The Effect of Attending or Missing Lectures on Soil Mechanics Examination Performance

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ABSTRACT: The effect of class attendance or absence on the performance of students is often debated. This investigation assessed the effect of the extent of lecture attendance or absence on the performance of 63 Soil Mechanics students of the Civil Engineering Technology Programme, at the University of Johannesburg, South Africa. The results indicated that a correlation exists between the extent of absence and attainment. A total of 6 of the 10 students who did not qualify to sit the examination attended a maximum of 1 lecture. Of the 53 students who sat the examination, it was evident that the pass rate generally improved with increased lecture attendance. More specifically, no students who attended less than 30 % of the lecture sessions passed the examination. In addition, 87 % of students who attended up to approximately 55 % of the lectures failed. A significant correlation (P = 1.3 % and r = 0.779) was established between the number of students that failed and the number of lectures missed. Finally, a highly significant correlation (P = 0.006 % and r = 0.956) was established between the chances of passing an examination and the number of lecture sessions attended.

Keywords: Soil Mechanics, Attendance, Attainment

1 Introduction

Soil Mechanics 2A is a compulsory course of the National Diploma: Engineering: Civil in South Africa. Instruction in this course is offered primarily by means of lectures (with associated presentations that are made available to the students), course notes (which include graded tutorials at the end of each chapter) and laboratory practical sessions. In addition, students have access to the Blackboard System which enables them to access information about the course, course notes, other additional resources (such as relevant journal papers) and announcements. Videos of the lectures have not been recorded.

The course syllabus comprises an introduction to soil mechanics, problem soils, soil formation, phase relationships, classification, site investigation, compaction and sub-surface water. The successful completion of this module is expected to impart the fundamentals of soil mechanics, including theory, methods of analysis and laboratory tests to enable the solving of soil mechanics problems.

The course has always been assessed by two closed book tests, a laboratory report and an examination. A semester mark was compiled on the basis of weighting Test 1, Test 2 and the laboratory report in ratios of 40 %, 40 % and 20 %, respectively. Students with a semester mark of 40 % or more are permitted to sit the examination (on the entire syllabus). The final mark for the subject is calculated by combining the semester and examination marks in the ratio of 40:60. A final mark of 50 % is considered as a pass.

The effect of lecture attendance or absence on the performance of students is often debated. There are a number of reasons why students miss lectures including financial, as some students are faced with a decision whether to use the transport money for food instead. In addition, some students commence

attending lectures relatively late, after a few lectures have already taken place, as they do not have the funds to register at the beginning of the semester.

Another common reason for absenteeism is studying for a test scheduled on the following day.

The benefits of attending lectures include exposure to worked examples, interaction with the lecturer and other students as well as continuous progress in terms of covering the syllabus (as opposed to procrastination of learning until immediately prior to assessment opportunities).

The University of Johannesburg has a regulation that at least 80 % of lectures and other relevant components of a course (e.g. laboratory practical sessions) have to be attended.

The author has unofficially observed that the students who perform very well in a course generally attend lectures. Efforts have always made to increase pass rates. However, these may be futile if students are not attending lectures. Hence, it was decided to assess the effect on lecture attendance (or absence) on the performance in the examination, by considering each student. Although there may be a relationship between the mark attained in the examination and the final mark attained in the subject by students, the final mark was not considered in this investigation, as it is based on tests as well as a group laboratory project. Incidentally, the final mark pass rates are higher than the examination pass rates due to the consideration of test marks (each on selected sections) and the laboratory report. The examination marks are often generally lower than test marks, as the examination is on the entire syllabus.

This paper considered the following hypothesis:

The fewer lectures students miss in a course, the better their chance of passing the examination.

2 Literature review

Kelly (2012) investigated lecture attendance rates and related factors, at University College Dublin, (Ireland). This study was based on two probability-based surveys, based on a questionnaire which considered factors that influence attendance that are in control of the university (such as the timetable) as well as those that are dependent on the students (such as part-time work).

