# A Correlation Between Absenteeism and Course Grades in a Third-Year Industrial Engineering Class

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A correlation analysis of absenteeism and course grades was conducted for a third-year industrial engineering course. Thirty-nine students in the class were informed that attendance would be taken for purposes of this study but that attendance records would not affect their course grade. A negative correlation was found between students' absenteeism and course grades.

Keywords: absenteeism, grades, correlation, engineering, attendance
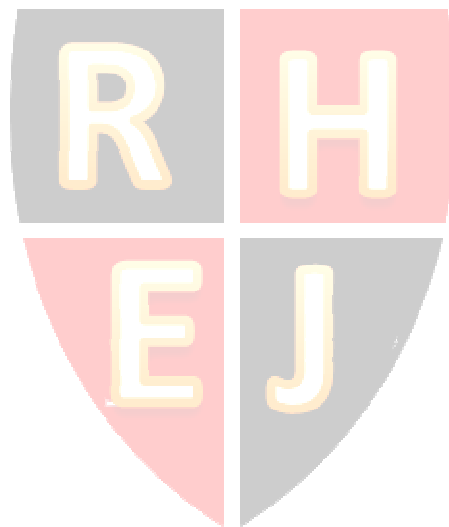
1. INTRODUCTION

To test the claim often presented that "students who regularly attend class typically earn higher grades than those who do not," attendance records were obtained for each class session during the Fall 2018 semester for a third-year industrial engineering course at Kennesaw State University, a four-year R2 institution in the metro-Atlanta area. Specifically, the course was called Human Factors Engineering and attendance records were obtained via a class roster sign-in sheet that was dated for each session. On the first day of class, this study was introduced to the students in the form of a class review of the Attendance Policy in the Syllabus, wherein the purpose and description of this study, and the request for voluntary student participation by signing-in throughout the semester, were addressed. The researcher obtained a unanimous, voluntary commitment of the students' participation for this study. Also included in the Syllabus was a listing of the various assessments for the semester, including homework assignments, quizzes, and exams and their respective assessment weights, as indicated in Table 1 (Appendix), that would comprise their course average, based on a traditional grading scale of A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = 59 and below, which led to their eventual course grade.

2. LITERATURE REVIEW

A correlation study was conducted by (Gunn, 1993) between attendance and grades in a first-year psychology class. In another study, a correlation analysis was conducted between attendance and grades on pre-service teachers enrolled in methods classes (i.e., lesson planning, reflecting, and instructional strategies) over a three-semester period (Silvestri, 2003). Lyubartseva and Mallik (2012) conducted a study to identify whether attendance influences students' success in both high-level and low-level chemistry courses at two different universities.

There are mixed feelings about the merit of taking attendance. Some teachers take attendance even though they believe it is more laborious than it is worth (Marshall, 2017). A study conducted at the University of Albany in 2010 indicated little positive correlation between attendance and course grades (Need reference from Chronicle of Higher Education (Kelli Marshall). Hyde and Flounoy (1986) studied a correlation of course grades by lecture attendance at the University of Oklahoma College of Medicine and made a startling discovery. Whereas students who attended 80-100% of the lectures appeared to be top performers, 21% of the students in the 0-19% lecture attendance category also were in the top 20% of their class, indicating that this portion of the low attendance students mastered the material without the aid of attending the lectures.

Rendleman (2017) discovered that there was a positive correlation between attendance and grade performance in an introductory agricultural economics course; however, the researcher could not conclude that having attendance policies influenced either course performance or class actual attendance. In a correlation study of attendance and course grades of undergraduate psychology students, Jones (1984) concluded that increased absences cause lower grades but that low grades influence more frequent absences, suggesting an interaction effect between attendance and grades.

