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TARGETED APPROACHES OF ONLINE DISTANCE LEARNING FOR ENGINEERING STUDENTS DURING COVID19

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ABSTRACT
Most educational institutions around the world, notably engineering departments, were obliged to alter their face-to-face teaching processes and convert them to new online learning strategies as a result of the worldwide health emergency caused by the COVID-19 pandemic in early 2020. The objectives of this study are to determine the advantages and disadvantages of online distance learning, to measure the efficiency of output and input information provided by the lecturers and students, and to identify the type of online platform preferred most by both parties. Background research for the study area, data collection, data analysis, result evaluation, conclusion, and recommendations are all part of the scope of work for this study. The methodology section describes the method and procedure for completing this study. Finally, university teachers and engineering department students acknowledged satisfaction with ODL's entire application. Key features include the professors' encouraging endeavours in class delivery as well as the ODL platforms used. Despite the challenges that ODL implementation has presented in the past, lecturers now have the opportunity to try out novel teaching strategies. On the plus side, ODL has proved that learning knows no bounds as the post-COVID-19 new standard.

Keywords:
Online Distance Learning (ODL), Covid19, pandemic, engineering, students

INTRODUCTION

Due to the worldwide health emergency created by the COVID-19 pandemic in early 2020, most educational institutions, especially for engineering departments, throughout the world were compelled to change their teaching techniques which were based on face-to-face teaching and convert them into new online learning tactics.

The Malaysian education system, particularly the Higher Learning Institutions, has made the use of online teaching and learning methods as an alternate teaching method mandatory throughout the country (Selvanathan et al., 2020). In these conditions, each institution developed its own approach, which often included preferred digital tools and platforms for distance learning, such as video call apps, as well as general rules and instructions for lecturers on how to adjust their lesson plans (Garcia-Alberti et al., 2021).

As a result, the purpose of this study is to look into the viewpoints of engineering lecturers and students on online distance learning implementation during COVID-19. By exploring both sides of viewpoints is definitely fascinating for required adjustments in the following semester, but a larger focus should be made on how the adoption of online engineering course learning has influenced their way of teaching and learning in the previous semester. Besides that, a better understanding of the lecturers and students' viewpoints will surely provide useful thoughts on how to enhance online engineering to course learning implementation.

Therefore, some of the questions will be pointed out in this study: (i) what have been the overall reactions from the lecturers and students of engineering to the online distance learning implementation so far?, (ii) what aspects of online distance learning do lecturers and students from the engineering faculty like the most?, and (iii) which online platform both side preferred most?

LITERATURE REVIEW

Many studies have been performed to examine the influence of the Covid-19 pandemic scenario on the education sector in many parts of the world, including the engineering education sector. Despite the fact that all of these studies span a wide range of online distance learning during the Covid-19 epidemic, the focus of this literature review will be on three major topics that have been discussed consistently throughout the research study. The three major topics consist of the following: lecturers and students feedback on online courses, challenges/obstacles affecting online courses and roles of the online platform.

One of the studies was conducted by Dietrich et al. (2020), which stated that instructors had a significant issue as a result of the COVID-19 outbreak, since they needed to convert all of their classes to distance learning as quickly as possible in order to maintain educational continuity and quality. Even if some instructors and students were prepared for the situation, the great majority of teachers and students were forced to change their teaching and learning in a very short amount of time, with no training. Teachers' techniques for online learning in lecture, group project, and lab work have multiplied as a result of the fast change.

Other than that, Rahiem (2020) also has conducted a study to explore and interpret the lived experience of university students in emergency remote learning (ERL) during Covid-19 pandemic. The research used a qualitative phenomenological method with 80 students as participants. A thorough examination of the students' diaries and reflective writings, as well as an online focus group, were used to gain an understanding of their experience. The results will aid to assure the efficacy of on-going ERL and better incorporate similar programs in the future if this happens again by evaluating how university students learnt during COVID-19. As discussed in this study (Rahiem, 2020), lecturers created and conducted remote learning programs without any prior preparation or training. Students, likewise, were not given the time to prepare for this shift in learning.