Using a different approach, Massingham & Herrington (2006), investigated reasons for absenteeism in the Faculty of Commerce at the University of Wollongong (Australia). They established a relationship between attendance, participation and performance.

Many researchers, in various countries, have conducted research into the relationship between lecture attendance and results achieved (attainment), including Romer (1993), Devadoss & Foltz (1996), Colby (2004), Burd & Hodgson (2006), Newman-Ford et al., (2008), Meulenbroek & van den Bogaard (2013) and Kwak et al. (2019).

Romer (1993) investigated the effect of lecture attendance in a macroeconomic course at Berkeley (USA). He established a positive correlation.

Devadoss & Foltz (1996) studied the effect on lecture attendance on the performance of 12 agricultural economics courses at the University of Idaho (USA). The performance considered exams, quizzes, projects and assignments. A significant relationship was established.

Colby (2004) investigated this relationship in a computer science course at the University of Central England (UK). His research led to the establishment of the following two rules of thumb.

- The 70 % rule: a student who attends more than 70 % of teaching sessions has a chance of failing lower that 0.67, and a chance of getting a first or upper second higher than 0.2.
- The 80 % rule: a student who attends more than 80 % of teaching sessions has a chance of failing lower than 0.5, and a chance of getting a first or upper second higher than 0.33.

Burd & Hodgson (2006) investigated the effect of lecture attendance on the examination marks of 5 compulsory courses (Computer Systems II, Software Applications, Theoretical Computing, Programming and Reasoning and Software Engineering) in the computer science department, over a five-year period, at the University of Durham (UK). They established a significant correlation (0.05 confidence level). Hence, they concluded that this relationship was unlikely to be due to chance.

In their investigation, Massingham & Herrington (2006) also concluded that relatively increased attendance resulted in relatively better performance.

Newman-Ford et al., (2008) conducted research into the effect of attendance on attainment, in coursework and examinations, of 22 psychology and criminology courses, at the University of Glamorgan (UK). They established a significant correlation (P=0.0001). They also concluded that these results were unlikely to be attributed to chance. Furthermore, two-thirds of students who failed attended between 10 % and 30 % of lectures and the average attendance of students who passed was 60 %.

Meulenbroek & van den Bogaard (2013) studied the effect of attendance on the marks of calculus exams, at the Delft University of Technology (Netherlands). They found that students that attend more than 75 % of classes had a higher pass rate.

Kwak et al., (2019) evaluated the effect of lecture and tutorial attendance on attainment. This study found the test scores to increase by 1.3 % per lecture attended.

Hence, considering the above results of other investigations, which all indicate a correlation between attendance (or absence) and performance, the specific objective of this paper was to verify this correlation in the case of the Soil Mechanics course being investigated. The effect of online materials (such as the lecture presentations) on performance was not assessed.

3 Methodology

The attendance of lectures of a group of 63 students, over an entire semester, in 2017, was recorded. This was done using the *Blackboard* Online System, where, immediately after every lecture session, the author (lecturer) accessed the system and a code was generated by the system. This code was, in turn, given to the students and they had five minutes to enter it on their student profile (using the Blackboard application), using a smart phone and the university's Wi-Fi network. The system then e-mailed a spreadsheet, with the details of the students who attended that lecture session, to the lecturer. This spreadsheet included student numbers, IP addresses, exact date and times, and coordinates (in the cases where location on the smart phone was enabled). Students who did not possess smart phones utilised the phones of other students.
The lectures for this course comprised a total of 11 weekly sessions. Each session comprised 3 consecutive 50 minute lectures, separated by a 5 to 10 minute break. Attendance of the first lecture, where the course (including the study guide) was discussed, was not recorded. In addition, due to an unknown reason, the attendance spreadsheet received for 1 other lecture was blank. Therefore, attendance was recorded for a total of 9 sessions.

