The Effect of Class Attendance on the Performance of Computer Science Students

S. Pudaruth*, L. Nagowah, R. Sungkur, R. Moloo and A. Chiniah

Abstract—The aim of this study was to assess the impact of lecture attendance on the academic performance of Computer Science students at the University of Mauritius. In this study, only examination marks have been considered. We also differentiated between part-time and full-time students, degree-level modules and post-graduate modules. A linear regression analysis of the data showed a correlation between attendance of lectures and performance of Computer Science students but the correlation varied for greatly across the different modules. In general, we found a stronger correlation for highly technical modules involving practical components and only a moderate correlation was noted for more theoretical based modules. To our knowledge, this is the first work that investigates the effect of attendance on Computer Science modules. The results obtained from this study can be very useful to colleges and universities for drafting attendance policies.

Keywords—Class Attendance, Computer Science, Exam Performance.

I. INTRODUCTION

Class attendance has long been subject of debates while measuring performance in exams. Proponents advocate that there is a direct relationship between these two variables and there has been prolific literature in this direction. Over the past few years, it has been observed that there has been a decline in student’s academic performance in the Computer Science field at the University of Mauritius. Evidence shows that the poor performance is widespread across all levels of both undergraduate and postgraduate programmes. Plausible explanations sought were (1) widened entry access, i.e., accepting students of lower grades; (2) large cohort size with batches of 60-100 students; (3) increased employment opportunities for students; (4) lack of motivation from students and some other social direction which are not evident leading to class absenteeism.

In an attempt to control the issue and to boost up academic performance, the University of Mauritius has enforced an 80% attendance policy to compel students in attending lectures. It is argued that attending classes is of value added to the student as this leads to better understanding of concepts. It facilitates interaction among students by working in groups. Failure to meet the attendance threshold, a student is debarred from sitting for the exam. This was done in a view to reverse the trend and to closely monitor students in class, as well as, to mitigate criticisms from policy makers and the Tertiary Education Commission (TEC) for a more efficient management of public funds.

However, does this policy really have an effect on student performance, especially in Computer Science? Being in an innovative and trendy sector, it has been observed that students do take advantages of new technologies in learning over the internet. Numerous e-learning platforms are available over the internet on different Computer Science modules. Lecture slides, step by step tutorials, forums, and source codes are widely available facilitating learning and making it available anytime and anywhere. In contrast to other departments of the University, the Computer Science department has its own Moodle e-learning platform whereby all lecture notes, labs and tutorials are available for downloads. Hence, students can learn anytime and anywhere without the need for attending classes.

In this paper, we attempt to assess the impact of lecture attendance on the academic performance of Computer Science students. To do so, examination marks and attendance of respective students from the different levels of both undergraduate and postgraduate programmers have been analyzed. Marks for continuous assessments have not been considered as these are not fully monitored and because most coursework are done in groups of two or three students. Part-time and full-time students were differentiated to have a more accurate view of the effect of attendance on these separate groups. The linear regression analysis method was used to find correlations among the different variables observed.

The rest of the paper is organized as follows. Section 2 deals with the literature review on similar studies carried out in other universities abroad. Section 3 deals with the methodology used, analysis and evaluation of the results obtained. We end the paper by making recommendations on the results obtained.

II. LITERATURE REVIEW

Hyde and Flour Moy (1986) study concluded that those students who attended class more regularly were amongst the best students in their class. However, they also found that 21% of students who had very low attendance were in the top 20% in their class. Thus, he is against a mandatory attendance policy as there were many medical students who could master the course materials without being present at lectures. Empirical literature
suggests a positive correlation between class attendance and student performance (Parr and Kerr, 1990; Romer, 1993; Durden and Ellis, 1995; Deva doss and Foltz, 1996; Marburger, 2001; Khan et al, 2003; Allen and Webber, 2006; Stanca, 2006; Andrietti et al, 2008; Ali et al, 2009). Riggs and Blanco (1994) found that students with less than 70% attendance could potentially not do well. Also, it was difficult to forecast scores for those with very low attendance rates. In a human physiology course, Hammen and Kelland (1994) found that for each absence, there was a corresponding decrease of 0.5% in the scores.