A study conducted by Lassoued et al. (2020), which aims to reveal the obstacles for achieving quality in online distance learning during the Covid-19 pandemic. According to the findings, lecturers and students encountered self-imposed as well as educational, technological, budgetary, and organizational barriers (Lassoued et al., 2020). Lassoued et al. (2020), as discussed in this study, said that lecturers and students encountered four categories of obstacles during online distance learning: personal, pedagogical, technical, financial and organizational. Furthermore, many technical issues confront e-learning users, such as time and location flexibility, student and learner differences, e-learning not feeling comfortable, increasing irritation and misunderstanding, and poor technology compatibility, all of which obstruct the teaching and learning system.

Elfirdoussi et al. (2020) has conducted a study to investigate the limitations of e-learning platforms and how these activities occur during remote learning in higher education 3 programs. A total of 3037 students and 231 lecturers took part in a research survey for this study. As shown in the study, the responses are arranged starting with the lecturer's responses, followed by the student's responses. According to Elfirdoussi et al. (2020), the bulk of lecturers (94%) provide materials for students and the rest (54%) deliver courses through video conferences. In addition to that, the study also stated, these platforms are used by 49.7% of respondents to supervise projects while 43.7% of lecturers use quizzes and assignments to assess their pupils remotely. Furthermore, 41.2% of participants established a distant training program and 14.6% ensured distance project defense.

In conclusion, the goal of this literature review was to look at the effectiveness of distant online courses from the perspectives of lecturers and students, as well as the obstacles that both parties encounter during online courses and the function of the online platform that was utilized for the online courses. The study examined shows that there were both good and negative aspects that impact both lecturers and students during online courses sessions.

METHODOLOGY

The research approach chosen for this study was both qualitative and quantitative method involving a questionnaire. Rather than identifying cause and effect, qualitative research gives a narrative knowledge of an event or phenomena, while quantitative research places a greater emphasis on the capacity to do statistical analysis. The participants' age, program, current semester, location during online studying, and internet quality were among the questions asked in section 1.

Other than that, the lecturers' and students' surveys were created with the general verbal input from stakeholders throughout the online training in mind. Both lecturers and students were asked to respond to sixteen multiple-choice and two free-response items in the survey. The poll included a range of questions for multiple-choice and one free response, including lecturers' and students' online learning experiences during the Covid-19 epidemic in section 2. This was required since the advantage and negative will be decided by the response during the online session.

Aside from that, in section 3, several of the questions from the multiple-choice and one free-response will revolve on the time or period during which both participants found online learning pleasurable throughout the online session. This sort of inquiry is also important to the study in order to assess how successfully lecturers and students interact, as well as to establish a stress-free environment during online sessions.

Finally, in section 4, the survey will only include several multiple-choice questions on the sort of platform that was utilized during the online learning course. This can assist in identifying the sort of online platform that has been utilized for online sessions on a regular basis, resulting in the most favored platform for online sessions. In order to define the number of respondents needed to complete the survey, a simple formula was employed to calculate the number of lecturers and students in the population.

Multiply the numbers of responders you want by 100, and then divide by the estimated response rate. As for this study, the total numbers of respondents expected were 60, including both lecturers and students, while the estimated response rate is 50%. The outcome of this easy computation is 60 people who will participate in the survey.

As a result, this survey will require the participation of 60 people. For methods of verifying the results, activities such as assuring methodological coherence, sample sufficiency, creating a dynamic link between sampling, data collecting, and analysis, thinking theoretically, and theory creation are examples of verification techniques that assure data dependability and validity (Morse et al. 2002).

The sample must be suitable, refer to 4 individuals who best represent or have expertise of the study issue, while methodological coherence ensures congruence between the research question and the components of the technique. The convenience sampling method was utilized to choose instructors and students of engineering departments from five universities in Peninsular Malaysia for the online survey. Due to the Covid-19, the Movement Control Order (MCO) was still in effect at the time of data collection, Google Form was chosen as the best instrument.

A final result was reached by examining the efficacy of online distance learning from the viewpoints of lecturers and students from engineering departments, as well as challenges that both parties experience during online courses and the function of the online platform that was employed for the online courses. As a result, the approach presented in this chapter was considered sufficient to address the study's research questions.

