

Students' Reactions to Online Learning During the COVID-19 Pandemic: A Case Study of a Malaysian Private University's Outcome Unit

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Abstract

COVID-19, a highly contagious disease caused by the severe acute respiratory syndrome Coronavirus-2, has infected over 3 million people worldwide to date. The only way to stop the virus from spreading is avoiding close contact. Hence, the conventional teaching and learning environment was transformed from face-to-face to online education through Zoom, personal to interactive, and seminars to webinars. However, the impacts and feedbacks from the students are unknown. Therefore, this survey study was conducted to evaluate the responses from students. The selected study unit is CVE40004 Water Engineering, an outcome unit with complex engineering problem offered in Swinburne University of Technology Malaysia Sarawak Campus. The teaching pedagogical approaches that had been adopted are crossover learning, context-based learning, computational thinking, and adaptive teaching. Most of the students proclaimed that learning quality, effectiveness, interest and comfortability were reduced significantly after attending online classes. With adequate computer skills and facilities, most of the students still felt isolated and faced difficulties in communicating with group members. It is believed that the situation and responses will get better after the students adapt to new online teaching and learning environment.

Keywords: COVID-19 Pandemic, Outcome Unit, Malaysia, Private University, Online Learning

1. Introduction

The severe acute respiratory syndrome Coronavirus-2 causes COVID-19, a highly infectious disease or sickness (SARS-CoV-2) [1]. It began in Wuhan, China, and has since expanded around the globe [2]. It is transmitted primarily by direct interaction with people, resulting in millions of deaths. Because of its size and seriousness, COVID-19 is referred to as a pandemic, as well as the world's largest public health outbreak [3, 4, 5]. The new coronavirus wreaked havoc on everything from world economies to social norms [7]. As a result, the International Labor Organization (ILO) forecasted a loss of 195 million workers [8].

One of the most favored options to mitigate the severity of this situation is to implement the COVID-19

containment measures in their respective jurisdictions [9]. People have been arguing lockdown since the Corona pandemic, and it is a common buzzword these days. Since March 2020, the responsible authorities (in this situation, the federal and state governments) have implemented a state of emergency policy to prohibit people from fleeing their homes, resulting in mass quarantines and stay-at-home warnings around the country [10]. The coronavirus triggered India's first phase national shutdown, which lasted 21 days and was repeated on April 15, 2020, for 19 days; on May 04, 2020, for 14 days as the third phase; on May 18, 2020, for 14 days as the fourth phase; and on June 1, 2020, only for containment zones, for 16 days [11]. People's unbridled devotion to taking stringent precautionary measures including maintaining social isolation, following medically recommended quarantine protocols, and embracing hygiene and sanitation will help to control the COVID-19 pandemic to a greater extent [12].

UNESCO estimates that 264 million children and teenagers are out of school, and the pandemic has exacerbated the issue [13]. As the COVID-19 pandemic spreads, more people are transitioning to online education because the only other option is for schools, colleges, and universities to shutter for an unknown period of time [14]. As a result, now is the time to rethink, revamp, and reinvent our educational system, which, given the current situation, is in dire need. Both informal and non-formal education have had a significant impact [15]. However, because of the direct interaction between the teacher and the pupils, no pedagogical approach will ever completely substitute the position of the teacher in conventional education [16]. Since the COVID-19 crisis, however, online education developed into a pedagogical transformation from traditional approaches to a modern approach to teaching-learning, switching from the classroom to Zoom, from personal to virtual, and from seminars to webinars [16].

Previously, non-formal schooling included e-learning, distance education, and correspondence courses; however, if recent developments continue, it appears that it will eventually overtake the formal education system [17]. Adobe Captivate, Articulate 360, Blackboard Learn, Blackboard pax, Blackboard Learn, Buncee, Classtime, Classwize, ClassDojo, Coursera, Code-academy, Docebo, Edmodo, Edx, Elucidat, Flipgrid, Floop, Future Learn, Feedback Fruits, GoGuardian, Google Classroom, G Suite, Gynzy, Hapara, Kami, Kialo Edu, LanSchool, Lectora Inspire, Neo, Otus, Parlay, Pluralsight, Pronto, Skillshare, Start.me, Seesaw, Shift, Ted-Ed, Udemy, WeVideo, WizIQ, and many more are some of the most popular online networking networks that will change the global education system's destination and direction in the post-COVID-19 period [16]. As the current situation aims to keep our children away from traditional formal education and enable them to follow their passions, the word "de-schooling society" [18] comes to mind.

