



A PRELIMINARY STUDY ON STUDENT PERFORMANCE IN FACE-TO-FACE AND ONLINE DELIVERY MODALITIES OF OPERATING SYSTEMS MODULE

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Operating Systems (OS) is one of the core modules in any Software Engineering/Computer Engineering or Information Technology curriculum. Therefore, gaining insights into student performance in this module can contribute to enhancing instructional strategies, curriculum design, and overall learning outcomes. The National Diploma in Technology (NDT) in Information Technology course was introduced in 2019. Hence, analyzing individual subject performance also is an indicator of course success. For this study, NDT 2018/2019 (first batch) and NDT 2020/2021 (third batch) batches were used. The main difference between these two batches are their learning mode. NDT 2018/2019 batch learnt in face-to-face mode and NDT 2020/2021 batch learnt in online mode. Mid semester examination marks, continuous assessment marks and final examination marks of both batches were analyzed. The batch learnt in a face-to-face setting resulted in better performance compared to online learning. Future studies should investigate reasons for performance degradation in online learning.

Keywords: Operating Systems, Online Learning, Face-to face Learning

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INTRODUCTION

Institute of Technology University of Moratuwa (ITUM) started to offer a National Diploma in Information Technology (NDT in IT) in 2019. The module Operating Systems is included in the first semester as a 2 credits module. It has one hour for lecturing and two hours for tutorials/practicals. Since NDT in IT course is the youngest course in ITUM, there is a necessity for studying students' performance in each batch to identify whether the course is meeting its objectives. Module-wise performance analysis is one of the easiest methods to learn the above.

This study includes a performance analysis of the Operating Systems(OS) module of two batches. NDT 2018/2019 batch (first batch) and NDT 2020/2021 batch (third batch). The main difference between these two batches is NDT 2018/2019 learnt in physical/offline (100%) mode and NDT 2020/2021 batch learnt in online mode (90%) due to Covid pandemic situation in 2020.

The primary objective of this study is to evaluate the performance of students who were subjected to two modes of delivery in the Operating Systems module.

METHODOLOGY

For the NDT 2018/2019 batch, lectures, practicals and assignments were conducted physically. In addition to that, a Learning Management System(LMS)-Moodle was used to upload notes, tutorials and conduct quizzes. For NDT 2020/2021 batch, all the lectures, tutorials and quizzes were conducted online using Zoom application. Students were in their own locations. For this batch too, practicals were conducted physically. For both batches, the same lecturer conducted the lectures tutorials and practicals while using the same set of lecture slides, tutorials and practical sheets.

At the end of the semester (15 weeks) both batches faced a two-hour question paper in the same format but with different questions (in 2019 and 2022). The final examinations were held physically for both batches. Overall final grade was calculated based on 60% from the final examination mark and 40% from the continuous assessments mark. Continuous assessments were conducted as mentioned in Table 1.

Table1: Continuous Assessments (40%) conducted for two batches

	Mid Examination(20%)	Continuous Assessment 1	Continuous Assessment 2
NDT 2018/2019 Batch	Moodle quiz (25 questions- 30- minute closed book Multiple Choice Questions)-In an examination hall at ITUM.	Presentation on given topic-Group Work (20%)-Physical presentations at ITUM.	-
NDT 2020/2021	Moodle quiz (43 questions – 35-minute	Creating a poster - Group work done via	Three online quizzes on



batch	open book Multiple Choice Questions.) – At their own places.	breakout rooms in Zoom app (10%)	“Quizizz” application (10%).(https://quizizz.com/)
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Mid examination for NDT 2020/2021 batch was limited to 35 minutes with 43 multiple-choice questions. Since time is marginally set, students had to utilize the time for answering without wasting time for surfing the internet, or asking help from peers(Driscoll et al., 2012).Since any online invigilation was not applied, the examination was an open-book test. The NDT 2020/2021 batch participated in all academic activities online, interaction and communication among students were very low. They had not met each other in the institute before. In order to create a friendly environment and increase interactions among students, a breakout room activity was planned. In addition to that, to avoid boredom, quizzes were used as a game. At each quiz, the top three students who scored highest marks were announced in the classroom. It was a big motivation for them to participate in lectures. By changing continuous assessments, it was expected to minimize the issues related to interactivity and communication in an online environment.

RESULTS AND DISCUSSION

Case	Gender		Study 1- Results Analysis of NDT 2018/2019 Batch
	Males	69 (70%)	
Females	29 (30%)		
Total	98		

Table 2: Gender Distribution of NDT 2018/2019 Batch

Grades Analysis of NDT 2018/2019 Batch

Figure 1 shows the distribution of Mid Semester Marks in NDT 2018/2019 batch. Students who have obtained at least 8 marks (40% of 20) were considered passed. Out of 98 students in the batch, 6 students were absent for the examination. Pass rate of mid semester examination was 96%.

