Open and Distance Learning: Investigation on Quality of Experience among Final Year Computer Science Students in UiTM Cawangan Pahang

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Abstract: COVID-19 pandemic gave a big impact to all sectors in the world when it first hit at the end of 2019. The Education field is one of the worst affected sectors by the pandemic – having to experience major changes where all traditional face-to-face teaching and learning in classroom environments have changed to a fully online and distance approach. This new shift in approach had to be carried out to pursue the continuity of previous educational implementation in making the learning objectives achievable and concurrently preventing the spreading of the COVID-19 viruses. In UiTM, the first implementation of open and distance learning (ODL) in mid-March 2020 offered various perceptions from both students and lecturers as many factors needed to be considered to ensure the sessions meet the educational needs. Therefore, this study aims to investigate the quality of experience towards ODL among computer science students by assessing four major factors; learning materials provided by lecturers, online platforms being used, delivery methods and device capabilities during ODL. Using a quantitative methodology where responses from students were collected using a structured questionnaire, the analysed data

then contributed new discoveries to this study. The analysis results reveal that the students rated their satisfactions towards the quality of experience during the implementation of ODL where the four factors discussed in this study were concerned, as 'good' and 'excellent'.
Keywords: Open and Distance Learning, quality of experience, computer science students, online teaching platform, ODL delivery

INTRODUCTION

The implementation of the Movement Controlled Order (MCO) in Malaysia which started in March 2020 has affected many sectors as it changes daily routines where face-to-face events and activities were limited in order to prevent the spread of the COVID-19 viruses. In the education field, specifically for higher education institutions, online learning has been one of teaching and learning approaches being used for the past years but the implementation of MCO in Malaysia gives the opportunities to universities in strengthening the strategies to ensure the continuity of the teaching and learning processes. Before the full implementation of ODL in UiTM, The Blended Learning (BL) approach had been introduced and implemented to empower the online and flexible learning and mostly conducted using the university's Learning Management System (LMS), the UFuture portal, previously known as the i-Learn 3.0 portal. In pursuing activities for the execution of the ODL sessions, lecturers may consider assessing the experiences of the students during the implementation to gradually enhance the quality of the new teaching and learning approach. Hence, this study was carried out to assess the quality of experiences among the students towards the implementation of ODL. The study also highlighted four factors that contributed to the quality of experiences for ODL; the learning materials provided, the platforms utilized, the quality of the delivery method and the device capabilities used by students during the ODL sessions for this computer programming course.

OPEN AND DISTANCE LEARNING AND QUALITY OF EXPERIENCE

Before the outbreak of the COVID-19 pandemic, higher learning institutions in Malaysia already offered an online learning approach in the form of either a combination of face to face and online learning called blended learning or fully online learning which was specifically designed to accommodate distance learners. However, as the pandemic hit all countries, open and distance learning was fully employed to replace the traditional face to face approach thus giving new perspectives to lecturers and students in pursuing teaching and learning activities. Some universities find difficulties in navigating and preparing the course and program to cater the distance education. (Fidalgo et al, 2020). In UiTM, proper plans and strategies involving the university management and the lecturers were, and continue to be, carried out to successfully accommodate the new teaching and learning approach while following the government's guidelines during the execution of MCO in Malaysia. To make the ODL more feasible, varieties of online platforms and tools are being introduced and explored to fulfil the needs and requirements of the variety of programs and courses offered in UiTM. The chosen platforms must be suitable for the course as different courses come with different requirements to achieve the learning outcomes. However, by using and introducing too many platforms to support one particular course in ODL sessions, might be difficult to manage and also overwhelm the students (Ghani & Noradzan, 2021).