Both teachers and students feel compelled to embrace the current instructional experience as the summum bonum of the online teaching-learning process because of the COVID-19 crisis [19]. Teachers should cater children's technical skills on the verge of cyber danger into educational opportunities in order to achieve success in potential ventures using digital intelligence [20], particularly in this pandemic where children are entirely dependent on online learning. The coronavirus is causing havoc in people's lives [21], posing a long-term threat to our educational institutions from kindergarten to tertiary education, and exacerbating the teaching-learning process on a daily basis.

Some people hoped to transform their entrepreneurship skills into profit-making ventures in addition to charitable projects [16]. External and internal forces are held responsible for all creative reforms, as outlined in his change management theory [22], which describes the fundamental method of any change through a three-step procedure (un-freezing, changing, and refreezing). The unfreezing of standard teaching-learning occurred unexpectedly outside of COVID-19 due to anticipated difficulties in adopting the conventional mode, resulting in the transition to online teaching [23].

In the midst of the COVID-19 outbreak, where retaining social distance is imperative, taking classes in a traditional mode is virtually impossible; thus, online teaching mode has undeniably become a must, putting an organization and an individual alike through an unfreeze phase [24]. The decision to unfreeze provided an impetus for system and stakeholder planning and motivation [25]. Additionally, during the COVID-19 outbreak, online training mode provides a sense of psychological security to the student community. The second move is to alter the protocol, which can be accomplished in one of two ways: either by implementing a new online mode that is already in place in other organizations or by creating one of one's own.

Shift is a dynamic process, such as a split continuity in this situation, rather than an incidence. For online teaching mode to complement the transition phase for any result-oriented change, it requires a time-suited outlook and a fresh mindset at the individual and organizational levels [26]. Increased educational imagination, expanded public-private educational relations, and the digital divide gap are three trends that will be seen in future transformations, according to "Resilience to be built into our educational systems" [27]. Even after the COVID-19 pandemic that resulted in refreezing, online teaching has undergone a paradigm shift after four

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months of online encounters, gaining traction to the point of near pervasiveness.

Refreezing is an inevitable stage of integrating technology into our teaching-learning process, as it helps us to educate students in ways that are not only convenient for them, but also satisfy the technological demands of the twenty-first century [16]. Mizoram University, which is located in Aizawl, Mizoram's capital, in north-eastern India, conducted the study. Mizoram University was awarded a "A" by the National Assessment and Accreditation Council (NAAC) in 2019 and is ranked 51 by the National Institutional Ranking Framework (NIRF) in 2020 [16]. Mizoram's Gross Enrolment Ratio (GER) in higher education was reported to be 25.7%, compared to 26.3% nationally [28]. There is one constituent college and 35 affiliated colleges at the university. In higher education institutions in India, the Indian government is initiating and developing policies on online teaching and learning [16, 29]. The Indian government began seriously debating this topic, emphasizing ICT and the use of online education as part of the tertiary level's mandatory teaching-learning process [16]. It is also reflected in the creation of a new national education plan for 2019, which has been praised as a positive and technologically productive step during this pandemic [16].

SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds) is a government-sponsored MOOC network that provides online courses in four quadrants. SWAYAM PRABHA is a DTH cable network of 32 channels dedicated to educational programming seven days a week. The MHRD unveiled the Annual Refresher Course in Teaching (ARPIT) on November 13, 2018, as an online career learning initiative using the SWAYAM website. Another MHRD initiative, e-PG Pathshala, was managed by the University Grants Commission (UGC) and provided high-quality curriculum-based and interactive e-content in 70 subjects spanning all disciplines [16]. On November 7, 2015, the MHRD and the National Council of Educational Research and Training (NCERT) unveiled e-Pathshala, an online learning platform that offered educational opportunities for teacher educators, students, researchers, research scholars, and parents [16]. As a result, it became aware of the difficulties and opportunities that online education presents. The University Grants Commission (UGC), India's largest administrative body for higher education, has taken proactive action to address the present educational situation, including issuing a circular regarding the academic calendar based on the recommendations of one of UGC's own committees [16]. It is also now obligatory for all Indian universities to complete 25% of their curriculum through online instruction and 75% through face-to-face contact [30].

