Does the Distance From the Teacher Influence Student Evaluations?

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Student ratings of the overall effectiveness of their instructor were recorded from 75 sections of college algebra freshman classes at California State University, Long Beach. These ratings were appraised in relation to seven independent variables, including number of students per class, number of rows per class, mean student grade, instructor, time of the class, frequency of instruction per week, and whether Web-based instruction was offered. A multiple regression analysis of the data revealed three significant findings: 1) ratings of individual instructors sizably differed; 2) mean student grades positively correlated to their ratings of the teachers; and 3) the number of rows per classroom was negatively associated with student ratings, that is, the classrooms with the most rows tended to yield the lowest student ratings. The last finding provides statistical support for the impression that the proximity to the teacher is important in the learning experience and that the design of the classroom matters.

Introduction

Over 2000 studies have appraised student evaluations of college teachers (Cashin, 1988; Centra, 1993; Evans and McLeis, 2000; Marsh and Kunkin, 1992; Stronge, 1997). The following were found to be factors affecting student evaluations: subject matter taught, classroom instructor, rank of the instructor, the student's expected grade, student major, whether the course is an elective or is required, class enrollment, the enthusiasm and warmth of the instructor, and the course level (Braskamp et al., 1984, p. 44). Most studies report the influence of class enrollment on student evaluations, revealing that lower enrollment is associated with higher evaluations (Centra, 1993; Evans and McNelis, 2000; Feldman, 1984; Mateo and Fernandez, 1996; Smith and Glass, 1980; Whitten and Umble, 1980). Nonetheless, a few researchers have found no significant relationship (Lin, 1992; Shapiro, 1990), while others have found a curvilinear relationship between class enrollment and student ratings (Kohlan, 1973; Pohlmann, 1975).

In any event, the relationship between class enrollment and student evaluations of the teacher has for the most part been reported as

statistically significant, but of modest importance as compared to other significant factors. Centra (1993, p. 67) reviewed studies indicating that classes with 10-14 students had mean overall ratings of 4.18 (on a 5 point scale) vs. mean ratings of 4.02 for classes of over 35 students. Braskamp and Ory (1994, p. 180) in their review found that the average correlation between classroom enrollment and global teaching ratings ranged from –0.09 to –0.16. Using the demarcations of "small" for a class of 25 students or less, "mid-sized" for 26-49 students, and "large" for over 50 students, Wigington et al.(1989) found that the interaction of instructor gender and class enrollment produces better ratings for female instructors in small classes and male instructors in large classes.

The size of the class can also be viewed from a physical perspective, the dimensions of the classroom. For example, how many rows does the classroom have? Obviously, a classroom with many rows has on average more students who are sitting at a greater distance from the teacher than one with fewer rows. Relating this distance to the student evaluations of their teacher is the focus of this study. It has not been the subject of prior research.

This research was performed at California State University, Long Beach for the fall semester of 2001 through the fall semester of 2002. All student evaluations from undergraduate college algebra courses during that period were included in the assessment. In addition to the student overall rating of the teacher's effectiveness, which was the dependent variable, seven independent variables were assessed and included in a multiple regression analysis.

Methods

In three semesters from the fall of 2001 through the fall of 2002, 75 sections of the undergraduate freshman level college algebra course at California State University, Long Beach were surveyed with respect to student evaluations and seven other relevant variables. The student evaluation consisted of nine items, though only one was used for the ratings in this study. This item was "Rate the overall teaching effectiveness of the instructor in this course." Scores ranged from 1 (very poor) to 5 (excellent). The dependent variable used in this study was the mean of the student evaluations.

In addition to the dependent variable, seven independent teacher, student, and classroom variables were included in a multiple regression analysis. These are listed in Table 1. These independent variables included the following: Instructors, Days (whether the class was a 2 or 3

days each week), Time (whether the class was during the morning, afternoon, or evening), Rows (number of rows in the classroom), N (number of students in the class), Mean Grade (average grade of all students in the class), and WeBWorK (whether or not the students in the class used a Web-based homework system in the class).

TABLE 1. Independent Variables Used in Regression Analyses

Instructors	There were 38 different instructors
Days	3 days a week course (MWF) or 2 days a week course (MW or TTh)
Time	Morning course (starts 8am-11am) Afternoon course (starts 12pm-3:30pm) Evening course (starts 4pm or later)
Rows	Number of rows in class
N	Mumber of students in class
Mean Grade	Average grade of all students for that particular class
WeBWorK	Students did homework in a traditional way or students did homework over the Internet using the WeBWorK program

Data on class enrollment, number of rows, and classroom dimensions were obtained from available administrative information or were measured by the first author.

Results

From the data on the average dimensions of the 75 classrooms in TABLE 2, it is apparent from the standard deviation of class enrollment (3.9) that the number of students in each class was relatively uniform (31.9). The number of rows per class averaged 7.2. The average number of seats per classroom was 42.3. The average classroom depth was 27.2 feet and the average width was 23.8 feet. The average ratio of depth to width was 1.14 to 1.