2.1 ODL Platforms

Educational institutions face difficulties in deciding the best online platform for students and lecturers as there are a lot of online platforms available to support online learning and ODL. Varieties of platforms are being utilized since they offer settings to conduct online sessions, provide learning materials, monitor students' participation and keep track of students' progress (Maqableh & Alia, 2021). A previous study by Hapompwe et al in 2021 highlighted two dominant categories of platforms being used as online learning tools during the Covid-19 pandemic; the Learning Management System (LMS) and the video conferencing platforms. LMS gives a comprehensive learning

environment with features such as content management and the ability to conduct discussions, online learning activities and collaborative-groupings among its users while video conferencing platforms such as Google Meet and Zoom offer students an interactive environment that imitate the face-to face sessions provided they have good devices and Internet connection (Bradley, 2021). This is in line with the study by Mahmood in 2021 which stated that a feature that supports video conferencing needs to be added to provide the real-time interaction between students and lecturers in the LMS of the university where the study was being carried out. Another common online interactive platform being discussed in other studies is the Microsoft Teams which provides live lectures and tutorial sessions as students get prompt and immediate clarification of the topics being discussed (Yuan, 2021).

The utilization of online commercial communication platforms is also accepted due to students' familiarity of using mobile applications such as WhatsApp and Telegram (Jones & Chacko, 2021). A research conducted by Saidi R.M et al in 2021 revealed that 81% of the respondents of the study felt comfortable and preferred WhatsApp as an ODL platform. The study involved 485 students and 74% of them were from science and technology streams. The utilization of commercial communication platforms to support ODL gives benefits to the approach as the platforms are not only easily accessed and user-friendly, but also provide real-time responses in communication, while being more affordable compared to other online learning platforms (Wulandari et al, 2021). Other advantages offered by commercial communication platforms such as WhatsApp and Telegram are that the information about the learning materials provided by the lecturers is being immediately noticed by students, they are suitable online discussion platforms for groupworks among students as they can be accessed using mobile devices, and they are convenient platforms to share educational materials (Shobeiry, 2021).

There is no restriction on the choices of platforms to execute ODL sessions in UiTM and lecturers are encouraged to use any online platforms in carrying out the teaching and learning activities as long as the course learning outcomes are finally achieved and all students manage to access the online platforms used by their lecturers. As for

this study, the two main platforms used to conduct most ODL sessions are Google Classroom for classroom environment and setting and also Google Meet for video conferencing feature. The implementation of the courses which is Programming Paradigms in Google Classroom platform is illustrated in Fig. 1. Another illustration in Fig. 2 shows the ODL contents available for the course such as notes, videos and lab exercises using the chosen platform. For the video conferencing sessions, Google Meet is the main platform being used to carry out lecture hours where all students can be part of the sessions as it also allows real-time interaction. The Google application has been selected for the ODL implementation for this course since it provides flexible features to

store and effectively manage the students' and class data, materials and assessments which were specifically designed to accommodate ODL requirements.