It was impossible to navigate teaching and learning scenarios in the post-COVID-19 epidemic educational scenario without relying heavily on online teaching platforms [31]. Students should expect a host of instructional challenges in the future after seeing the frightening coronavirus, including quality teaching, hands-on experience, laboratory preparation, library trips, peer tutoring, remedial instruction, research, and imagination. As a result, preserving the blend between online and offline learning lessons is a partial solution to post-COVID-19 educational tantrums (hybrid mode) [16]. The problems in HEIs incorporating online teaching-learning are similar to those encountered in introducing the education reform process that happened during the COVID-19 crisis; these difficulties are due to the novel experiences of online education and their technological difficulty [31]. Prior to the pandemic, it was assumed that online education in India was limited to free universities [32]. However, in the COVID-19-induced age, online teaching-learning has proven to be a massive obstacle, and stakeholders are not technologically competent to cope with the current situation, and they are unlikely to be able to respond to the rapid educational change [16, 33, 34]. As a result, in order to effectively implement instructional reform (in this case, the shift from traditional teaching-learning methods to online teaching-learning methods), the effects of transfer must be addressed [16]. The journey begins with a collective goal shared by the UGC and the Ministry of Human Resources Development (supra-system), universities and colleges (system), and various academic divisions (sub-system) in favor of integrating online teaching and learning into the education system.

When confronted with COVID-19, the school system's shared vision remembered that after the pandemic, teachers and students were motivated to adapt online teaching-learning resources to address current educational needs [33]. Everyone, whether teachers or students, was polite and professional at using social media apps such as WhatsApp, Facebook, Twitter, and Instagram, which facilitated the use of online instructional tools such as ZOOM, Google Meet, Cisco WebEx, and others as a sign of positive learning transfer. There are some useful educational tools, such as Office 365, Google Classroom, and an even more user-friendly videoconferencing program, that can be downloaded for free and are easy to use [35], so there seems to be little reason to be concerned with acquiring new technology all of a sudden, as some of the programs are already integrated in our HEIs. Just a limited number of stakeholders had laptops, which are necessary resources for integrating online teaching and learning. Mizoram University has an ICT center as well as a learning management system (LMS) to help with online teaching and learning.

In response to the pressing need, the federal and state governments collaborated to launch online education around the world [36]. Various national, state, and university-level teacher and student groups backed the vision

of online teaching-learning modes with a mixed bag of opinions as a result of excitement to try out new technologies and a contemporary way of teaching-learning in the education system; it is due to stakeholders' lack of preparedness, orientation, and incentives in using online mode of teaching; it is due to stakeholders' lack of preparedness, orientation, and rewards in using online mode of teaching. With our planning for online teaching mode, the need for change in this pandemic, and the resources available to implement online teaching mode in mind, the action plan was developed. To go along with the action plan, teachers prepared and trained themselves personally to become familiar with the technology used with using online teaching styles. At the university level, system administrators and information and communication technology (ICT) experts aided and led collaborators through the transformation. However, though many studies on the effectiveness of online teaching and learning have been completed, none have been conducted during the COVID-19 lockdown period. As a result, the researcher becomes very interested in carrying out this analysis, which has the following objectives.

2. Case Study

The selected unit to evaluate students' response to online Learning during COVID-19 Pandemic is CVE40004 Water Engineering, an outcome with complex engineering solution unit offered in Swinburne University of Technology Malaysia Sarawak Campus. This unit of research is designed to help students gain a better understanding of water quality, as well as basic engineering concepts and analytical methods for designing a water supply and sewerage scheme. Water Engineering (CVE40004) is a project-based unit. This unit will choose a research field for each semester to explore and debate the most appropriate ways to cope with existing and potential water challenges in an urban context when considering climate change and sustainability concerns. Following that, students must prepare and build recycled water and sewerage pipes, evaluate alternative design solutions in terms of economic, social, and environmental considerations, and explain their design using these factors as well as common engineering standards and practices [37, 38].