3. METHODOLOGY

Sign-in attendance sheets with the full class roster were given at the beginning of each class session and was collected at the conclusion of class. All students had previously volunteered to participate in this research study by agreeing to sign the class roster attendance sheet for each class. Not a single student dissented. It was also agreed that students would sign their name only and not their friend's name who may have been attend on a given day. It was considered a violation of the Student Code of Conduct to sign in for another student. All attendance sheets were maintained in a file for later analysis after the Fall semester ended. Thus, the attendance records show a complete history of both days present and days absent for each student during the semester.

Although the course was taught as a F2F hybrid course, the Desire to Learn™ (D2L) Learning Management System was used by the university as the vehicle by which to deliver announcements, course materials in weekly Learning Modules, assignments, Dropbox folders for assignment submissions, and a gradebook, among numerous other features. A hybrid course means that students are required to view a pre-recorded lecture, read the textbook, and review the PowerPoint slides one day prior to the actual live lecture session another day during the week. During the live session, the professor reviews the key concepts from the chapter and then proceeds to work through problems until the expiration of the class period. Students are expected to take notes.

Students' course grades were comprised of the following assessment types: (1) Syllabus and Course Schedule Quiz; (12) 30-minute timed chapter quizzes; (13) homework assignments; and (3) exams. The chapter quizzes contained a mixture of ten true/false and multiple-choice questions for each chapter. These quizzes were online, auto-graded quizzes covering the key concepts and definitions of each chapter. Upon submitting each quiz, the student would promptly receive their quiz grade; however, the quiz would not open for the student to see which questions were missed, if any, until all quizzes had been submitted and graded. Then the professor would open the Submission View of the quiz so that students had complete access to their own quizzes. This prevented the possibility that a student who finished the quiz early might share the answers with other students before time expired. Solutions to all questions were provided in the Feedback section for each question.

Homework assignments consisted of chapter problems that varied in quantity, depending on the complexity of problems assigned. Students were required to show all work for full credit. Showing only the answer earned zero points. The homework assignments showed all problems in a Word document that could be downloaded whereby students could type their work in this same Word document, and then save their work. Students were given the option of showing their work either by using the equation editor in Word or the Word document could be printed and student work could be neatly handwritten for each problem. All homework was to be submitted in the appropriate Dropbox folder in the D2L course learning management system. A grading rubric was used to evaluate all student submissions for each homework assignment. The grading rubric is a very useful tool that helps to prevent subjectivity, favoritism, or any other form of bias in grading assignments on the part of the professor.

Each of the three 75-minute timed exams covered one-third of the course. Exams consisted of a mixture of twenty true/false and multiple-choice questions. Questions consisted of concepts, definitions, and problems to be solved. Similar to the quizzes, upon submitting each exam, the student would promptly receive their exam grade; however, the exam would not open for the student to see which questions were missed, if any, until all exams had been submitted and graded. Then the professor would open the Submission View of the exam so that students

would have complete access to their own exams. This prevented the possibility that a student who finished the exam early might share the answers with other students before time expired. Solutions to all questions were provided in the Feedback section for each question.

Grades for each assessment were recorded in D2L's Grades tab as well as the professor's Excel spreadsheet.

4. ANALYSIS

Attendance in the form of Days Absent (X) is used in the analysis. Moreover, course grades are given as A, B, C, D, or F. There are no pluses or minuses given at this institution, such as a grade of A- or C+. Therefore, for quantitative purposes in the correlation analysis, we will make the following grade conversions: A = 4, B = 3, C = 2, D = 1, and F = 0. Grades are represented by the response variable (Y).

The Pearson Product Moment correlation coefficient of $r = -0.259$ as indicated in Table 2 (Appendix) indicates a weak, negative correlation between number of days absent and course grades. This implies that as the number of days absent increases, the student's course grade tends to decrease.

However, as indicated in Figure 1 (Appendix), there was an extremely wide range of days absent in which students still earned the course grade of A. This indicates that students mastered the material without the aid of attending the lectures, which agrees with the discovery made by Hyde and Flournoy (1986) of medical students at the University of Oklahoma College of Medicine. As might be expected, students who suffered many absences did not fare well in their course grades of C or D.