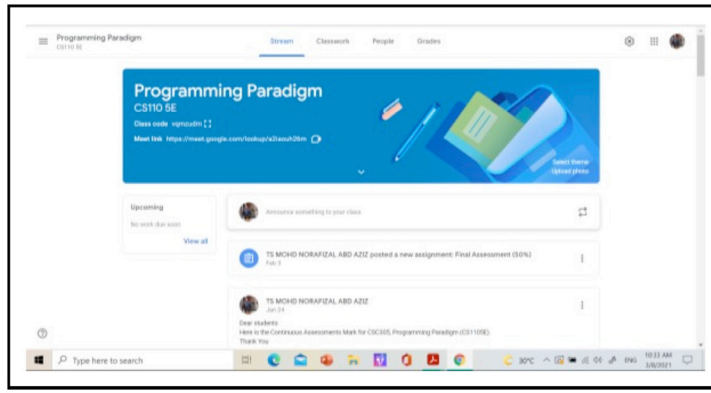

Fig. 1 The ODL platform for Programming Paradigms course using Google Classroom

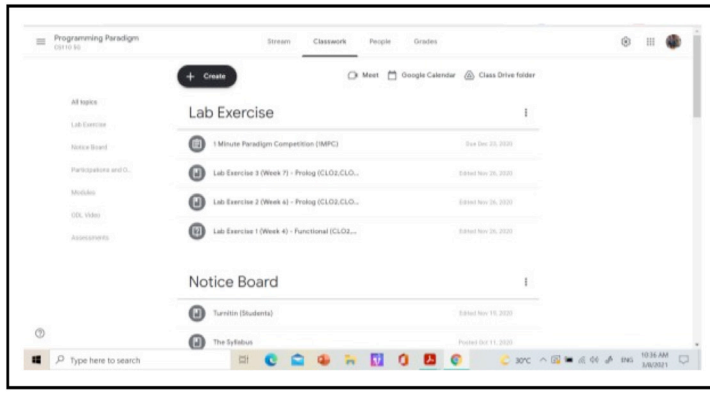

Fig. 2 The ODL contents for Programming Paradigms

2.2 Quality of Experience

Quality of experience is an analysis of human experience of cooperating with technology and business point of view which will lead to improvement of performance such as effectiveness, efficiency and satisfactions towards the usage of approaches or products being used (Memon et al, 2021). The experience of students while learning online is different compared to the predictable traditional face to face classroom approach (Maqableh & Alia, 2021).

Three factors influencing the quality of online teaching materials were being discussed to improve the students' experiences. The factors are the availability of pre-recorded videos provided by lecturers, technical quality of audio and video used, and accessibility of the learning materials via mobile devices (Jones & Chacko, 2021). The study also revealed that synchronous instructions provided by the lecturers are able to engage students compared to asynchronous instructions as the students prefer to have interactive learning sessions compared to depending on the pre-recorded lectures prepared by the lecturers. However, there is a result that shows the positive feedback of students towards the usage of pre-recorded videos as they found that good selection of contents, as well as interesting and engaging videos can successfully convey lessons thus increasing students' motivation to

continue watching (Yuan, 2021).

In accommodating students with a conducive online learning environment, there is no doubt that lecturers are facing a variety of challenges to make sure the learning activities can be carried out as effectively as traditional face to face sessions previously. A study was conducted to reveal the challenges faced by students so that it will give clear perspectives to lecturers in identifying the weaknesses of online sessions. Four common challenges faced by students are the unreliable Internet connection, lack of skill in using online platforms, unconducive learning setting at home, and the difficulties to access online learning platforms via mobile devices (Şenol, Lesinger, & Çağlar 2021). These challenges also aligned with the finding by Maqableh & Alia in 2021 as 61.3% respondents in their study were also having technical issues such as poor Internet connectivity, inadequate devices besides the lack of digital literacy to access the online platform for online sessions. Two progressive actions taken by the lecturers to improve the situation were selecting suitable online platforms to be used and adjusting the duration of the lesson module to approximately 20 to 25 minutes per session to retain students' engagement and focus.

By identifying the factors that affected students' quality of experiences together with the challenges faced by both lecturers and students, major improvements can be made and significantly enhance the quality of experiences towards ODL implementation for higher learning institutions. This also indicates the importance of experiences from the student's perspectives to acknowledge the continual improvements needed as the challenges of ODL implementation will vary according to the pandemic situation not only in Malaysia but also all over the world.