The selected study area in Semester 2 2020 during the pandemic period is Bintulu Town. On June 7, 1995, LAKU Management Sdn. Bhd., a wholly owned subsidiary of the Sarawak State Government, was created. The company and the state government signed a 25-year concession agreement for the cultivation, delivery, and collection of water revenue in Sarawak's three northern urban townships of Miri, Bintulu, and Limbang. It took over the above functions from the Public Works Department of Sarawak on January 1, 1996. LAKU currently employs around 360 people, with headquarters in Miri and regional offices in Miri, Bintulu, Limbang, and Samalaju [39].

LAKU is concerned about the sustainability of supplying potable water to its customers especially in Bintulu and its surrounding areas. LAKU wish to investigate different options to make the current operation more sustainable due to ever increasing water demand in Bintulu and its surrounding areas. Currently, the main water treatment plant of Bintulu is located at Nyabau with a total capacity of 177MLD and Samalaju Water Treatment Plant with the capacity of 80 MLD [40]. The raw water source was extracted from Sungai Sibiew & Assyakirin Dam and Kelalong Dam.

However, the raw water source that extracted from Sungai Sibiew & Assyakirin Dam and Kelalong Dam is no longer sufficient to meet the ever-growing water demand especially after the implementation and construction of Samalaju Industrial Park & Sarawak Corridor of Renewable Energy (SCORE) Project [41]. The raw water demand is kept on growing from time to time in Bintulu. There are strong community concerns that current water management strategies are not sustainable in long-term. The future demand for potable water is expected to have a significant impact on the natural environment, and any damage to this environment is likely to reduce the livability of the area. Therefore, LAKU would like to have a more sustainable water management strategy instead of transferring the raw water source from one basin to another. One of the aspects that LAKU would like to investigate is studying the feasibility of supplying the Standard A treated wastewater to residential and industrial areas in Bintulu.

In this unit, students are required to brief and advise LAKU on:

- (i) Identify sustainable water management strategies for Bintulu and its surrounding area,
- (ii) Identify the environmental impacts that will result from the use of these water management strategies,
- (iii) Identify strategies to mitigate these impacts, and
- (iv) Provide a preliminary sizing of the infrastructure required with associated costs.

There are a few reports need to be submitted for this unit. The project progress was monitor closely by milestones submission. At the end of semester, students are required to submit Final Design Report, Design file cum 25 minutes presentation covering the important aspects of the design.

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3. Teaching Pedagogy

The modern teaching pedagogy for innovative learning strategies that had been adopted for CVE40004 Water Engineering are crossover learning, context-based learning, computational thinking, and adaptive teaching.

A. Crossover Learning

The first teaching pedagogical approach that I am adopting is crossover learning. Pictures, videos, and presentation slides related to different technologies for treating sewerage system were presented to the students and linked them with syllabus content. Besides, the actual installation procedures and processes for sewerage pipeline and recycled water supply pipelines together with stop valve, reflux valve, air valve, scour valve, fire hydrants etc., were also shared with the students using videos and slides presentations. It is believed that learning in university can be enriched by experiences and knowledge sharing from the experienced engineer cum lecturer. Students' curiosity and desire to learn would be piqued because of these interconnected interactions.

Thereafter, these relevant teaching materials will be transformed into assignment questions. The crossover learning can be deepened by exploring the relevant information that are related to the assignments through group work, discussion and sharing their findings. From assignments, students will collect photos as evidence, and share their findings by producing assignment report and oral presentation back in the class. Crossover learning activities take advantage of all worlds' strengths to provide learners with genuine and immersive learning opportunities. Since learning happens over the course of a person's life, drawing on a variety of experiences in a variety of contexts, there is a larger incentive to assist learners in capturing, connecting, remembering, and communicating their varied learning experiences.

B. Context-Based Learning

Context-based instruction is the second teaching pedagogical technique that we used. Students may benefit about their experiences as they are placed in context. By understanding new knowledge in the sense of when and where it happens and comparing it to what we already know, we will understand the significance and meaning of context.

