

# Engineering Student Attendance at Lectures: Effect on Examination Performance

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**Abstract** - This study had two principal objectives: to establish the levels of attendance at lectures by civil engineering students at University College Dublin and to ascertain whether lecture attendance influenced the examination performance of these students. Lecture attendance for two classes of engineering students was monitored and analysed. The average lecture attendance rate for these students was found to be 68%, which is in line with attendance rates in US studies, but higher than comparable Irish studies in other disciplines. A linear regression analysis of the data showed a strong correlation between lecture attendance and examination performance. Each 10% increase in student attendance at lectures improved examination performance by about 3%, which is again in line with that found by other studies.

*Index Terms* – lecture attendance, examination performance, engineering education, linear regression.

## INTRODUCTION

The bachelor of civil engineering degree at University College Dublin (UCD) consists of four undergraduate years of study. Students entering this programme of study are drawn from the upper academic echelon of the second level cohort of students in the country. These students enter the University via a national central applications office and typically score, at entry, in the region of 500 points out of a possible 600 points and also possess a high mathematical ability.

The undergraduate engineering curriculum at UCD could be described as being of a traditional format, consisting of lectures, laboratories and tutorials, and student performance is largely assessed by end-of-year examination. A small fraction of the course (typically circa 20%) relates to 'year's work' (laboratories, assignments etc.) and is continuously assessed. In the academic year 2006/2007, the undergraduate engineering curriculum is being radically revised, moving to a fully semesterised, modularised system.

This paper has two principal objectives: to establish the levels of attendance at lectures amongst second and third-year students in the Civil Engineering programme at University College Dublin and to identify the relationship, if

any, between lecture attendance and examination performance. The attendance surveys were undertaken in the academic year 2005/2006 and thus the data presented below refers to the traditional engineering curriculum format.

## LITERATURE REVIEW

The ability of students to apply course material in real-world engineering design and problem solving is obviously one of the key goals of educators. Face-to-face lectures, laboratories and tutorials are the most common methods used to instruct undergraduate engineering students. From the author's survey of the literature on this subject, there appears to be little published work on the lecture attendance of engineering students and its effect on student performance. Most of the literature on this subject relates to medical students and to a lesser extent, students in other disciplines, for example, economics students. There is much evidence that examination performance improves with increased rates of class attendance [1, 2, 3]. However, Hyde et al. [4] cautioned against a mandatory attendance policy, having found from their research that a sizeable group of students did very well in learning the required course material without the aid of lectures.

Hammen et al. [1] tested the hypothesis that regular attendance in a human physiology course is correlated with higher examination scores. They found a decrease of 0.5% in score per absence from class. Riggs et al. [2] found that medical students with more than 30% absence from lectures were at risk of poor performance while lower absence rates did not predict performance. Sade et al. [3] also found that medical students who chose to attend lectures during the first two years of medical school perform significantly better in GPA than students who chose not to attend, even when corrections are made for premedical performance. Cretchley [5] found that mathematics students who attended a 'substantial' number of course lectures achieved a mean examination score of 63.6%, while non-attendees scored 54.3%. Chen et al. [6] found, on average, that attending lectures corresponds to a 7.66% improvement in examination performance. Shimoff et al. [7] discovered an interesting finding that, by simply recording attendance (without awarding course credit for attendance), both attendance and overall examination academic performance improved. While

all of the studies cited above show a positive correlation between lecture attendance and examination performance, Hyde et al [4] found that 21% of medical students who attended less than 19% of lectures were among the top 20% in their class.

The paper by Kirby et al. [8] on the effect of attendance on grade for economics students at University College Cork (UCC), Ireland is particularly relevant to the present study since it provides a comparative Irish study. They found that the attendance rate of 47% for first year economics students in UCC was much lower than those found in US studies, typically in the range 66% to 89%. They also found that the principal factors impacting on lecture attendance were extra-curricular gainful employment and travel time to the university and that lecture attendance was more important for enhancing grade rather than obtaining a pass mark. They recommended that counting first year grades as part of the degree grade is the most likely method of improving first year attendance.

