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Redefining the Practice of Teaching and Learning

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Effects of The Implementation of Open and Distance Learning (ODL) and Open-Ended Laboratory (OEL) on Water Engineering Laboratory

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Abstract

Due to the restriction of Movement Control Order (MCO), only limited essential services such as healthcare, logistics, food supply chain, and banking can operate while all schools and higher educational institutions were strictly closed. The enforcement from the government is to ensure that all Malaysians will stay at homes to stop the virus from spreading and breaking the chain of infection. On the first week of April, the Ministry of Higher Education announced that all higher learning institutions' teaching and learning sessions must be conducted online until December 31st. The aim of this study is to determine the effects of the implementation of Open and Distance Learning (ODL) and Open-Ended Laboratory (OEL) for Water Engineering laboratory. OEL is where students are given the freedom to develop their own experiments, instead of merely following the prepared set guidelines from a laboratory manual or elsewhere. The students must devise their own strategies and back them with explanations, theory and logical justification. Usually, the practice of OEL learning session is conducted by using face to face technique between students and lecturer. However, the normal practice of OEL learning session could not be implemented during MCO and the laboratory lesson is totally changed to online. From the analysis of this study, it is found that the percentage differences between ODL and OEL for CO1-PO4 is 10% while for CO2-PO6 is 13%. Therefore, it is proved that ODL is not the best method to measure the students' achievement based on their psychomotor skills.

Keywords: movement control order, open and distance learning, open ended laboratory, water engineering laboratory

Introduction

The World Health Organization (WHO) declared the Coronavirus disease (COVID-19) outbreak as a pandemic on 11th March 2020. In many countries, including Malaysia, a pandemic action plans have been announced by the authorities. One of the action plans is known as a Movement Control Order in Malaysia (MCO) to stop the spread of COVID-19 while transmission and mitigation can be further understood. Due to the restriction of movement, only limited essential services such as healthcare, logistics, food supply chain, and banking can operate while all schools and higher educational institutions were strictly closed. The enforcement from the government is to ensure that all Malaysians will stay at homes to stop the virus from spreading and breaking the chain of infection. Then, the Ministry of Higher Education announced that all higher learning institutions' teaching and learning sessions must be conducted online until December 31st.

In Malaysia, ODL method is gaining an importance attention as an alternative teaching-learning and training medium during COVID-19 pandemic. ODL classes are quite easy to be practised for theory-based courses compared to practical based courses. In general, practical based courses are such courses where the psychomotor student skills are evaluated based on related tasks like project works, experimentations, practical test etc. Faculty of Civil Engineering, University Teknologi MARA Pasir

Copyright © 2020 Virtual Symposium on Teaching and Learning (VSTL2020) e-proceeding. Gudang decided that all courses were compulsory to go through online learning for semester March-July 2020 because of COVID-19. By using online platform such as Ufuture, Google Classroom, Google Meeting, Webex and Facebook Live, majority of the students enjoyed the learning activities conducted by their lecturer. For teaching and learning theory-based courses, students can study from anywhere, choose flexibility learning session, save time and at the same time they still have social interaction with the lecturer for assessment and lecture's consultation. Meanwhile, for teaching-learning practical based courses, it is totally different where the students started their learning activities from home with no physical interaction with the lecturer and groupmates to perform laboratory experiment and practical assessment (Basantia, T. K., 2018). These are the challenges occurred when applying online learning practical based courses during a pandemic outbreak to make sure the program outcomes of practical courses were well achieved. In this study, a comparison data analysis between student's programme's outcome achievement on ODL method and OEL practical based courses were conducted.

Content

2.1 Students

All semester five Civil Engineering diploma programme students will undergo water engineering laboratory course in their study plan. In the laboratory sessions, students were divided into a small group of 4 to 5 members. They were divided in a small group to allow them to communicate, work in team and discuss within peers for the whole process of laboratory investigation until the completion of technical report submission. The lab session was spread over fourteen consecutive weeks, 2 hours each. For this study the ODL implementation was for semester March until July 2020 students while OEL was for semester September 2019 until January 2020 students.

2.2 Methods

In normal practice, laboratory sessions were conducted using OEL method. An OEL is where students are given the freedom to develop their own experiments, instead of merely following the prepared set guidelines from a laboratory manual or elsewhere. It will encourage students to think critically out of the box and be more independent in developing their psychomotor skills when conducting an experiment. The students must devise their own strategies and back them with explanations, theory and logical justification (Abd Rahman, N., et al., 2011).