The background of a classroom or lecture theatre is usually constrained to a set space and time. For CVE40004 Water Engineering, context-based learning was carried out by sharing my personal experience while practicing as a design and site civil engineer. In this way, students may expose and grab the actual site experience from the lecturer even before going to actual construction site. Students can gain context outside of the classroom by observing the world around them with the help of guides and measurement instruments. For CVE40004 Water Engineering, enriched context-based learning is achieved by visiting a wastewater treatment plant and water treatment plant.

C. Computational Thinking

The third teaching pedagogical approach that I am adopting is computational thinking. Computational thinking is a powerful approach for thinking and problem solving. It entails decomposing large problems into smaller ones (decomposition), understanding how these contribute to previously solved problems (pattern recognition), removing unimportant information (abstraction), defining and designing the steps required to find a solution (algorithms), and refining these steps (debugging). Computational thought aims to teach pupils how to solve problems using mathematics and scientific analysis, enabling them to deal with complicated problems in all facets of their lives.

For CVE40004 Water Engineering, an actual project was given to the students and students are required to think how to solve and design the project. The students are required to determine how much wastewater can be collected from the residence and industry areas, determine the water demand, and delivered the recycled water to end users. Students must design the size of sewerage and recycled pipelines, by considering of the head losses include major loss, minor loss and frictional lose. Beside the power required by the pump will be determined for calculating the operation cost especially the electricity charges at different tariffs. Besides, students also need to calculate capital cost, maintenance cost, renewal, and adaptation cost.

D. Adaptive Teaching

Per learner is unique. Most instructional displays and content, on the other hand, are universal. This causes a learning issue by putting the onus on the student to work out how to interact with the content. It means that some students will be bored, others will be perplexed, and only a small percentage of students will be able to

find pathways through the material that lead to optimum learning. This issue can be solved with adaptive instruction. It creates a customized roadmap through instructional content using data about a learner's or student's past and current learning.

In Swinburne University of Technology Sarawak Campus, all the teaching materials are uploaded on CANVAS platform where students can control their own pace of study. Apart from conducting online lectures and consultations, all the teaching materials include lecture slides, assignments, tutorials and recorded videos are also uploaded on CANVAS platform. CANVAS also has the feature to monitor and record students' login time and attendance. These features enable students to review the materials that had been taught, monitoring their attendance and submit their report using the link provided. The marks scored for each assessment will be published on CANVAS platform as well. Besides, students can contact lecturer through MS Team Meeting Chat, created WhatsApp group for CVE40004 Water Engineering and through email, which is really important and effective to clear all the students' doubt especially during this pandemic period.

E. Analytics of Emotions

My fifth teaching pedagogical approach is analytics of emotion especially during face-to-face session. Eye monitoring and facial recognition software can be used to assess how students learn and then respond accordingly to their emotional and cognitive states. If students have answered a query and how they describe their understanding are two examples of traditional cognitive facets of learning. If a student is irritated, confused, or disturbed, there are non-cognitive factors to consider. More broadly, using an analytics of emotions teaching pedagogy methodology, students' mindsets (such as viewing their brain as stable or malleable), techniques (such as focusing on learning, finding support, and preparing how to learn), and engagement characteristics (such as tenacity) can be evaluated, all of which have a significant impact on how they learn. Unfortunately, since it is difficult to maintain eye contact with students during an online session, this teaching pedagogical style is not well suited to online learning. However, lecturers still can evaluate the students' emotion through feedback and discussion with students through MS Team, WhatsApp group, email, and students' presentation also, even though it is not that effective.

4. Methodology

The surveys were conducted using google form with sample size of 78 students, who are taking CVE40004 Water Engineering in Sem 2 2020. Questionnaire survey was conducted with the inclusion of over 10 questions. A multiple-choice format dominated the survey questions which extensively investigated the students' response to online learning include quality, effectiveness of delivery, impressiveness, comfortability, assessments, socialize and relationship among students and lecturers, preference between online and face-to-face learning, computer skills and facilities, communication. Google form will create and analyses the survey [42]. The results will be presented in pie chart format.

