

IMPACT OF COVID-19 PANDEMIC ON TEACHING AND LEARNING: PERCEPTIONS OF CIVIL ENGINEERING STUDENTS TOWARDS THE ONLINE CLASS AND ITS CHALLENGES

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ABSTRACT

The COVID-19 pandemic accelerated the adoption of technology and greatly transformed the way humans communicate. Since the start of the pandemic, the delivery of lectures and workshops shifted from face-to-face to online. However, this shift in the mode of teaching may or may not suit learners. This study was conducted to determine the students' perception of the mode of teaching, their learning experience after attending the online classes throughout the semester, and the major challenges they faced during the classes. The participants were Year 1 students from an AutoCAD workshop, Year 3 students from a Traffic Engineering Course, and Year 4 students from a Highway and Pavement Design course. The results show that prerecorded classes with the addition of live-streaming classes were more preferred in computing classes because students can learn at their own pace, especially when learning the new software. For lecture-based courses, physical classes or a mix of physical and online classes were favored by students because physical classes can be more interactive. There were also challenges encountered by the students during online classes such as poor internet connection and distractions at home. Thus, instructors need to personally communicate with the students to understand their learning preference so that the necessary adjustments can be made to the mode of teaching, particularly with the use of hybrid teaching.

Keywords: *teaching and learning, case study, COVID-19, engineering, higher education, virtual learning, experience-sharing, student experience*

INTRODUCTION

1.1 Impact of COVID-19 Pandemic on the Mode of Communication and Teaching Delivery

The world was affected by the COVID-19 Pandemic in 2020. Due to the unforeseen circumstances, digital technology has been widely adopted and its use expedited in numerous sectors, including education. With the implementation of social

distancing to reduce the spread of the COVID-19 infection, the mode of communication among people shifted from physical gatherings to virtual meetings. This shift has prompted decision-makers to rethink the efficiency and need of frequent physical meetings, since virtual meetings can deliver a similar outcome while saving cost and time (Hilbe et al., 2020; Jiménez-Sánchez et al., 2020).

Similarly, for higher education, most classes

were conducted virtually during the pandemic. For instance, Pravat (2020) pointed out several digital initiatives proposed by University Grants Commission (UGC) and the Ministry of Human Resource Development (MHRD) in India during the COVID-19 pandemic. The initiatives included TV channels, online courses, ebooks platform, the National Digital Library, virtual labs, and other online educational portals. Pravat (2020) also stated that COVID-19 accelerated the adoption of technology in educational institutions as all teachers and students became more technology savvy. Mahler et al. (2021) also discussed the teaching approaches and their challenges in adopting online education in different North American universities during the pandemic. However, for one of the universities, they highlighted that online teaching and learning may not align with their strong focus on field-based learning and community engagement, which may prompt them to go back to in-person teaching or considering a hybrid model of teaching.

1.2 Aim and Objectives of the Study

As COVID-19 slowly recedes, more classes are returning to face-to-face, with considerations of hybrid learning, or slowly implementing its use, due to the great benefits it offers. However, as the preference of each student varies, it is important to assess the effectiveness of various teaching approaches through the students' perspectives.

Therefore, this paper is a case study that aims to assess the effectiveness of each teaching approach through a survey conducted among the students involved. The teaching and survey were carried out at the University of Nottingham Malaysia (UNM), involving three civil engineering subjects, namely an AutoCAD workshop, a Traffic Engineering course, and a Highway and Pavement Design course. The specific objectives are to (a) understand the students' preferred mode of learning for the particular class or course, (b) identify the major challenges students encountered in the class or course, (c) determine the effectiveness of the teaching method employed for the particular class or course, and (d) determine the overall quality or satisfaction of the students pertaining to the class or course.

2. LITERATURE REVIEW

There were several case studies conducted at other universities to assess the effectiveness of

online learning during the COVID-19 pandemic. For example, Lapitan et al. (2021) presented the Discover, Learning, Practice, Collaborate and Assess (DLPCA) strategy for used in an undergraduate Chemistry course that helped their university transition from face-to-face learning to online learning during the pandemic. The synchronous part of teaching was conducted through broadcasting software such as Zoom or Google Meet, whereas the asynchronous part of teaching was achieved using prerecorded lectures on YouTube. In the study, the students' learning experiences and academic performances and the lecturers' observations were recorded and discussed.

Similarly, García-Alberti et al. (2021) presented the learning outcomes, student experiences, feedback, and reflections from the instructor of six civil engineering courses during the pandemic. They concluded that online learning might be beneficial in a few aspects, but face-to-face learning is still essential for students' engagement and motivation.

Kuok et al. (2021) evaluated the students' responses to adopted teaching methods in the water engineering module, such as crossover learning, context-based learning, adaptive teaching, and computational thinking. Most students reflected that after attending online classes their quality of learning, interest, effectiveness, and comfort level were significantly reduced.