This investigation considered all the registered students and did not make a distinction between those who were repeating the course. Interestingly, Colby (2004) found that repeat students had a higher failure rate (51 %) compared to the first-time students (23 %).

The attendance of students who did not qualify to sit the examination was considered. Furthermore, in the case of the students who gained entrance into the examination, the attendance of the lecture sessions was correlated with the examination mark.

4 Results and discussion

4.1 Examination entrance

Of the 63 students included in the investigation, 53 students obtained entrance into the examination.

Table 1 shows the number of students who attended the different number of sessions as well as the number of students who did not gain entrance to the examination. The average attendance was 4 sessions (44 %).

Table 1. Attendance of sessions and qualification for the examination

Results	Number of Sessions Attended									
	0	1	2	3	4	5	6	7	8	9
No. of Students (63)	9	7	3	4	5	11	6	13	5	0
No. of students Excluded from Exam (10)	4	2	1	1	0	1	0	1	0	-

From Table 1, it is evident that:

- None of the student attended all 9 lecture sessions.
- 60 % students that did not write the examination attended 0 or 1 lecture session.
- All students who attended 8 lectures qualified to sit the examination.

The percentage the students who did not qualify to sit the examination, in each of the number of sessions attended, is shown in Figure 1.

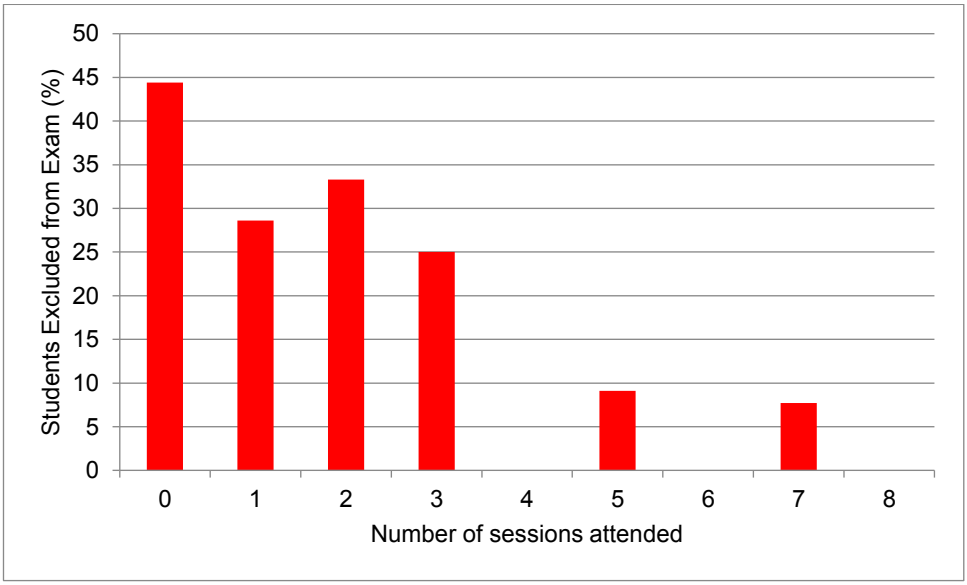

Figure 1. Percentage of students who did not qualify to sit the examination

It is evident from Figure 1 that, generally, a larger percentage of the students who attended fewer sessions did not gain examination entrance.

4.2 Examination statistics

The statistics pertaining to the 53 students who sat the examination are shown in Table 2. The performance of these students is considered below.

The average attendance was 5 sessions (56 %). The lowest, average and maximum marks for the examination were 9 %, 40 % and 88 %, respectively.

Table 2. Attendance and results of examination qualifying students

Results	Number of Sessions Attended									
	0	1	2	3	4	5	6	7	8	9
No. of Students (53)	5	5	2	3	5	10	6	12	5	-
Fail (40)	5	5	2	2	5	7	5	6	3	-
Pass (13)	0	0	0	1	0	3	1	6	2	-

It is evident from Table 2 that the overall examination pass rate was 25 %.