Usually, the practice of OEL learning session is conducted by using face to face technique between students and lecturer. However, the normal practice of OEL learning session could not be implemented during MCO and the laboratory lesson is totally changed to ODL. For this course, the medium used for ODL is Google Classroom and Ufuture. The videos related to each of the laboratory session and also the data will be given to the students in order to give clearer view on the laboratory testing. So, the students have no chance to conduct the experiment physically like usually being done in OEL learning session.

2.2 Course Outcome and Programme Outcome

Course Outcome describes what students are expected to know and able to perform or attain by the end of the course. While Programme Outcome describes what graduates are expected to know and able to perform or attain by the time of graduation which include the skills, knowledge and behaviour. So, in Water Engineering Laboratory course which consists of two CO's and PO's which are CO1-PO4, and CO2-PO6. PO4 and PO6 are the programme outcome that are being assessed related to the psychomotor domain and this data will be used to measure the comparison between ODL and OEL students' achievement.

Course Outcome		Programme Outcome	
CO 1	Construct the experiments, data analysis and interpretations methods related to basic fluid mechanics, hydraulics, hydrology and water quality using standard test and measurement.	PO 4	Conduct investigations of well-defined problems, locate and search relevant codes and catalogues, conduct standard tests and measurements.
CO 2	Demonstrate leadership skills in task related to water engineering.	PO 6	Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well defined engineering problems.

2.4 Implementation of the Laboratory Activities

Implementation of the OEL activities at the Faculty of Civil Engineering, UiTM, Pasir Gudang was progressively introduced, monitored, reviewed and streamlined since the last accreditation exercise by EAC in 2012. New guidelines were introduced to facilitate the teaching and learning activities to benefit not only the students but new lecturers of the courses. Manual preparation for each laboratory activities would include the elements as shown in Table 3. The preamble to the laboratory manual should include introduction, objectives and learning outcomes. The lecturers may also include basic theoretical information as and when necessary.

Table 3: Elements in an OEL Manual

Level	Preamble	Problem	Ways & Means	Answers	Common Name of Lab Activities	Degree of Open Ended
0	Given	Given	Given	Given	Traditional	0 %
1	Given	Given	Given	Open	Partially open	33%
2	Given	Given	Open	Open	Partially open	66%
3	Given	Open	Open	Open	Fully open	100%

Results and Discussions

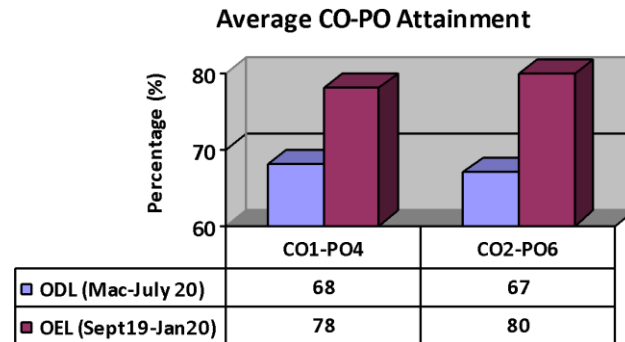


Figure 1: Students average CO-PO Attainment

Figure 1 shows the students' average CO-PO attainment according to ODL and OEL implementation. The percentage of both ODL and OEL was a combination of the reports and also the teamwork and practical skills. The bar chart shows that, the data for OEL was 78% for CO1-PO4 and 80% for CO2-PO6. While for ODL, 68% for CO1-PO4 and 67% for CO2-PO6. From the data, it was found that the percentage differences for CO1-PO4 is 10% while for CO2-PO6 was 13%. It showed that the PO achievement during OEL were higher compared to ODL.

From the result, it showed that most of the students are having some problem with online learning especially for practical based course. Many students did not prefer the laboratory session to be conducted as ODL because it could not be done physically. So, it will affect the development of the students' psychomotor skills and understanding in conducting the experiment.

Conclusion

It can be concluded that the PO achievement during OEL implementation is better compared to ODL by measuring the students' achievement based on their psychomotor skills. It is also closely related to student's perception on their lack of communication skills throughout the course. From our experiences, the OEL increases the independent learning amongst students by giving them a platform to be innovative and creative in designing and executing their own experiments. The OEL implementation has affected the overall marks scored that represent the students' abilities in designing and conducting the experiment, analysing and interpreting the result and actively participate in the laboratory session.

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