Ledman and Kamuche (2002) examined the effects of attendance on student performance in a Statistics course. Their results show that student performance is better when class attendance is higher. However, their study was not limited to this finding. They argue that there is a difference between knowledge and understanding of course material (Frost and Fukami, 1997). According to them, students who perform best on tests and exams are not necessarily those who have better understanding of the course material. Learning is said to take place when students can recall and apply materials learned from more basic courses to more advanced courses. They found out that the correlation between student performance and student learning was higher than the correlation between student performance and test scores.

Cretchley (2005) found that mathematics students who attended a sufficient number of classes got an average score of 63.6% while others got 54.3%. Marburger (2006) showed that a mandatory class attendance policy can reduce absenteeism significantly. Allen and Webber (2006) argued that the link between student performance and class attendance is not linear. Other factors such as revision strategies and peer-group effects might have significant impact on performance. They noted that class attendance has only a very small marginal benefit on test scores. This idea is supported by Martins and Walker (2006). Purcell (2007) found that for each 10% increase in class attendance, there was about a 3% increase in examination performance. The study was conducted on 2nd & 3rd year Civil Engineering students.

Arulampalam et al. (2007) conclude that the best class performers are those who are more likely to suffer from a missed lecture. Ajiboye and Tella (2007) reported that for a verbal-based subject like Social Studies, class attendance is very important. Chen and Lin (2008) further confirmed that class attendance has a positive and significant impact on exam performance. In particular, their study reports that there is a 7.66% improvement in exam performance when students attend their lectures.

There is a lot of research which has been conducted to show the correlation of class attendance and student test scores. In general, the higher the class attendance, the higher the examination marks. However, we noticed that so far none of the studies have been conducted on Computer Science courses. Most of the studies were concentrated on economics, medical studies and traditional engineering disciplines. Thus, our research contributes to existing literature by providing further evidence of class attendance versus student performances for both part-time and full-time computing degrees. It is also the first paper in Mauritius that focuses on this aspect of student education.

### III. Methodology and Evaluation of Results

The attendance of students over one semester (15 weeks) was collected and the corresponding marks that they obtained for the exam was tabulated. Then the degree of correlation between attendance in class and marks obtained for each exam was determined. Graphs were plotted to see the correlation. Marks and attendance were the two variables considered and the correlation between them was determined by identifying the degree to which there is a ‘linear relationship’ between them.

The correlation coefficient (r) was identified. The value of r obtained can very quickly give us an idea about the strength and significance of the coefficient. The general classification is normally as follows:

<table>
<thead>
<tr>
<th>Correlation Coefficient</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.2</td>
<td>Very weak to negligible correlation</td>
</tr>
<tr>
<td>0.2 to 0.4</td>
<td>Weak correlation (not very significant)</td>
</tr>
<tr>
<td>0.4 to 0.6</td>
<td>Moderate correlation</td>
</tr>
<tr>
<td>0.6 to 0.8</td>
<td>Strong, high correlation</td>
</tr>
<tr>
<td>0.8 to 1.0</td>
<td>Very strong correlation</td>
</tr>
</tbody>
</table>

Another important measure is the coefficient of determination (R²). This number tells us how well the best-fit line actually represents the data. R² specifically tells us the percentage of variation in one variable that can be explained by the variation in the other variable.

The data collected was not limited to only some batches or modules but was widespread. Exam marks and attendance for various modules ranging from the fresher’s year to the final year Master students have been analyzed and discussed. Furthermore, we also differentiate between part-time and full-time students, degree-level modules and post-graduate modules. Some major results and their discussions are shown below. Modules have been classified per level of studies.

#### A. Level 1 Modules (Full-Time)

![Fig. 1 Attendance v/s Exam marks for Maths for Computing](image)

\[ r = 0.1422 \]

\[ R^2 = 0.0202 \]

Programme: BSc (Hons) Computer Science
Sample Size: 59
Discussion: The correlation between % attendance and examination grades is very low. This can be partly explained by the fact that the module has many topics in common with the A-level Mathematics. Since A-level Maths is a requirement to follow this course, many students are able to do well in the exam even if they have missed many classes. 10.59, which is indeed very low. It can also be noted that the highest marks are from students who were present for at least 90% of their classes.