### METHODOLOGY

The study population was 63 second-year civil engineering students and 73 third-year civil engineering students in the academic year 2005-2006. For the second year students, lecture attendance was recorded at 36 classes; for the third year students, lecture attendance at 41 classes was recorded. The calibre of each student cohort, as measured by central applications office entry points and the number of students in each class are summarised in Table 1. Lecture attendance was recorded by means of sign-up sheets passed around each class. The attendance was randomly recorded by subject, day and time. The students were informed of the purpose of the exercise and that the attendance roll did not imply that lecture attendance was compulsory.

The average percentage attendance for each student cohort was calculated and compared with national and international data. The average mark attained by each student in the end-of-year examinations was calculated and correlated with the corresponding percentage attendance for that student. A regression analysis of the data was undertaken using the Excel spreadsheet.

TABLE I  
SUMMARY OF CALIBRE AND NUMBER OF STUDENTS

Student cohort	Median points (out of 600) at entry to First Engineering	Number of students in class
Second year	500	63
Third year	480	73

### RESULTS

Referring to Table 2, the average lecture attendance rate for these students was found to be 68%, which is in line with attendance rates in the US studies, but higher than comparable Irish studies in other disciplines [8]. A second observation relating to this study was that, although the entry points for the two cohorts of students were virtually identical to First Engineering, there was a significant difference in the mean performance of the two groups of students.

TABLE 2  
SUMMARY OF STUDENT ATTENDANCE AND EXAMINATION PERFORMANCE

Student cohort	Mean examination mark (%)	Mean attendance at lectures (%)
Second year	65	69
Third year	55	67

The examination performance plotted as a function of each group of students is presented in figures 1 and 2. Although there is considerable scatter in the data, a definite trend is evident between class attendance and examination performance. Examination of these figures also shows that the pass mark of 40% can be attained at relatively low attendance levels (< 20% attendance).

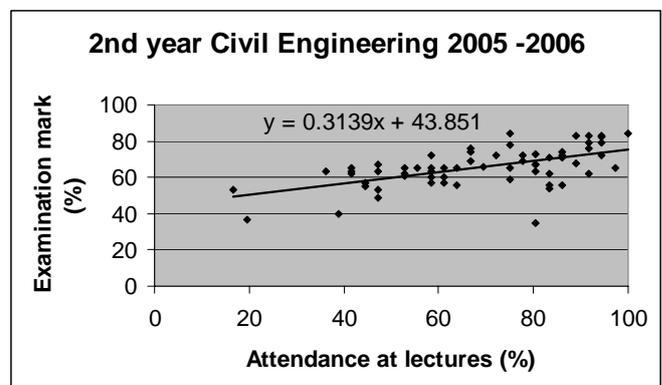


FIGURE I  
PERFORMANCE OF SECOND-YEAR CIVIL ENGINEERING STUDENTS

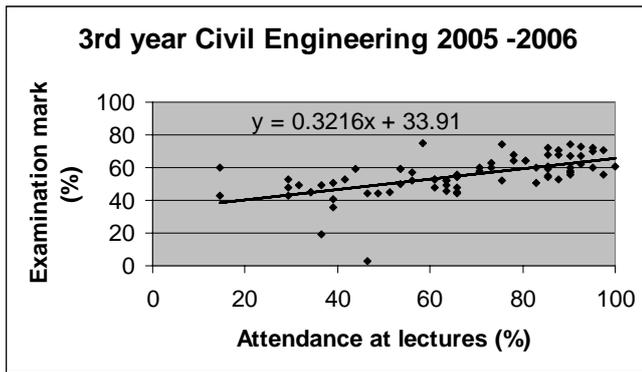


FIGURE 2

PERFORMANCE OF THIRD-YEAR CIVIL ENGINEERING STUDENTS

The data clearly show that those students that have high lecture attendance rates clearly outperform those with a poor attendance record. Hyde et al. found a similar result in their study: the students who attended 80% -100 % of their lectures appeared to be the best performers in their class. This category had the highest number of students in the top 20% of the class and the lowest number of students in the bottom 20%. What they found surprising was the performance of the students in the 0 – 19% attendance category: 21% of the students in this group were in the top 20% of their class, and only 13% were at the bottom. They concluded from these results that there were students who could master the course material well without the aid of lectures.