Comparing the data in Table 2 to Colby's (2004) 70 % and 80 % rules, students who did not attend at least 70 % (6 sessions) or 80 % (7 sessions) of sessions had an 87 % and 86 % chance of failure, respectively. This translates to an almost 1 in 10 chance of passing. This failure rate is higher than the values given by Colby (2004) of 67 % and 50 % chance of failure at attendance rates less than 70 % and 80 %, respectively. On the other hand, Burd & Hodgson (2006) obtained better pass rates than Colby (2004) in that 40% and 37 % of students who attended less than 70% and 80 % of the lectures failed. Newman-Ford (2008) also achieved reduced chances of failure compared to Colby (2004).

Table 3 shows the statistics, from Table 2, grouped according to equal sized session ranges.

Table 3. Attendance and results according to session ranges

Results	Number of Sessions Attended		
	0-2	3-5	6-8
No. of Students (53)	12	18	23
Fail (40)	12	14	14
Pass (13)	0	4	9

Figure 2 shows pass and failure rates as a percentage of the number of students in each of the ranges in Table 3.

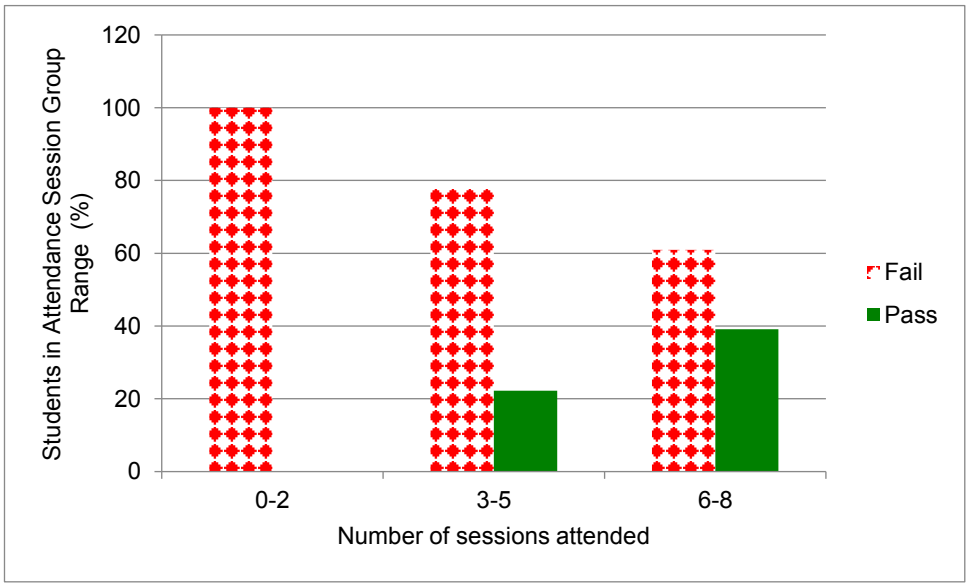

Figure 2. Success rates for different session attendance ranges

Furthermore, It is evident from Tables 2 and 3 and Figure 2, that the pass rate generally improved with increased lecture attendance. This in agreement with Romer (1993), Devadoss & Foltz (1996), Colby (2004), Burd & Hodgson (2006), Newman-Ford et al., (2008), Meulenbroek & van den Bogaard (2013) and Kwak et al. (2019).

Referring to Table 3, the following is evident:

- No students who attended less than 3 lecture sessions passed.
- 87 % of students (26 of 30) who attended 0 to 5 lecture sessions (up to approximately 55 % of lectures) failed.
- 61 % of students (14 of 23) who attended between 6 and 8 lecture sessions (approximately 70 % to 90 % of lectures) failed.