METHODOLOGY

This study adopted the quantitative methodology where a structured questionnaire was used to assess students' experiences. This study was conducted during the second semester of ODL implementation and distributed to students after each ODL session ended, from Week 1 to Week 14 of the semester. The data were gathered using Google Form and were

then analysed using Microsoft Excel as shown in Fig. 3. The questionnaire set consists of three (3) sections; the first section is the demographics information of the respondents, followed by a set of questions to evaluate students' quality of the experiences during ODL, and the last section is to evaluate students' learning outcomes for the particular session of ODL implementation. The demographics information includes the group information, type of ODL session, and platform used during the ODL implementation. The quality of experiences factors includes learning materials, the assessments provided, the main platform used, and other platforms available for the ODL session, and the delivery perspectives. In addition, the questionnaire set also investigates students' accessibility to the network and Internet connection to support ODL, including the connection availability, coverage, delay time, and faultiness, which were also crucial to be determined. The students were also required to give feedback on the device's capabilities in supporting the ODL session including the costing, as well as the online resources available. The experiences data were collected from students enrolled in a computer programming course during their final year of pursuing a Diploma in Computer Science in UiTM Cawangan Pahang, Raub campus.

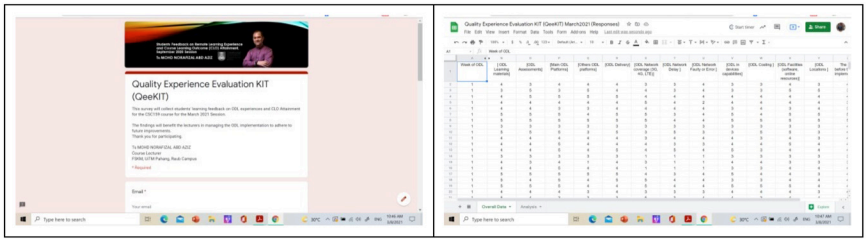

Fig. 3 Questionnaire as in Google Form and Google Sheet to store the dataset

RESULT AND DISCUSSION

1028 responses were collected from 83 students at the end of every ODL session conducted. Two groups of final year students involved in this study were from the Diploma of Computer Science program enrolled in the Programming Paradigms (CSC305) course. The Programming Paradigms course highlights the fundamental concepts in computer programming

and students are exposed to a few programming languages and software to support each paradigm. Basically, the course requires the students to understand the theoretical studies during lecture sessions and be able to use programming skills for the lab sessions.

In this study, there are four main factors evaluated to measure the students' quality of experience towards the ODL sessions conducted. The factors are; learning materials provided by lecturers, online platforms being used, the delivery, and the device capabilities to get connected to the ODL sessions. The first factor evaluated is the quality of experiences towards ODL learning materials available at the platforms being used by the lecturers. Learning materials in these courses are in Microsoft PowerPoint notes, lecture videos created by the lecturers, online worksheets for tutorial sessions, and the discussion boards to provide interactivity between students and

lecturers. Table 1 summarizes the analysis of four factors that contributed to students' quality of experiences towards ODL sessions. The results show that the respondents in this study experienced 'satisfactory' and above levels for all factors evaluated.

Table 1. Quality of Experiences towards ODL Sessions

	Percentage				
	Unsatisfactory	Less than Satisfactory	Satisfactory	Good	Excellent
Learning Materials	0.00%	0.39%	15.56%	55.25%	28.79%
Platforms	0.00%	0.19%	15.47%	53.99%	30.35%
Delivery	0.29%	0.68%	14.98%	54.18%	29.86%
Devices Capabilities	0.10%	0.58%	18.87%	55.35%	25.10%

The analysis from the responses collected in Table 1 concludes that 55.25% and 28.79% students had 'good' and 'excellent' experiences respectively towards the ODL learning materials provided by their lecturers in these courses. These findings show 84.04% of positive feedback on the selection of modules offered in the platforms since both courses are a combination of theoretical and lab practices to achieve the course learning outcomes.

The main platforms being used by the students during the ODL implementation in this study were Google Classroom, which provides content sharing and learning activities, and Google Meet, which serves as the main video conferencing tool to support real-time interactivity between students and lecturers as shown in Fig 4.