To test this hypothesis in relation to the present study, further analysis of the data was undertaken. Figures 3 and 4 present bar charts showing the number of students plotted against the percentage attendance at lectures for the second-year and third-year civil engineering students respectively. Examination of figure 3 shows that only 2 students are in the 0-19% attendance category. None of these students featured in the top 20% performers in the class: the highest mark for the students in the 10-19% category was 53%, whereas the lowest percentage mark for the top 20% performers in the class was 74%. Examination of figure 4 shows that only 2 students are in the 0-19% attendance category. None of these students featured in the top 20% performers in the class: the highest mark for the students in the 10-19% category was 60%, whereas the lowest percentage mark for the top 20% performers in the class was 64%.

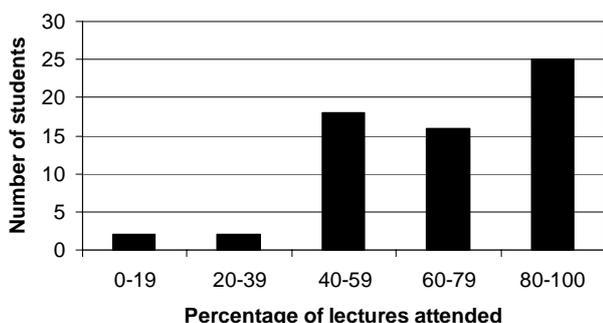


FIGURE 3

LECTURE ATTENDANCE FOR SECOND-YEAR CIVIL ENGINEERING STUDENTS

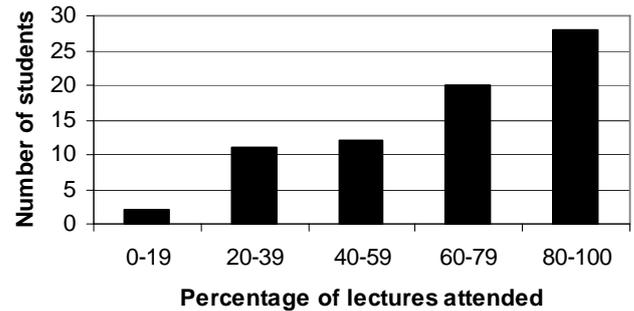


FIGURE 4

LECTURE ATTENDANCE FOR THIRD-YEAR CIVIL ENGINEERING STUDENTS

DISCUSSION

A direct comparison between the current study and other similar studies undertaken is useful but must be treated with caution since the former relies principally on end-of-year assessment whereas the latter is more heavily weighted towards continuous assessment.

Examination of Figures 1 and 2 clearly shows that students who have chosen to attend lectures regularly perform significantly better in their examinations than students that have chosen not to attend lectures. The best-fit equations ( $y = 0.31x + 43.90$  and  $y = 0.32x + 33.91$ ) indicate that each 10% increase in lecture attendance results in an approximate 3% improvement in examination performance. These correlation equations compare favourably to other studies, for example, Lockwood et al. [9].

A further interesting result is that, although the academic abilities of the two cohorts of students, as measured by their points at entry to First Engineering, appear to be virtually identical, there is a significant difference in the performance of the two groups of students (approximately a 10% difference in their mean score). The poorer performance of the third-year students may be attributed to the fact that the academic year was shorter (by approximately 6 weeks), to facilitate a work experience programme for these students. The shorter academic year may have resulted in insufficient time for these students to study the course material in sufficient depth, resulting in poorer performance.

One could argue that the purpose of engineering education is not to produce students capable of scoring well in examinations, but rather to produce students that leave the third level institution equipped to practice as excellent engineers, capable of undertaking continuous professional development. The sparse data relating examination mark to later career performance suggests little correlation between them [10]. Rather than making lecture attendance compulsory, perhaps a more productive approach might be to provide support in time-management and study techniques to those non-attending, under-achieving students.

CONCLUSIONS

1. The analysis of the lecture attendance and examination performance of civil engineering students at University College Dublin shows clearly that lecture attendance has a positive effect on the examination performance.
2. The average lecture attendance rate for the cohort of civil engineering students studied was found to be 68%.
3. Attendance is more important for enhancing examination performance than for obtaining a pass mark.

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