Figure 3 shows the relationship between the percentage of students that failed the examination and the number of lectures missed. This relationship is based on Table 2, for example 5 out of 5 (100 %) students

missed all 9 lectures (attended none) and 3 out of 5 students (60 %) missed 1 (attended 8 lectures). This relationship yielded a correlation coefficient (r) of 0.779 and was significant with P = 1.3 %.

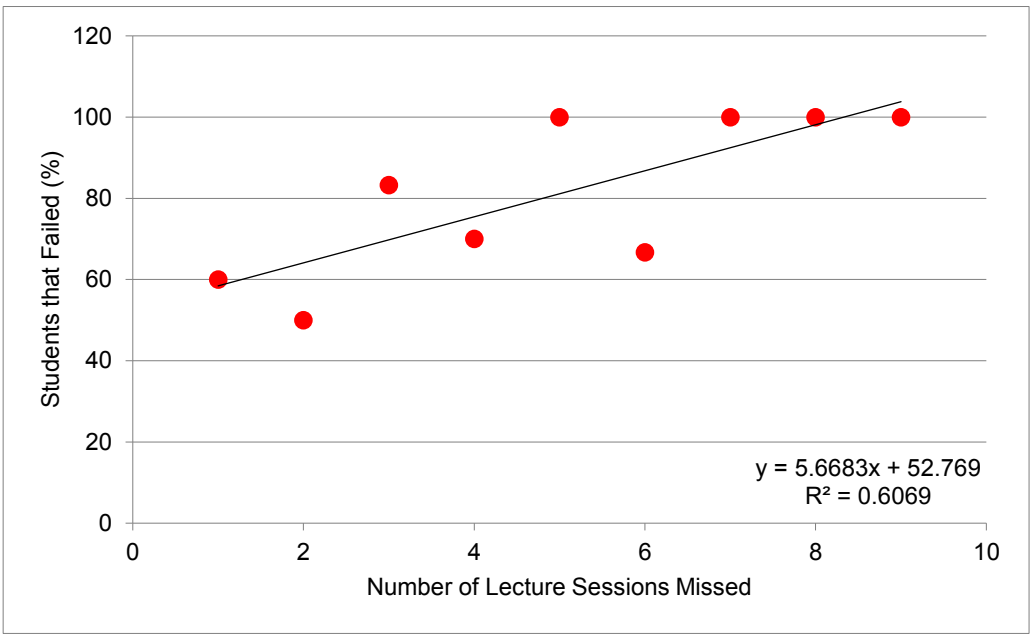

Figure 3. Success rates for different session attendances

From Figure 3, it is evident that, generally, students who missed approximately half of the lectures (5 out of 9; 55 %) failed. Furthermore, 60 % of students who missed only 1 lecture failed.

Figure 4 shows the relationship between the percentage chance of passing and the number of lecture sessions attended. This relationship yielded a correlation coefficient (r) of 0.956 and was highly significant with P = 0.006 %.