RESULTS AND DISCUSSION

A total of 60 participants from engineering departments from five universities in Peninsular Malaysia - Infrastructure University Kuala Lumpur (IUKL) in Selangor, Universiti Malaya (UM) in Kuala Lumpur, Universiti Teknologi Malaysia (UTM) in Johor Bahru, Universiti Sains Malaysia (USM) in Penang, and Universiti Teknologi PETRONAS (UTP) in Perak - took part in this survey. The response rate was satisfactory, thanks to the ease of use provided by the technology utilized in the data collection procedure. The qualitative data on the lecturers' and students' opinions included general feedback, what they liked best about ODL, and ODL implementation ideas. There are a total of 4 sections with 16 questions, of which 2 questions are open-response, while the rest of the questions are multiple-choice.

Section 1: Participants General Information

According to the results gathered, the respondents consist of the age range between 20 to 50 years old, with the majority of 61.7% to be in range of age 20 to 25 years old, while age 36 to 40 years old are the lowest with 1.7% as seen in Figure 1.

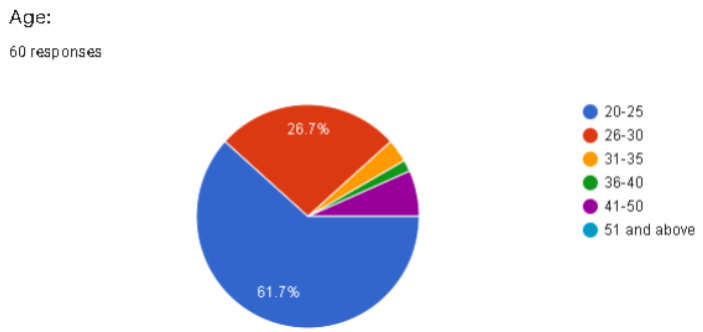

Figure 1: Age of the Responses

According to Figure 2, most respondents are from Bachelor of Civil Engineering (BCE) programmed with 16.7%, while others are from other programmes within engineering departments with 1.7%.

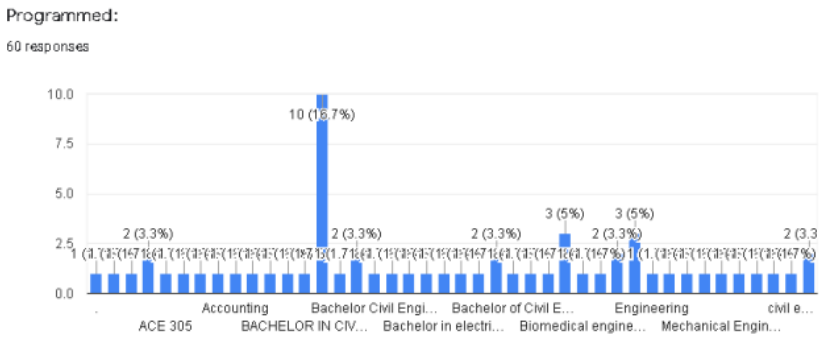

Figure 2: Respondent Programmes

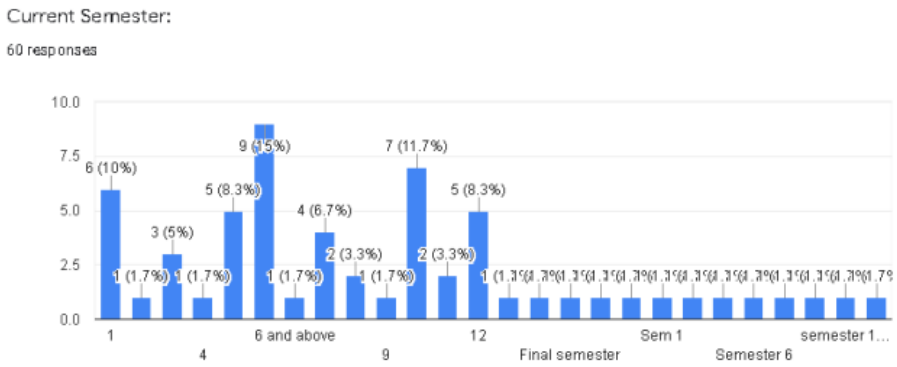

Figure 3: Respondent Current Semester

For Figure 3, the data show the respondents' current semester which the highest falls to semester 6 with 15%, while the lowest goes to final semester, 1st semester, etc. As shown in Figure 4, most respondents located in West Malaysia (Peninsular) with 40%, while the minority located East of Malaysia with 1.7%. Majority of the respondents have a good quality during the ODL with 83.3%, while the other 16.7% of respondents have a bad internet connection as shown in Figure 5.