Discussion: This is the same group of students who have followed the Math’s for Computing module with the same lecturer. However, the correlation is slightly more pronounced for this module though it is still low. This is a semester 2 module and it we look at the graph we can easily notice that most of the students were present for at least 80% of the classes. This explains their better performance in the module and as a consequence, a higher value for r.

Discussion: Computer Programming is a difficult subject. And it is clear from the graph that students have benefited a lot by attending classes. For most of them, this was their first attempt at programming. The graph shows that the maximum mark a student could obtain by attending zero (0) classes are

Discussion: the value of r denotes a mild relationship between attendance of students and their performance in examinations. The Computer System Organisation module is quite technical in nature and involves a lot of logical thinking and calculation. Since for this batch, Mathematics at ‘A’ level is not an entry requirement, students not having that subject do face difficulties in achieving a good grade in the above mentioned module despite having full attendance.
students. Weak students, hence find the module difficult although they attend most of the classes.

**Fundamentals of Computer Science**

\[ r = 0.5828 \]
\[ R^2 = 0.3396 \]

Programme: BSc (Hons) Information and Communication Technologies (ICT)
Sample Size: 24

Discussion: the value of \( r \) denotes a moderate (but close to strong) correlation between attendance of students and their performance in examinations. The Fundamentals of Computer Science module is quite theoretical in nature and involves some similarities with the Computing module at A level. Hence although some students tend to be absent in class, they perform quite well in the continuous assessment and in exams.

**Multimedia Authoring**

\[ r = 0.3562 \]
\[ R^2 = 0.126 \]

Programme: BSc (Hons) Computer Applications
Sample Size: 60

Discussion: the value of \( r \) denotes a weak correlation. Considering the sample size and the module being technical, attendance rate do have an impact on the final results. Students have not benefited from lectures as much as was expected. Further investigation might be required to explain this low correlation value.

**Multimedia Application Development**

\[ r = 0.7299 \]
\[ R^2 = 0.532 \]

Programme: BSc (Hons) Information Systems
Sample Size: 40

Discussion: the value of \( r \) denotes a high correlation. The module being technical, students following the lectures and labs were more likely to have good results than the others. This high value shows that students will benefit a lot by attending their lectures and labs for this module.

**Mobile Application Development**

\[ r = 0.5379 \]
\[ R^2 = 0.289 \]

Programme: BSc (Hons) Information and Communication Technologies
Sample Size: 20

Discussion: the value of \( r \) denotes a moderate correlation. The module being technical, students following the lectures and labs were more likely to have good results than the others. Although the Multimedia Application Development and Mobile Application Development were both lab-oriented modules, the correlation for the Mobile module is much lower. The only difference here is the cohort of students. Those following the Multimedia module are students of Information Systems and those following the Mobile module are from ICT programme.
Fig. 10. Attendance v/s Exam marks for Computer Graphics

\[ r = 0.8512 \]
\[ R^2 = 0.724 \]
Programme: BSc Computer Science
Sample Size: 30

Discussion: the value of \( r \) denotes a very strong correlation. The module being very technical, students following the lectures and doing class exercises and labs were more likely to have good results than the others. Students have benefited greatly by attending their classes. Since the class size was quite small, this has also contributed to the high correlation.

Fig. 11. Attendance v/s Exam marks for Network System Administration

\[ r = 0.6895 \]
\[ R^2 = 0.4755 \]
Programme: BSc Computer Application
Sample Size: 30

Discussion: the value of \( r \) denotes a strong correlation between attendance and performance. The module being very technical and practical, students following the lectures are more prone to having good results than the others. Individual attentions provided by the tutor in the lab sessions have also helped the regular students.

Fig. 12. Attendance v/s Exam marks for Enterprise System Development

\[ r = 0.7368 \]
\[ R^2 = 0.5429 \]
Programme: BSc Information Systems
Sample Size: 26

Discussion: the value of \( r \) denotes a strong correlation between attendance and performance. The module being technical and practical, students following the lectures are more prone to having good results than the others. Individual attentions provided by the tutor in the lab sessions have also helped the regular students.