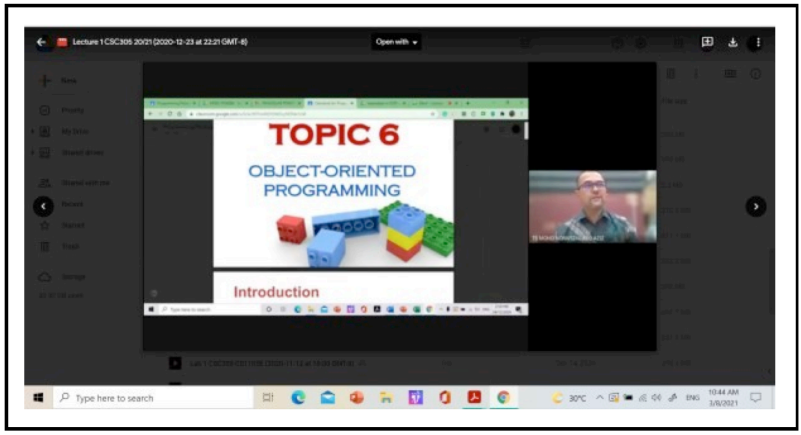

Fig. 4 The ODL delivery in Google Meet

Other platforms such as UiTM Learning Management System (LMS); uFuture and UiTM MOOC, Whatsapp, Telegram, Youtube and a few web-based programming software were also being utilized to support the teaching and learning activities. The analysed result shows 53.99% and 30.35% of total responses were experienced good and excellent quality of ODL platforms used for ODL sessions. A few platforms were utilized for these courses to suit the lesson outcomes for each session - for example, lecture videos posted on the Google Classroom and the university's LMS for theoretical sessions, micro-videos created by lecturers, and some are taken from YouTube for programming activities and web-based programming software to allow students to do hands- on practices for lab sessions and tutorials. Lecturers also use Google Meet to conduct real-time lecture sessions that enable students to communicate directly with lecturers and classmates. Fig. 5 below shows the quality of experience based on the main platforms used for ODL sessions. As mentioned above, the main platform being used in this study is Google Classroom to provide online

classroom environment where all learning materials can be accessed, and online activities and assessments can be monitored. Another platform being utilized in this study is Google Meet that serves as a video conference tool to support real-time interaction. 72% of the total number of respondents were satisfied and very satisfied with the sessions conducted using this platform and 83% were satisfied and very satisfied with video conference sessions using Google Meet. The reasons that might influence the results are; Google Classroom and Google Meet can also be accessed using mobile devices and personalized at their own devices, learning materials are available prior the sessions conducted and there is very minimum downtime to access the online classroom. Further study can be conducted to examine the success factors contributing to students' satisfaction towards the selected platforms.

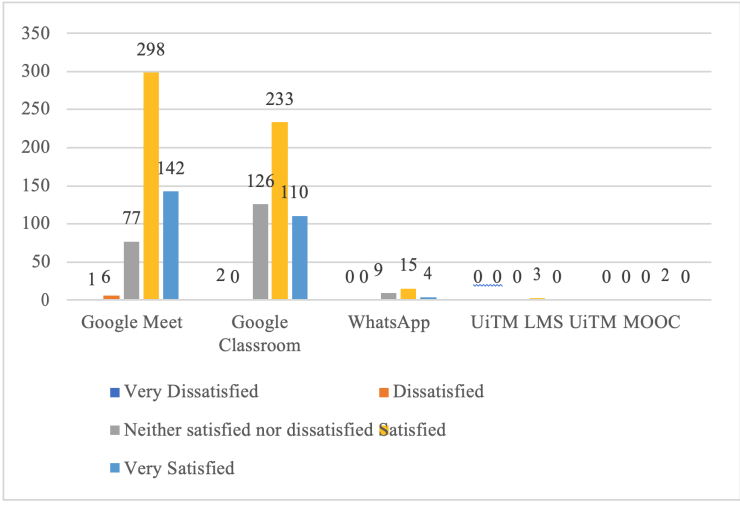

Fig. 5 Quality of Experiences based on Main ODL Platforms Used

The third factor discussed in this paper is the quality of lecturers' delivery during ODL implementation. ODL highlights more on the lecturers' delivery as each lecturer has a different style of delivery. However, the network's limitations, coverage, and various factors will affect the effectiveness of the ODL implementation. There are differences in delivery and these depend on several factors - the different types of subjects, such as the technical and non-technical subjects in the ODL, to the interest of the ODL (Mathew et al., 2021), differences from the subject perspectives and contents of the