5. Results And Discussion

The results of a survey conducted by Swinburne University of Technology Sarawak Campus students on the CVE40004 Water Engineering unit, which aimed to gain a deeper understanding of sustainability as it relates to water, as well as the basic engineering concepts and research techniques used to build a water supply and sewerage scheme, are shown in Fig. 1 to Fig. 10. From Fig. 1, it shows that 11.1% of the respondent student strongly agreed that the online learning, increased the quality and had a positive impact on their learning, while 33.3% of the respondent student played neutral in their opinions. In the meantime, 22.2% of the respondent student strongly do not agree that the online learning, increased the quality and had a positive impact on their learning. Fig. 2 show that 16.7% of the respondent student strongly agreed that the online learning system is an effective means to deliver the content of the topics, while 33.3% of the respondent student played neutral in their opinions. In the meantime, about 27.8% of the respondent student strongly does not agree that the online learning system is an effective means to deliver the content of the topics.

This was due to a sudden shift in their adaptability and atmosphere to the modern teaching and learning platform, which was a move from face-to-face to immersive teaching and learning [43]. The abrupt shift from face-to-face to interactive teaching and learning has wreaked havoc on consistency, implementation efficiency, impressiveness, comfortability, evaluations, socialization, and relationships between students and lecturers [44]. Virtual learning had cost most of the student feels uncomfortable and emotionally unstable to express their thoughts and feelings [45]. In addition, teaching and learning activities in face-to-face involve the used of emotions, mimicry, interaction, behavior, etc., which help to create a full concentration in the classroom compared with virtual learning and teaching.

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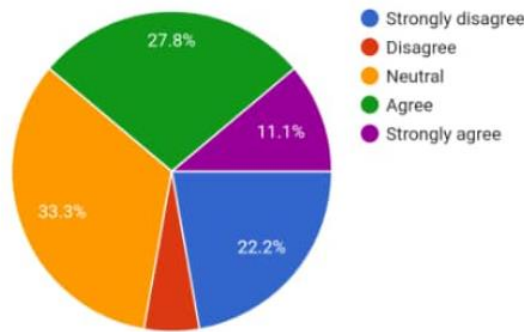


Fig. 1 The online learning increased the quality and had positive impact on my learning.

Fig. 3 show that 16.7% of the respondent student strongly agreed that an online learning system made the topics more interesting, while 33.3% of the respondent student played neutral in their opinions In the meantime 16.7% of the respondent student strongly does not agree that an online learning system made the topics more interesting. Fig. 4 show that 16.7% of the respondent student strongly agreed that they are comfortable with online teaching, while 16.7% of the respondent student played neutral in their opinions In the meantime 27.8% of the respondent student strongly does not agree that they are comfortable with online teaching.

Not all topics presented during face-to-face teaching and learning can be presented or delivered through virtual platform [31]. Taking the example of laboratory work, most of it needed hands-to-hands exposure, which made the topic interesting. In addition, the lecturer also having difficulty explaining in detail, while student having difficulty in perceiving the information and replicate the information independently. This created big gaps of exposure between lecturer and students, in delivering and perceiving information's [46].

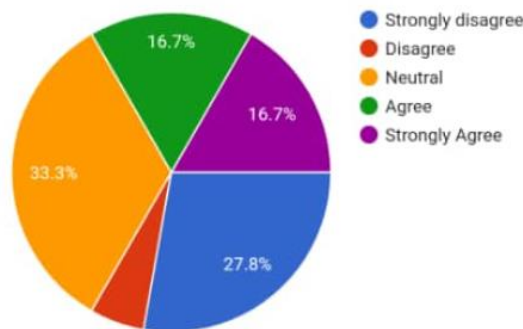


Fig. 2 The online learning system is an effective means to deliver the content of the topics.

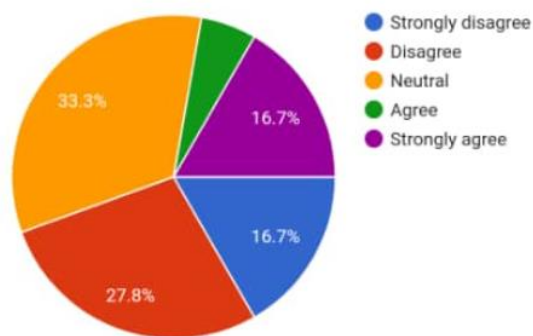


Fig. 3 The online learning system made the topics more interesting.

