Statistics 520, Fall 2016

Assignment 0

A study was published in the Journal of Statistics Education in 2015 that attempted to compare three methods of course delivery in an introductory statistics class. The methods of delivery were called "traditional", "online", and "flipped". While a number of endpoints were used in the study as observed measures of quality of instruction, for our purposes we can just think of the simple and obvious measure of final exam score. Our concern here is the study design, which can be summarized as follows.

The course that was the focus of the study was a $16-$week undergraduate introductory course at a "research-intensive university in the American Midwest". The three methods of delivering course materials were each used in one section of the course. The Traditional section had 330 students, the Online section had 74 students and the Flipped section had 56 students. Although the course format differed among sections, all sections used the same textbook and common assignments, all had the same instructor, and all took the same exams.

When students registered for the course, they decided which of the three sections they would attend, which apparently accounts for the differences in numbers of students in the sections. It appears that the same instructor was responsible for each of the sections of the course.

The data were analyzed primarily through the use of ANOVA. It is noted in the paper that "scores on the dependent variable are normally distributed, observations are independent", and a test for homogeneity of variance was conducted. In addition,

A pre-analysis comparison was performed in order to examine differences

in student demographics between the sections. Pearson χ^2 tests were used to determine if gender, nationality (domestic or international), and class rank varied by course section. A one-way ANOVA using expected mean squares (EMS) estimates and Type III sums of squares was used to examine whether or not the students were academically different across the sections by comparing their GPA prior to the start of the course. Prior GPA was available for 444 (N=316 traditional, N=54 flipped, N=74 online) of the 462 students (96.1%) who participated in the study.

There are any number of things about of this study that might deserve comment. Your assignment is as follows. Given that the analysis consisted of comparing group means, identify the single biggest problem with the study design. Note that although there may be additional aspects of the analysis you might like to know about, they should be irrelevant for what you are being asked. Limit your answer to the ONE thing that is the biggest problem for this study. You should have to write no more than a couple of sentences for your answer.