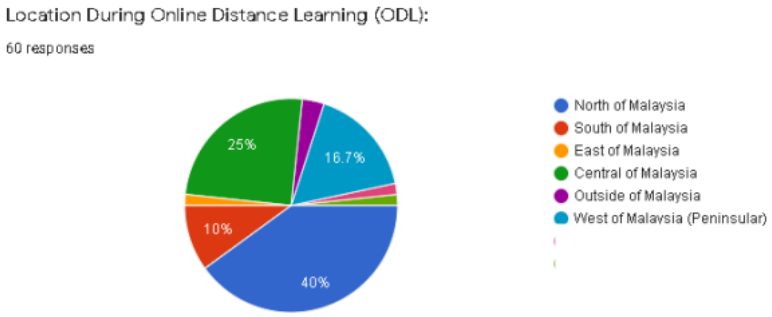

Figure 4: Location of respondents during ODL

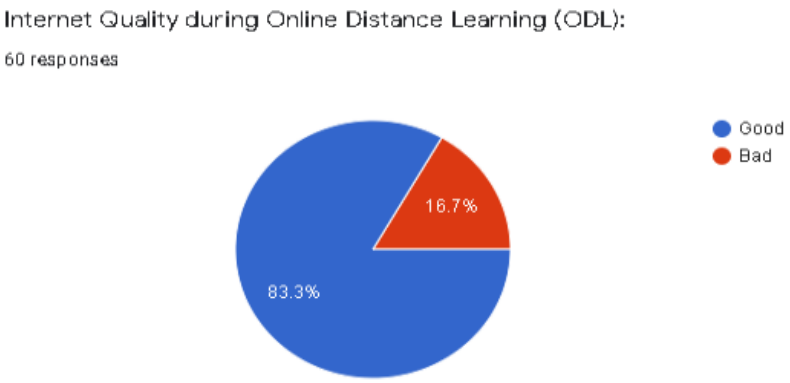

Figure 5: Respondents internet quality during ODL

Section 2: Experiences during Online Distance Learning (ODL)

In this section, the survey asked a series of multiple-choice questions and one free-response question about lecturers' and students' online learning experiences during the Covid-19 epidemic. According to Figure 6, about 55% of the respondents agreed on 'the ability to attend class from any location' as enjoyable, while 33.3% of the respondents agreed on 'easier to understand due to the helps of recording video during online classes and the lowest with only 11.7% of respondents agreed on 'the ability to adjust the class time due to time constraints'.