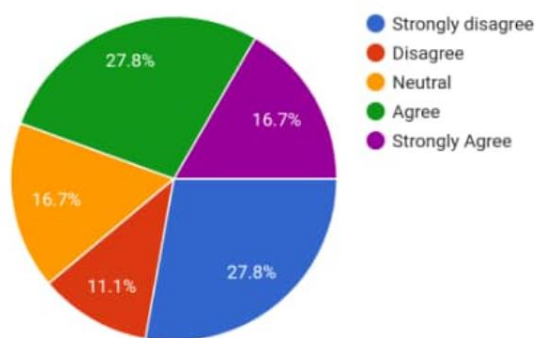


Fig. 4. I am comfortable with online teaching.

Fig. 5 show that 16.7% of the respondent student strongly agreed that the assessments helped they to gain the basic knowledge of the unit effectively, while 27.8% of the respondent student played neutral in their opinions In the meantime 5.6% of the respondent student strongly does not agree that the assessments helped them to gain the basic knowledge of the unit effectively. Fig. 6 show that 27.8% of the respondent student strongly agreed that the online learning made them felt isolated with other students and lecturer, compared to conventional face-to-face instruction, while 27.8% of the respondent student played neutral in their opinions In the meantime 5.6% of the respondent student strongly does not agree that the online learning made me felt isolated with other students and lecturer, compared to conventional face-to-face instruction. Fig. 7 show that 44.5% of the respondent student strongly agreed that the lecturer provided help and available for consultation when they need guidance, while 5.6% of the respondent student played neutral in their opinions In the meantime 5.6% strongly does not agree that the lecturer provided help and available for consultation when they need guidance. Fig. 8 show that 16.7% of the respondent student strongly agreed that they prefer online learning compared to face-to-face lectures and tutorials, while 11.1% of the respondent student played neutral in their opinions In the meantime 38.9% strongly does not agree that they prefer online learning compared to face-to-face lectures and tutorials.

The assessment helps the student evaluate their basic level of knowledge and understanding on the topic that were taught and which they are learned, and how does it affect their understanding on the specific topic [47]. The student was also aware that the lecturer has provided them with most available platforms to reached them if they needed the guidance [31]. However, most of the students still think that the online teaching was very less effective compared to the face-to-face teaching and learning, due to the values they have spent to take the courses. Lack of interaction in the online learning made them feel isolated due to the lack of interface face-to-face interaction.

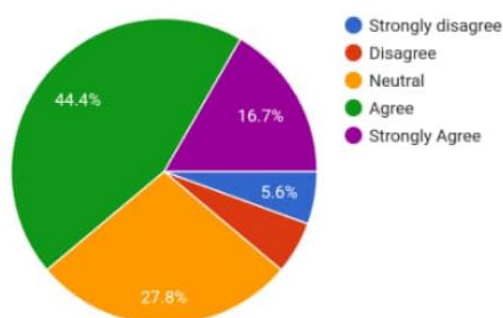


Fig. 5 The assessments helped me to gain the basic knowledge of this unit effectively.

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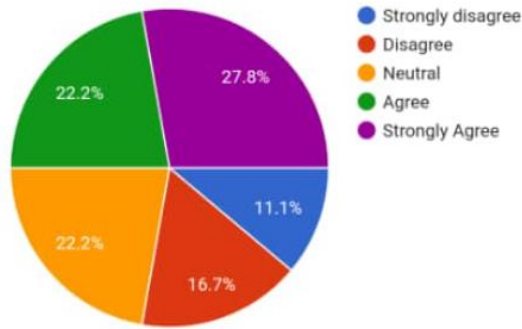


Fig. 6 The online learning made me felt isolated with other students and lecturer, compared to face-to-face instruction.