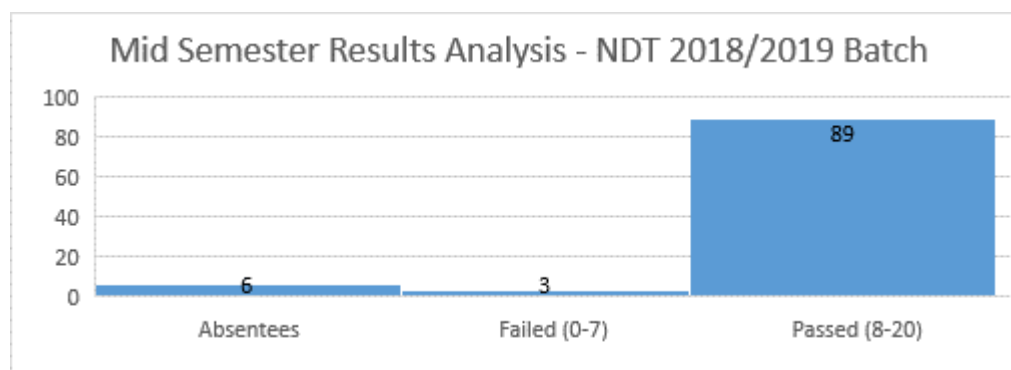


Figure 1: Mid Semester Marks Analysis-2018/2019 batch

The mean of the marks distribution is 14 and the standard deviation is 3.3. Hence, most of the students' marks lie in between 10.7 and 17.3. Students who obtained at least 16 marks (40%) for both continuous assessments were considered passed.



Table 3 shows the analysis of the final results of the NDT 2018/2019 batch. 11 students have obtained A+ and 5 students have failed the final examination paper. The mean of the final marks distribution is 64 and the standard deviation is 13. Hence, most of the marks lie between 51 and 77. There was only one student who did not complete continuous assessments and final examinations due to a health issue. The remaining 97 students passed the continuous assessments. (Pass rate 100%).

Table 3: Final Results Analysis of NDT 2018/2019 batch

Grade	Description	Lowest Margin	No.	%
A+	80 and Above	80	11	11.2%
A	75 to 79	75	13	13.3%
A-	70 to 74	70	17	17.3%
B+	65 to 69	65	12	12.2%
B	60 to 64	60	14	14.3%
B-	55 to 59	55	10	10.2%
C+	50 to 54	50	13	13.3%
C	40 to 49	40	02	2.0%
I-FE	Below 40 for FE		05	5.1%
I-CA	Below 40 for CA		00	0.0%
F	Below 40 for both FE and CA		01	1.0%
NE	Not Eligible		00	0.0%

Gender	
Males	64(64%)
Females	35(36%)
Total	99

AB	Absent		00	0.0%
N	Academic Concession		00	0.0%
	Total		98	

Case Study 2: Results Analysis of NDT 2020/2021 Batch

Table 4: Gender Distribution of NDT 2020/2021 Batch

Grades Analysis of NDT 2020/2021 Batch

Figure 2 shows how Mid Semester Marks are distributed in NDT 2020/2021 batch. Pass rate of mid semester examination is 94%. The mean of the mid semester marks distribution is 11 while standard deviation is 3.4 Hence most of the marks lie in between 7.6 and 14.4.

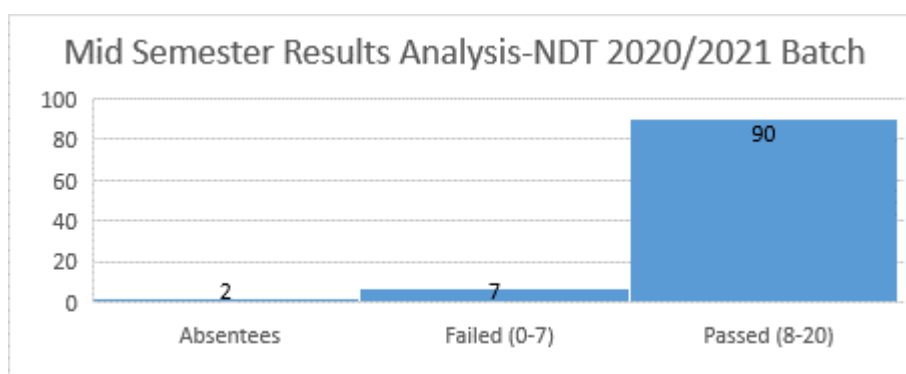


Figure 2: Mid Semester Marks Analysis-2020/2021 Batch

Table 5 shows an analysis of the final results of the NDT 2020/2021 batch. There are 11 students who obtained A+, 13 students who scored below 40 for the final examination and two students who failed both CA and FE. The mean of the final marks distribution is 54 and the standard deviation is 21. Hence, most of the marks lie between 33 and 75.

Table 5: Final Results Analysis of NDT 2020/2021 Batch

Grade	Description	Lowest Margin	No.	%
A+	80 and Above	80	11	11.1%
A	75 to 79	75	09	9.1%
A-	70 to 74	70	08	8.1%
B+	65 to 69	65	05	5.1%
B	60 to 64	60	09	9.1%
B-	55 to 59	55	11	11.1%
C+	50 to 54	50	12	12.1%
C	40 to 49	40	07	7.1%
I-FE	Below 40 for FE		13	13.1%
I-CA	Below 40 for CA		00	0.0%
F	Below 40 for both FE and CA		02	2.0%
NE	Not Eligible		00	0.0%
AB	Absent		12	12.1%
N	Academic Concession		00	0.0%
	Total		99	



CONCLUSIONS

The main objective of this study was to evaluate the performance of students who used two modes of delivery. By understanding the patterns in the results of students, it is helpful for the teacher to draw the big picture about students' learning.

Findings indicated that the students who used offline predominantly showed better performance than online learnt batch. Sometimes the change in learning mode may be the reason for low performance in online learnt batch. Even though the same lecturer used the same set of notes, there were differences in questions used in examinations. Hence direct comparison between two batches may not be valid. As a future research, a separate study should be conducted to find the reasons for degradation of performance in the NDT 2020/2021 batch.

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