subjects taught. Therefore, it is essential to investigate the delivery from the experiences of the students for the lecturers to improve and enhance the teaching delivery method in the ODL implementation, which may be different from the traditional implementation as before the pandemic. The result displays 54.18% and 29.86% of total responses experiencing good and excellent experience on the delivery of ODL sessions being conducted.

To complete the investigation on the quality of experiences, the last factor evaluated is the device capabilities since all students are required to use their own devices for ODL compared to previous face-to-face class where they can use computers and facilities at the laboratories in campus. 55.35% and 25.10% of students responded that they have good and excellent device capabilities for ODL implementation. Device capabilities include the hardware and the software being used for programming courses they enrolled in. A study conducted in the Department of Perspective Geometry and Graphics in one university in Russia involving 140 students also indicates high level of device capabilities among university students which includes the computing, printing, scanning devices as well as the quality and the speed of their Internet connection (Ignatiev et.al, 2021).

LIMITATION AND RECOMMENDATION

Throughout this study, three main study limitations have been identified. The limitations are categorized as limited access to data, time constraints and conflicts arising from personal preferences. Since this study used data obtained from students, it is hard to ensure that all students responded to the survey within a time frame set. This has impacted the study findings as it caused limited access to data by the researchers. The second limitation is a conflicting limitation - time constraints. The time available to study a research problem is limited as the study was conducted during an active semester which means that the researchers were involved in classes and other administrative tasks - however, in order to obtain, rich and meaningful data, the study needed to be conducted during an active semester in which students were busy with classes, assignments, tests and others. In terms of personal preferences, the study faced limitations as students might be biased due to personal preferences of the ODL platform even before answering the survey. This might be due to previous personal experiences or external information (reading, hearsay and others). This study also cannot produce

convincing results about overall computer science final year students, since it involved a small number of respondents enrolled in only one course.

Responding to the limitations discussed, these recommendations are proposed. It is recommended that future studies ensure that all respondents chosen respond to the questionnaire set distributed in the study. This will impact the accuracy of findings presented. The survey should also be conducted in a bigger sample size from different backgrounds as it will contribute to more conclusive results. Besides that, a bigger and better variety of sample size will also ensure a more diverse quality of experiences among students. Questionnaires should also be distributed to students those using other platforms besides Google applications, especially for UiTM LMS and UiTM MOOC that

serves as the official university platforms for ODL. Further improvements on ODL can be made for the upcoming semesters to expand the students' quality of experiences as the new norms are progressively taking place, where ODL will be continually implemented as the country enters the endemic phase.

CONCLUSION

The effect of the COVID-19 pandemic on all global education systems has made the shift from traditional face to face to open and distance approach compulsory in all higher learning institutions. Both students and lecturers encountered challenges due to the sudden shift but as the time goes by, the adaptation of the new approach is gradually improved. The results from this study can give benefits to lecturers in improving students' quality of experience towards ODL implementation. The findings also revealed the suitable platforms for conducting computer science courses which consist of theoretical and lab sessions, as well as tutorials in order to achieve the course learning outcomes. Based on the data analysed, students show good and excellent experience on the usage of Google Classroom and Google Meet, which are deployed as the tools when engaging in a combination of synchronous and asynchronous delivery in ODL sessions. The results discussed in this paper also revealed that most responses were recorded at satisfactory level and above, thus subsequently concluding the fact that the four factors presented are adequate in contributing to good and excellent

quality of experiences during ODL for the students.

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