5. CONCLUSIONS

The results of this study are similar to the results obtained by Hyde and Flournoy (1986) involving medical students at the University of Oklahoma College of Medicine. Of significance is that the current study was conducted 32 years later and involved fourth-year industrial engineering students at a different university.

Students were able to earn a course grade of A even though there was a wide range of absenteeism (i.e., 1-12 days) in the course. Perhaps the course prep materials (i.e., chapter videos, PowerPoint slides, handouts, and homework assignments) provided in each week's learning module sufficiently aided the students to the extent that some students may have felt attending the live session was unnecessary, particularly given the large volume of traffic in the metro-Atlanta area. Another consideration is that many students worked during the class period and had no alternative but to miss lectures.

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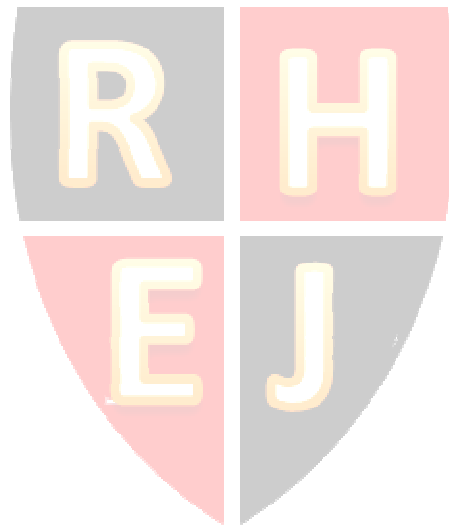
APPENDIX

Table 1. Weighted Course Assessments

Component	Points	Weight
Syllabus and Course Schedule Quiz @ 100 pts	100 points	5%
(13) HW Assignments	460 points	25%
(12) Quizzes @ 100 pts each	1,200 points	25%
Exam 1	100 points	15%
Exam 2	100 points	15%
Exam 3	100 points	15%
Total		100%

Table 2. Correlation Matrix

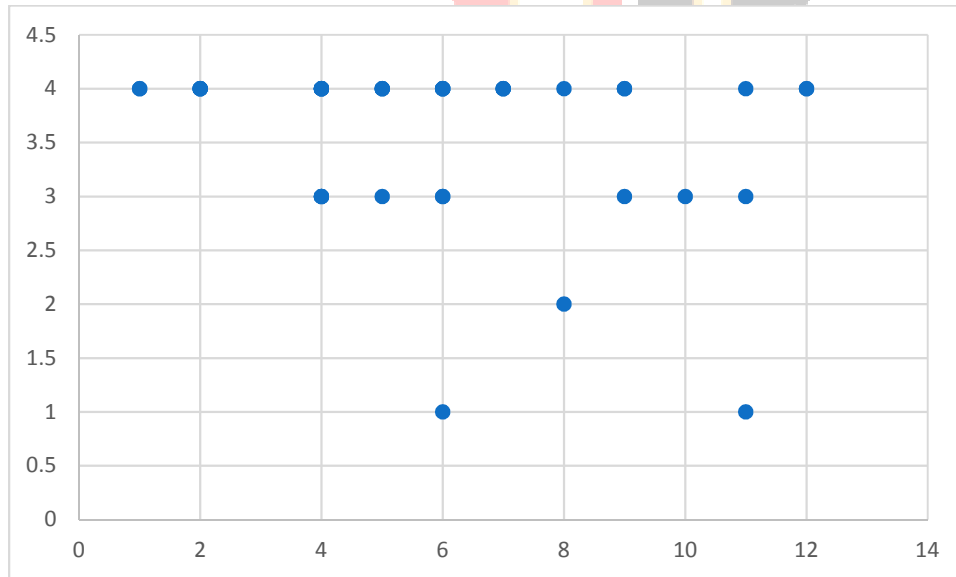| Correlation	Y	X
Y	1	
X	-0.259	1

Figure 1. Scatter Plot of Course Grades (Y) vs. Days Absent (X)