TABLE 2. Number of Rows and Students in the Classrooms

Rows Per Classroom	
Range	4 - 9
Average	7.2
Standard Deviation	1.2
Students Per Class	
Average	31.9
Standard Deviation	3.9

Seats Per Classroom	
Average	42.3
Standard Deviation	2.7
Dimension of the Classrooms	
Average Ratio of Depth to Width	1.14 : 1

The results of the multiple regression analyses are listed in TABLE 3. The mean student evaluation of the instructor showed that after accounting for the enrollment and the rest of the independent variables, the R2 adjusted (the explained variation of the dependent variable using the model of independent variables) was significant at 78.9%. The three significant independent variables at the 5% significance level were the mean grade of the students for the particular class, the instructor of the class, and the number of rows in the classroom. There were no significant interactions among the independent variables.

The regression model accounted for the difference in instructors. Instructors differed significantly from one another in mean student evaluation. The fact that the instructors are incorporated into the model is important since individually they were significant in their influence on student evaluations.

There was a negative relationship between the number of rows in the classroom and the mean student evaluation of the instructor. That is, as the number of rows in the classroom was decreased by 1 row, holding all the other independent variables constant, the mean student evaluation ratings of the instructor went up by 0.05 units. Also, as the grades in the class went up by 1 unit, while holding all the other predictors constant, the student evaluation scores went up by 0.24 units.

TABLE 3. Results of Regression Analysis

Dependent variable	R^2 adjusted	Significant independent variables at the $\alpha = 0.05$ level of significance	p-value of the significant independent variables	Parameter estimates associated with significant independent variables
Mean of student evaluations of teachers	78.9%	1) rows 2) mean grade 3) instructor	0.03 <0.01 <0.05 for specific instructors	-0.05 0.24 ---

Discussion

The main finding of this study is that student assessments of the effectiveness of their college algebra instructor are influenced by the dimensions of the classroom while taking into the account the number of enrolled students. The greater the number of rows in the classroom, the lower the average student evaluations. A second finding is that higher scores on student evaluations were associated with higher student grades. A third finding is that individual instructors differed significantly from one another in student evaluations. Both of the latter two findings have been consistently reported in the literature (Centra, 1993; Evans and McLeis, 2000).

Although classroom design does influence the teaching outcome in this study, its impact has not been the subject of methodologically sound research in the literature (Allen et. al., 1996; Owu, 1992). Daniel Niemeyer in "Hard Facts on Smart Classroom Design" (2003) reports that "faculty prefer wide not deep classrooms" to keep "the teacher closer to the farthest students…" (p. 130). Though reasonable, he cites no research to support this view. The findings of the present study, however, support the related proposition that the closer students are to the teacher, the higher they will rate the teacher's effectiveness.

The finding that the distance from the teacher is a significant variable in student evaluations merits attention, even though it is not as significant a factor in this respect as student grades or differences between individual instructors. Because of this new finding, the distance from the teacher deserves consideration as one of a number of factors that influence student appraisals of their instructor.

It is natural to expect some relationship between class enrollment and the physical size of the classroom. For example, a large classroom with a small student enrollment would permit a variety of seating arrangements. Thus, to assess the independent status of the number of rows in a classroom requires comparing classroom size with a range of class enrollments. This was not possible in this study because class enrollment had been intentionally made similar by administrative design. Although class enrollment differences were accounted for in the multiple regression analysis, they were too small to be meaningful.

Nonetheless, a concrete perspective of the issue can be instructive. Because the average classroom size was 7.2 rows and the average number of seats per classroom was 42.3, at most only 6 students per row could attain a seat. Thus, the first three rows could hold a maximum of 18 students. Consequently, 14 or more students would have

to sit in the 4th row or behind that. Thus, an estimated 44% (14/31.9) of the students would be in this position.

The decision to use one global student rating, which was "rate the instructor's overall teaching effectiveness," was based on the following: the finding that it had a very high positive correlation to other measures of teaching competency (Braskamp and Ory, p.182); its use by Williams and Ory (p.6) as one of the two global student ratings of their teachers; and the finding that global teacher ratings have the same reliability in large samples as the average of all ratings (Centra, 1993, p.59).

Niemeyer (2003) notes "many [classroom] designers feel that a proportion of 1 unit deep by 1.3 units wide is the ideal length by width ratio" (p. 130). By contrast, the typical college algebra classroom at California State University, Long Beach was 27.2 feet deep by 23.8 feet wide. Thus, its dimensions are 1.14 units deep by 1 unit wide, a reversal of the recommended dimensions.

Michael Owu (1992) writes "Professors and students now want to be closer to each other during instruction." He goes on to state that "good chalkboards are important, but so are the size and shape of the room." Modern classrooms in some schools have curved seating arrangements with a maximum of 3 rows so that all students are accessible to the teacher (Niemeyer, 2003, p.16).

Conclusion

Classroom design can measurably influence the learning experience of students. Classrooms that are deeper than they are wide prominently separate many students from the proximity of the teacher and result in a lower overall rating of student satisfaction with their teacher's effectiveness. Future research should attempt to replicate this finding and assess whether classroom design also has an impact on the learning efficiency of students.

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