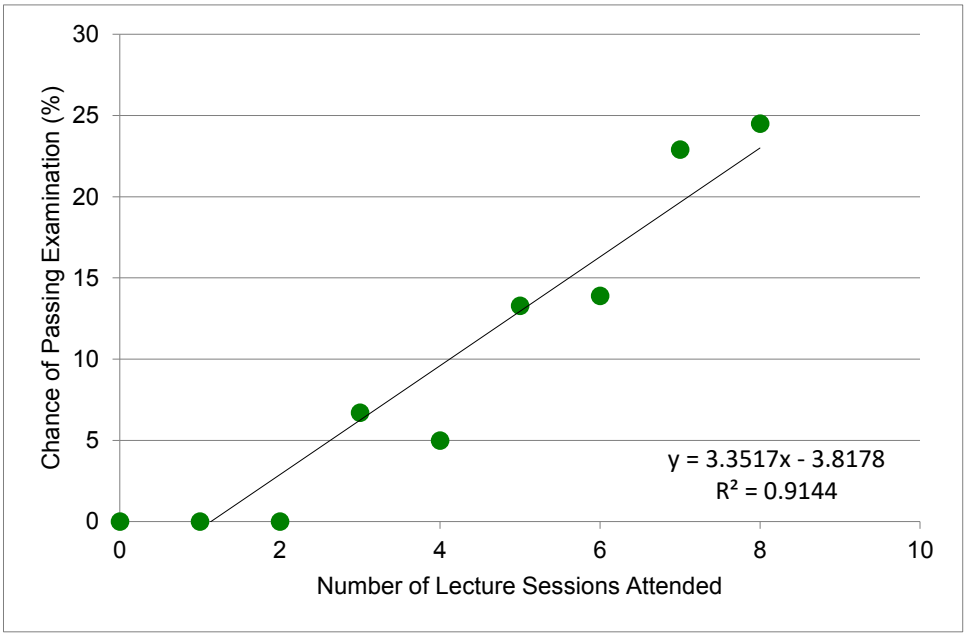

Figure 4. Percentage chance of passing versus lecture attendance

From Figure 4 and Table 2, it is evident that students who attended 33 % of lectures (3 lectures) had a 6.7 % (1/(5+5+2+3)) chance of passing, compared to students who attended 88,9 % of lectures (8 lectures) who had a 24.5 % (13/53) chance of passing, which is a 75.5 % chance of failing.

Finally, it should be borne in mind that although the results of this investigation were specifically compared with those of others, the nature of the course investigated here (Soil Mechanics) is very different from the courses investigated by other researchers (e.g. Economics, Computer Science and Criminology). Hence, differences in results may be justified. It is recommended that the correlations established be validated by additional data.

Incidentally, 30 of the 53 students (57 %) who wrote the examination passed the course (Final Mark).

5 Conclusions

The correlation between attendance of lectures and attainment in the Soil Mechanics examination was investigated.

A total of 10 of the 63 students considered did not gain entrance into the end of semester examination, based on their marks in the test and the laboratory report, during the semester. A total of 6 of these students attended a maximum of 1 of the 9 lecture sessions.

Of the 53 students who wrote the examination, it was evident that the pass rate generally improved with increased lecture attendance. More specifically, no students who attended less than 3 lecture sessions passed. In addition, 87 % of students who attended 0 to 5 lecture sessions (up to approximately 55 % of lectures) and 61 % of students who attended between 6 and 8 lecture sessions (approximately 70 % to 90 % of lectures) failed.

A significant correlation (P = 1.3 % and r = 0.779) was established between the number of students that failed and the number of lectures missed. The results indicated that 60 % of the students who missed only 1 lecture failed.

Finally, a highly significant correlation (P = 0.006 % and r = 0.956) was established between the chances of passing an examination and the number of lecture sessions attended.

As the correlations established are specific to the Soil Mechanics course investigated, they may not apply to other courses in the qualification or courses in other schools.

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Author's bio

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Professor George C. Fanourakis joined the Department of Civil Engineering Technology at the (now) University of Johannesburg (UJ) over twenty-six years ago, after leaving his employment at Jones and Wagener (Pty) Consulting Engineers. He received the degrees MSc(Eng) from the University of the Witwatersrand and a DTech(Eng) from the UJ. He is a Chartered Civil Engineer and Fellow of the Institution of Civil Engineers (UK). He is a Fellow of the South African Institution of Civil Engineering, Honorary Fellow and Past President of the Institute of Professional Engineering Technologists, Member of the Soil Science Society of Southern Africa and Member of the fib (Fédération Internationale du Béton). His professional involvement includes serving on three Geotechnical National Standards (SABS) Committees as well as Membership of Commission 9: Dissemination of Knowledge, of the fib. His primary general teaching and research interest areas are Geotechnical Engineering and Concrete Technology. In addition, Prof. Fanourakis is active in research in engineering education.