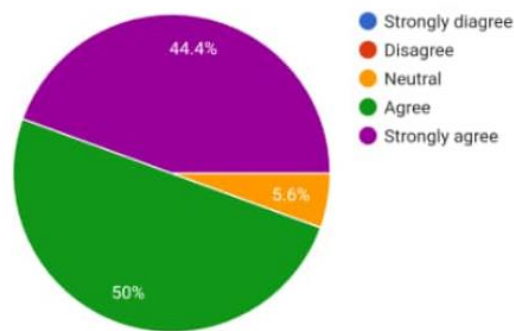


Fig. 7 The lecturer provided help and available for consultation

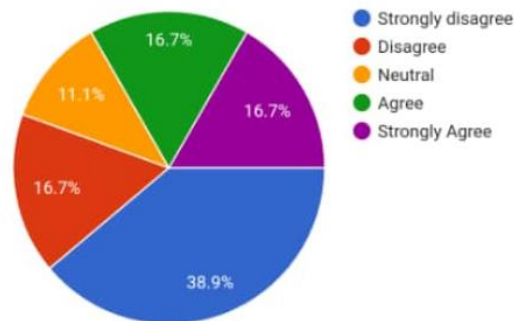


Fig. 8. I prefer online learning compared to face-to-face lectures and tutorials.

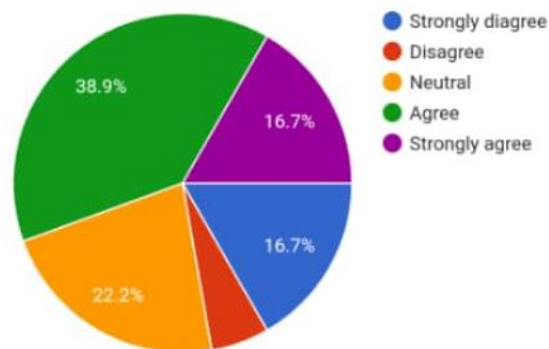


Fig. 9. I had adequate computer skills and facilities for online learning.

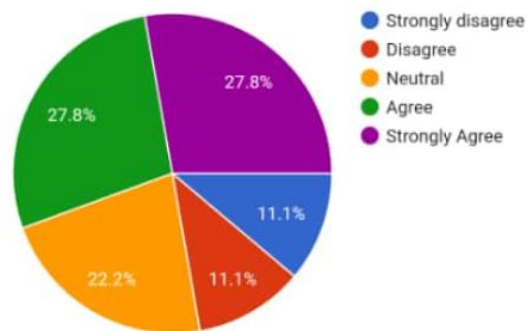


Fig. 10 I do not face any communication problem with my group members throughout the semester.

Fig. 9 show that 16.7% of the respondent student strongly agreed that they had adequate computer skills and facilities for online learning, while 22.2% of the respondent student played neutral in their opinions In the meantime 16.7% s of the respondent student trongly does not agree that they had adequate computer skills and facilities for online learning. Fig. 10 show that 27.8% of the respondent student strongly agreed that they don not face any communication problem with my group members throughout the semester, while 22.2% of the respondent student played neutral in their opinions In the meantime 11.1% of the respondent student strongly does not agree that do not face any communication problem with my group members throughout the semester.

It was noted that most of the students have adequate computer skills and facilities for online learning. It may involve the used of internet, apps, etc. But the range of disagree are worried due to lack of computer skills and facilities for online learning may reduce their efficiency on teaching and learning [19]. However, in terms of communication with a colleague or group member, the lack of face-to-face interaction really bothered them, as they unable to exchange information related to the topic they learned. This has cause increase in stress level between students and lecturers [48]

6. Conclusion

Generally, the survey results revealed that most of the students have negative responses to the implementation of online learning during the pandemic period. Most of the students experienced the quality, effectiveness, interest and comfortability of learning were reduced significantly for online learning even though the lecturer is always available to provide help and guidance. Even the students have adequate computer skills and facilities, but most of the students still felt isolated and faced difficulties in communicating with group members. The main reason is students are still not able to adapt new online teaching and learning environment compared to physical face-to-face previously. Besides, the design component of this unit is difficult to be delivered through virtual platform since it is a complex engineering problem as the students are required to do their own judgement due to the difference in topography, amount of collected wastewater, recycled water demand etc. Moreover, the lecturer also faced difficulties in explaining how to solve complex engineering problems in details, while students also having difficulty in perceiving the information and solved the complex engineering problems independently. However, it is believed that the situation will get better one the students get used to the new online teaching and learning environment.

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