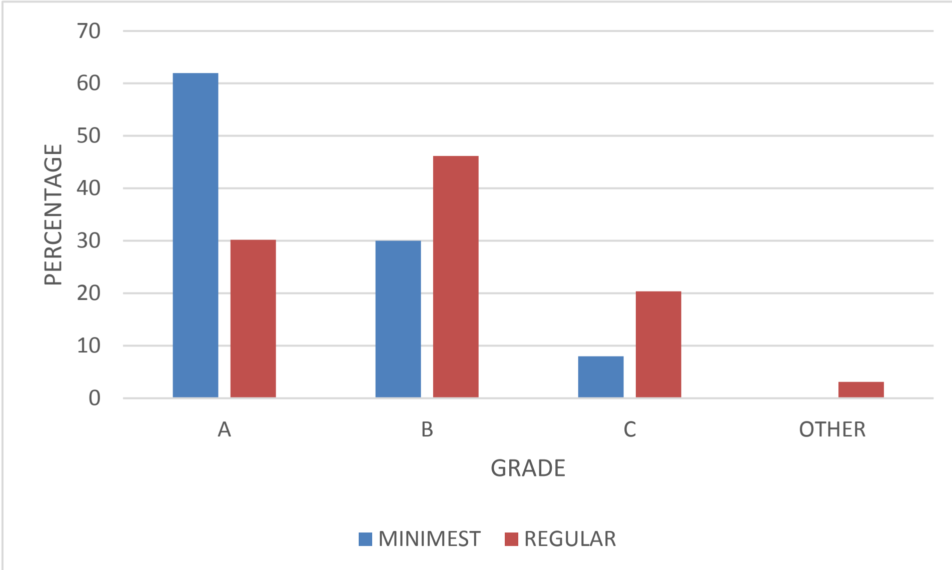

Figure 1: Student performance

Discussions

The results of the statistical analysis are meaningful in the sense that it provides support to the hypothesis students enrolled in a compressed academic session perform better than those taking the same course in a regular session. The study shows that the mean exam grade of students taking a Mechanical, Electrical, and Plumbing course offered at a state university in a minimester is significantly higher than that of the students in a Spring semester. The reason for this significant difference in student grades, however, was not very clear. Some studies suggest that instructors often lower the rigor of teaching a course in an abbreviated semester that results in increased student performance. But this was not the case for the present study; the syllabus, teaching method, and evaluation methods adopted by the instructor were exactly the same for both Spring and minimester sessions.

A shortcoming of this study could be that it was not controlled for student demographics. However, the author did not observe any significant difference either in age or ethnic difference between the two groups of students, except for gender. The percentage of female students in the compressed semesters was about 16 and that in the regular semesters was 10. But it is doubtful whether this factor would be responsible for enhanced student performance in a compressed semester. A previous pedagogical study[12] by the author indicates that gender does not make any difference in student performance.

One possible explanation that can be offered is increased student focus in a minimester. None of the students took more than one course during the abbreviated session; they had to concentrate on only the MEP course. Being in the class for four and a half academic hours every day made them know one another better, thereby creating a more collegial atmosphere. This fostered more classroom interactions and in-depth discussions that ensued a better understanding of the course content. It eventually may have paved the way to enhanced student performance.

Conclusions

The study provides a moderate support to the hypothesis that there is a statistically significant difference in academic performance of students attending a minimester and regular semester. Minimester students perform better than those enrolled in a regular semester. Obviously, the minimester students grasped the concepts and materials faster than their counterparts, and could use them well during the exams.

However, the results of the study must be taken with some caution. It was done for only one course in a semester and, therefore, the findings cannot be generalized. The study will hopefully generate enough interest to do further research on predicting performance of students in other courses.

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