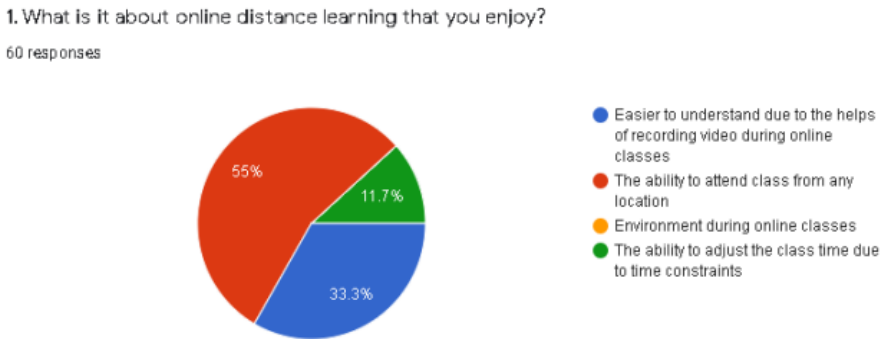

Figure 6: What About the ODL the Respondents Enjoyed

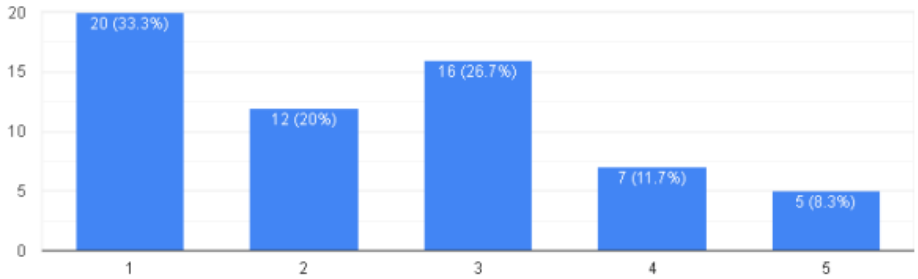

Figure 7: Difficulty in Using Distance Learning Technology by the Scale of 1-5

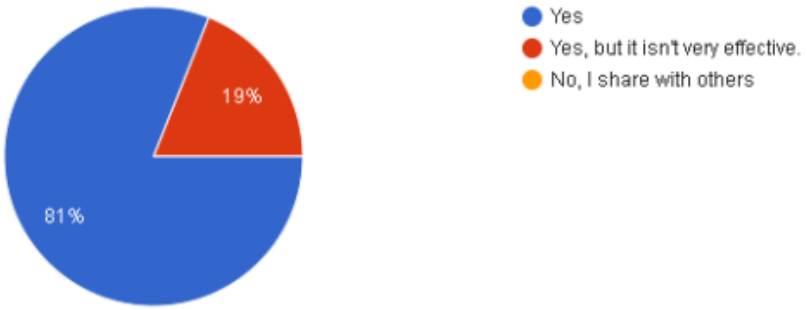

Figure 8: Access to Gadget

Figure 7 shows a question about the difficulty of using distance learning technology such as a computer, laptop, or other device, with a scale ranging from 1 (very simple) to 5 (challenging). According to the data gathered, the majority of the respondents find that it is very simple to use the gadget needed for ODL with 33.3%, while the minority with 8.3% of the respondents find it is challenging.

As shown in Figure 8, most respondents have access to gadgets that allow them to learn online with 81% of the respondents, while 19% of the respondents have access but it isn't very effective. As seen in Figure 9, the majority of 79.3% of respondents use laptop during their ODL, while 5.2% of respondents are using smartphone and tab during their ODL.

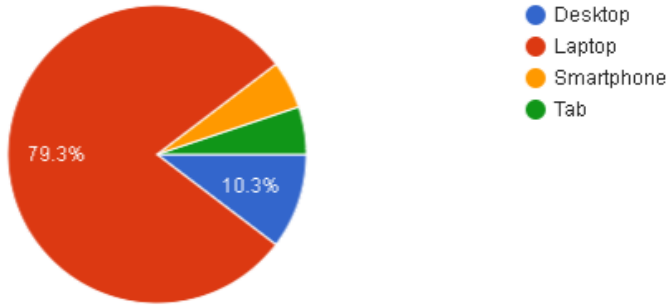

Figure 9: Type of Gadget

Figure 10 displays the data on how supportive the university is in providing resources needed for ODL and the majority with 62.1% of respondents agreed on 'moderately helpful'. While the lowest with 1.7% of the respondents agreed on 'not helpful at all'. 9

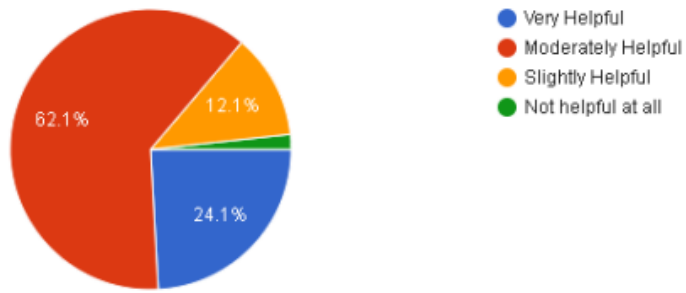

Figure 10: Support from the University in Providing Resources

For the last question in section 2, it is an open-response which asks about how enthusiastic they be during ODL. Majority of the respondents find ODL "very interesting" and "allow access to the information and knowledge anywhere" as the respondents stated. While there are also negative respond regarding ODL, such as stated by one of the respondents, "not really enjoying the ODL" and "lack of concentration, understanding, and other factors, "I was unable to properly grasp the scope of what was being done" as stated by one of the respondents.

Section 3: Interaction between Lecturers and Students during ODL

In section 3, there are a total of 5 multiple-choice questions in which the respondents are able to select more than 1 answer. As shown in Figure 11, majority of the respondents agreed on presentation as the most engaging activities during ODL (60%), while the lowest activities that the respondents find engaging during ODL is projects (28.3%).