Fig. 13. Attendance v/s Exam marks for Event-Driven Programming

\[ r = 0.4985 \]
\[ R^2 = 0.2485 \]
Programme: BSc Computer Applications
Sample Size: 27

Discussion: the value of \( r \) denotes a moderate correlation between attendance and performance. The module being technical in nature, we would expect the regular students to perform better than those who do not attend the classes. However, the technologies used in the module are quite similar to those used in the Computing module at A-level. Hence, students having a prior exposure to the programming language have also given a good performance although being absent in some classes.
C. MSc Level Modules (Part-Time)

![Wireless Technologies](image1)

Fig. 14. Attendance v/s Exam marks for Wireless Technologies

Fig. 15. Attendance v/s Exam marks for Software Project Management

Fig. 16. Attendance v/s Exam marks for ERP & Change Management

![ERP & Change Management](image2)

![Software Project Management](image3)

![Computer System Organisation](image4)

![Computer System Organisation](image5)

Discussion: The value of \( r \) denotes a very strong relationship between attendance and academic performance of the MSc students. The students following this Masters level module are mature students working full time in companies and striving to obtain a Masters degree. Given the small group size, individual attention have been provided, be it in lectures which have been more interactive and labs, whereby all issues and questions were dealt face to face.

Discussion: The value of \( r \) denotes a moderate correlation between attendance and academic performance of the part-time students. The students following this Masters level module are mature students working full time in companies and striving to obtain a Masters degree. Depending on their work schedule, they are sometimes unable to attend classes. However, being more mature with the ability to learn by themselves and catch up the missed classes, they are able to perform well in assessments.

Discussion: There does not seem any correlation whatsoever between % attendance and exam grades for this module. This is quite unexpected as the correlation coefficient is high for the other Master's level modules. The highest marks were not obtained by those who had the highest % attendance. Looking at the equation, it can be seen that students who have 0% attendance would score 57.47 marks. Thus, it can be possibly be concluded that the exam was for this module was very easy and mostly of theoretical nature. Thus, students who stayed at home to revise their notes did equally well compared to those who attended classes.

D. Part-Time Degree-Level Modules

Discussion: The value of \( r \) denotes that there is a strong relationship between attendance in lectures and academic performance. This module as mentioned above for the fulltime batch is quite technical and involves a lot of logical thinking.
But compared to the fulltime, this batch is smaller in number, and more individual attention are provided to the students, who are also more mature, given that most of them are working. So here, it is noted that the more the student was present, the higher the result achieved.

Discussion: The correlation coefficient is quite high. For each extra 10% of classes attended, the student can expect to get an additional 3.56 marks. Most of the students are working and they generally have little time for self-study. Part-time students do not mingle as often as full-time students. Thus, if they are absent, it is often difficult for them to know what has been covered and from where to get the notes and explanation. This explains why attendance has played an important part in the examination grades of these students. Note that r is lower (0.3562) for the full-time batch. The much lower class size seems to be the only plausible reason to explain this significant difference.

IV. CONCLUSION

The aim of this study was to assess whether attendance at or absence from lectures has any effect on the academic performance of Computer Science students. Our study is innovative in the sense that this is the first study which analyses the effects on attendance on Computer Science modules. It has been observed that nowadays, many students following a course at the University of Mauritius are already working part-time and they have to cope both with their studies and their part-time job. Indeed, it has been observed that the percentage of students exiting the UoM with a first class or with a second class first division has greatly decreased. Many students are motivated by modern ways of teaching and learning, and question the traditional classroom approach. Thus, it has become imperative for policy and decision makers to make the right choice in terms of an attendance threshold for all modules of the field of study. Through our study, we have clearly shown that there can be a huge variation in the degree to which attendance can affect performance at examination. Thus, we suggest that there should no longer be a general attendance threshold for the whole of the Computer Science department. Instead, the threshold can be linked to specific modules and may be left to the discretion of the instructor. Other university might conduct similar studies to see whether the same results can be obtained from students from different countries and different cultural backgrounds.

REFERENCES