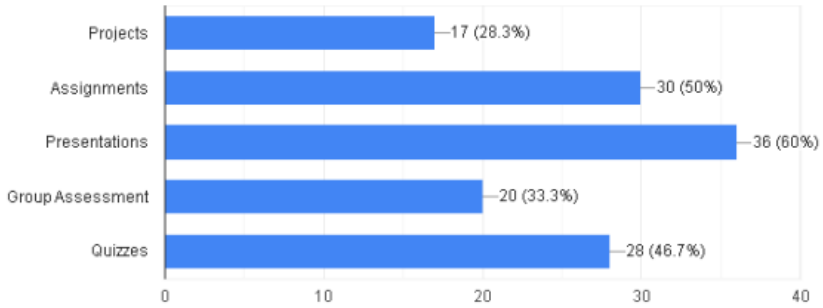

Figure 11: Engaging Activities during ODL

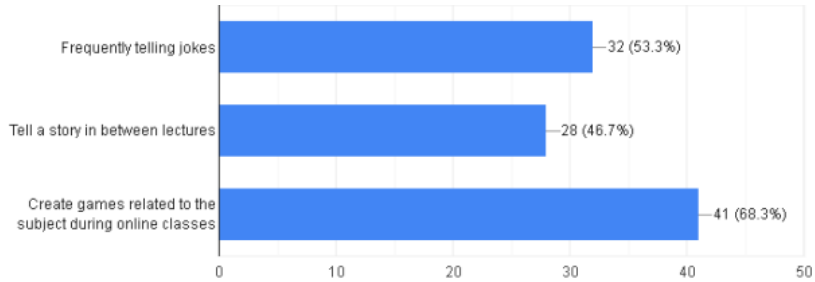

Figure 12: Thing That Make ODL More Enjoyable

Figure 12 displays data for the things that make ODL more enjoyable according to the respondents, which the majority (68.3%) of respondents would like to do is 'create games related to the subject during ODL', while 'tell a story in between lectures' is the lowest (46.7%).

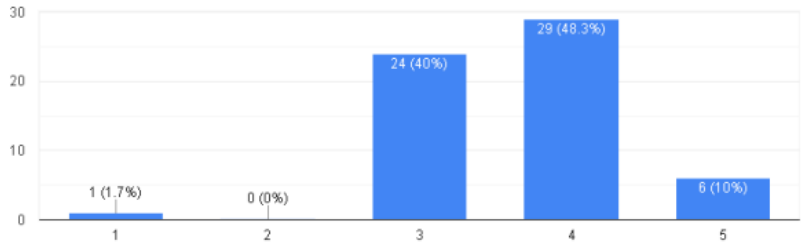

Figure 13: ODL Rating on the Scale of 1-5

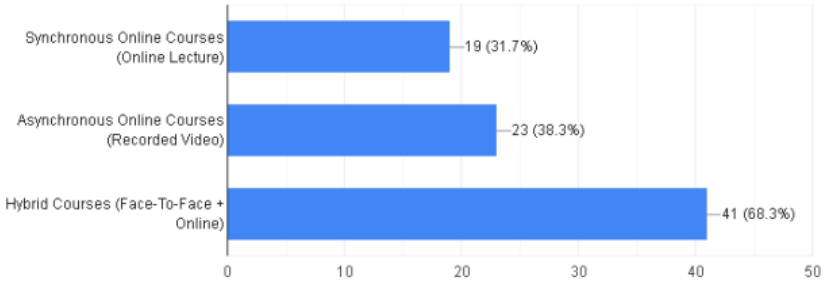

Figure 14: Preferred Learning Environment

From Figure 13, the respondents were asked to rate their ODL during Covid-19 pandemic, from 1(very dissatisfied) to 5(very satisfied). As shown, most respondents were satisfied with their ODL (48.3%), while 1 respondent found it very dissatisfied with their ODL (1.7%). As seen in Figure 14, the majority of the respondents (68.3%) agreed on hybrid courses as their learning environment preferred which combine both face-to-face and online learning at the same period of time. As for asynchronous online courses, about 38.3% of respondents preferred as it is a recorded video provided by the lecturers and lastly the synchronous online courses which have the least preferred (31.7%) by the respondents.

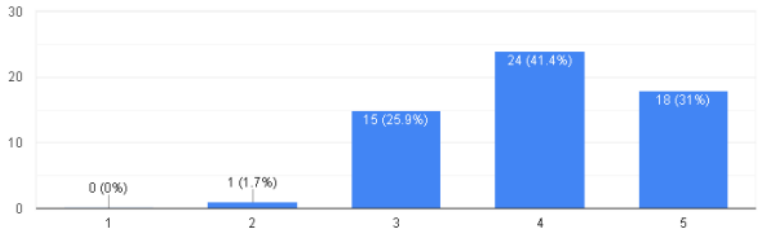

Figure 15: Time and Effort Rate at the Scale of 1-5 by Respondents

Figure 15 displays the data gathered as the respondents rate their effort during ODL, which range from 1 (less effort) to 5 (a lot of effort). About 41.4% of the respondents put effort during their ODL, while 31% of the respondents put a lot of effort during their ODL.

Section 4: Favourable Online Platform

The survey will only have 5 multiple-choice questions in this part about the type of platform that was used throughout the online learning course. This can help determine the type of online platform that has been used on a regular basis for online sessions, culminating in the most preferred platform for online sessions.

As shown in Figure 16, about 58.3% of the respondents preferred Google Meet, while 51.7% of the respondents agreed on Microsoft Team and lastly, around 35% of the respondents agreed on Zoom as their preferred online platform during ODL.

As seen in Figure 17, the results reflect the respondents' reasons for preferring their earlier response. The majority of respondents (76.7 %) believe their preferred online platform is easier to use than the other two online platforms, with 50% citing the high quality of video and audio while using the online platform as a reason, and around 45% citing the platform taking less time to open.

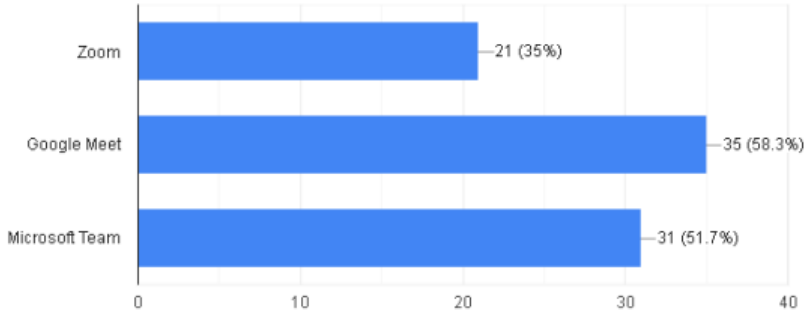

Figure 16: Preferred Online Platform

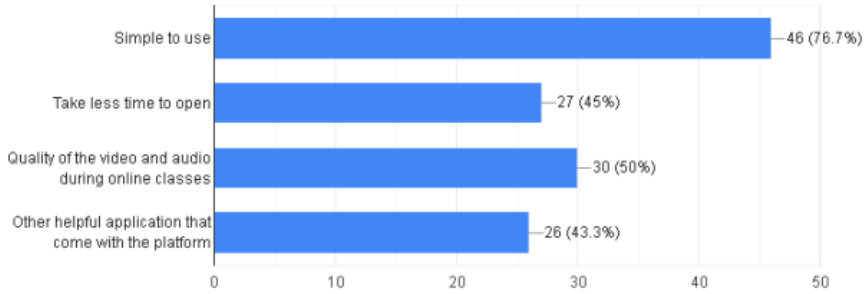

Figure 17: Reasoning on the Preferred Online Platform

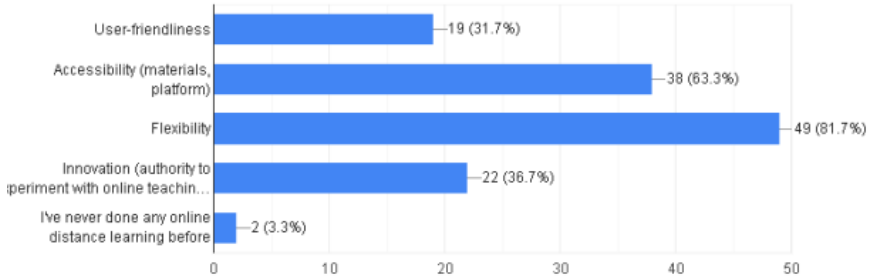

Figure 18: Experience by the Teachers on ODL

Figure 18 shows that the majority of respondents (81.7%) agree on the flexibility since it makes ODL more enjoyable. When it comes to topic material accessibility, roughly 63.3 % of the respondents are satisfied. 14 Figure 19: Challenging task Figure 19 shows that the majority of respondents (73.3%) consider communication between lecturers and students to be the most difficult responsibility during ODL, along with sustaining all students' interest and engagement.

While the least favourable group (6.7%) felt that there are ‘no problems have arisen’ during their ODL. As shown in Figure 20 below, the data represents the respondents’ opinion on ODL being part of practice in university once the universities reopen. Majority of the respondents (61.7%) agreed on ‘university will revert to its previous state, with minor modifications’, while 33.3% of the respondents agreed on ‘university will be different with online learning as part of the university

routines' and lastly, the less (23.3%) of respondents agreed on 'university will convert back to its original practice', which 100% face-to-face learning.

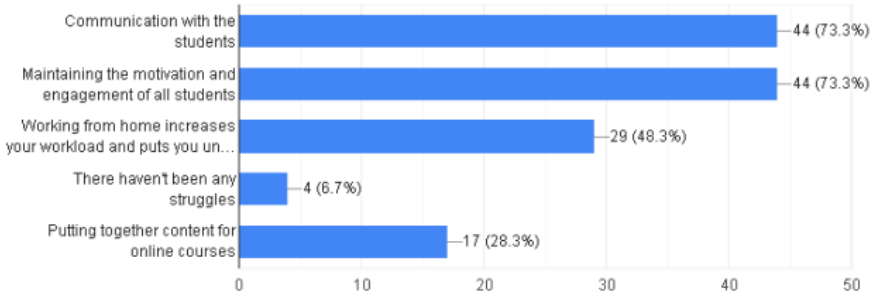

Figure 19: Hurdles for the Teachers during ODL

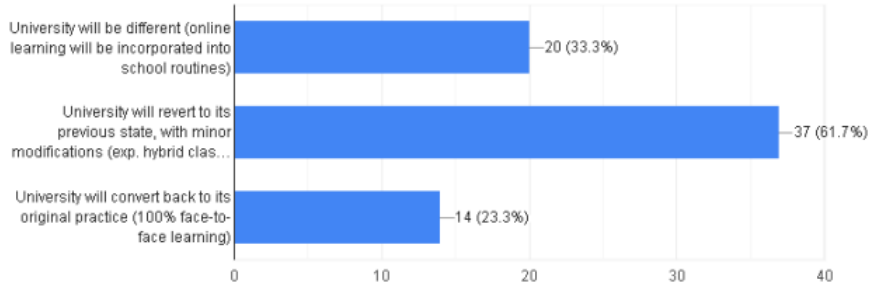

Figure 20: Effects of ODL in Universities after Covid-19

CONCLUSION

In conclusion, university lecturers and students from the engineering department expressed satisfaction with the overall application of ODL. The lecturers' encouraging initiatives in their class delivery, as well as the ODL platforms utilized, are the key elements. The hybrid techniques are the most popular and favoured platforms, in which some of them can attend courses while the rest can join the class via an online platform, where they can record the class and replay the teachings at any time. Due to bad internet connection concerns, some students suggested that ODL not be continued in the following semester.

Despite the difficulties that have been encountered in the past with ODL implementation, lecturers now have the possibility to experiment with new teaching methods. On the plus side, ODL, as the post-COVID-19 new standard, has demonstrated that learning has no bounds. Instead of conducting lessons within the four walls as is customary, the deployment of ODL will elevate teaching and learning to a whole new level, allowing both lecturers and students to express themselves creatively.

There are several recommendations suggested, in order to have an even more quality ODL, such as:

1. Establish guidelines: Online instruction differs from face-to-face instruction. Lecturers can address the norms that encourage good learning with students as they transition to this mode of learning. This might include issues like suitable attire, when to mute/un-mute, when to use chat, when to raise your hand to contribute, how to use backgrounds, how to cheer, and what to do while classes are recorded.

2. Develop good relationships with students: Lecturers understand the value of building meaningful relationships with and among students. This is just as crucial, if not more so, when teaching online. Consider adding tools and tactics that promote communication between you and your pupils.
3. Don't rebuild the wheel: One of the best things about online learning is that there are already a variety of high-quality resources at your fingertips. Lecturers are not curriculum writers; those who are have already completed this task. Find out what resources are available, while having more time to focus on the important aspects of teaching, such as assisting students in learning, developing connections, building relationships, and ensuring that their social emotional needs are addressed.

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