Wardhono et al. (2020) conducted descriptive research, targeting 50 civil engineering students who took part in the engineering and structure courses. From the results of the survey, the students perceived that online learning was not effective.

Nonetheless, there were also cases where online learning was highly favored by the students. For instance, Manea et al. (2021) analyzed the advantage of online learning perceived by engineering students from a technical university in Bucharest. The students showed a relative acceptance of the online classes with great satisfaction due to the educational and personal benefits it offered.

From this review of various case studies, it is clear that different students perceived online learning differently and not all students accept this change in mode of teaching and learning. Thus, it is important to conduct a survey among the target students before implementing any change in the mode of class delivery.

3. METHODOLOGY

3.1 Innovative Teaching During COVID-19 Pandemic

Before the COVID-19 pandemic, the delivery of lectures at the UNM was mostly in person; however, teaching and learning technology was also involved. Moodle was used to access learning resources, Kahoot for class engagement, and lectures were recorded with Echo360 (Engage) to aid students in reviewing material.

Since the declaration of the Movement Control Order (MCO) in Malaysia, all teaching activities and assessments at the UNM were shifted to blended learning, which was mostly virtual based. Microsoft Teams was the chosen platform for virtual communication, teaching, and learning. Moodle continued to be used for resource access and Echo360 (Engage) was maintained as the medium to play back online recorded lectures. Meanwhile, all labs were conducted virtually and accessing software for the computing workshops was done through remote desktops or students' personal devices.

The survey for our study was conducted on courses mostly delivered by the same lecturer. The lecturer used Open Broadcaster Software (OBS) to produce interactive and engaging prerecorded videos by integrating various types of teaching and learning materials and swapping different scenes, such as video clips, in the software. Further, Microsoft PowerPoint was used for presentation slides, a webcam to display facial expressions and body language, and visualizer to demonstrate hands-on skills. For live streaming online classes, the lecturer used OBS as a virtual webcam to display a single view with multiple scenes that simultaneously integrated the personal webcam, presentation slides, an internet browser, the software, and the visualizer.

3.2 Selected Courses for Online Survey.

All courses selected for this survey were taught and delivered by the same lecturer. The courses were all online classes, namely AutoCAD 2-dimensional workshop, traffic engineering, and highway and pavement design. Therefore, the teaching experiences, classroom management skills and teaching quality were consistent for all the courses, though there were minor differences in the mode of teaching and the delivery approach.

3.2.1 AutoCAD 2D

AutoCAD 2D workshop is a Year 1 computing workshop where the basic skills of AutoCAD drafting were taught. For the workshop, the students needed to download software from AutoDesk with a student license affiliated with the University of Nottingham Malaysia. Otherwise, the students may access the remote PC via VPN to utilize the software installed on the university's computers. For this course, students were required to submit an A3 technical drawing in PDF and DWG formats as part of their assessments. A total of 16 hours of workshop were scheduled into 4 sessions. Students watched the pre-recorded video lasting five hours that was produced with Open Broadcaster Software (OBS), followed by live supported clinics. A visualizer, document scanner, and digital drawing board were used as the teaching tools with a webcam switched on.

3.2.2 Traffic Engineering

Traffic Engineering is a 36-hour course with lectures and examples in class that is offered to Year 3 students and covers the fundamentals of traffic parameters, traffic studies, and intersection design. In the 100% final course mark, 20% was from Coursework 1, another 20% was from Coursework 2, 30% from a multiple-choice question (MCQ) test, and the last 30% from a time-based test. Coursework 1 was a presentation on traffic studies and Coursework 2 required students to download an intersection modelling software, SIDRA Intersection. The MCQ test was done through the Microsoft Teams platform and the time-based test through the university's learning platform, Moodle. There was a combination of lecture delivery adopted for this course, starting from hybrid teaching for the first two lectures, webcam viewers for the third and fourth lecture, and OBS for the remaining lectures. Hybrid teaching was done with several students attending the physical class and others simultaneously attending virtually. The software demonstration for Coursework 2 was also done by live streaming to provide students with the opportunity to ask questions. In all the classes, a visualizer, document scanner, and digital drawing board were also used as the teaching tools with a webcam switched on.

3.2.3 Highway and Pavement Design

The syllabus of the Year 4 Highway and Pavement Design course encompasses the

knowledge of geometric design for highway, pavement structural designs, and knowledge of pavement surfaces for different functions. This is a 33-hour lecture with example classes, and 6-hour were allocated for students' design project presentation on highway geometric (horizontal and vertical alignments). The assessment of the course was comprised of 60% a time-based exam, 20% for the first coursework, and another 20% for the second coursework. Similarly, there was a combination of lecture delivery for this course, involving hybrid teaching, webcam viewers, and OBS. Apart from live streaming classes, there was also a prerecorded four-hour video using OBS for the topic of Marshall Mix Design. The time-based exam was done through the Moodle platform. For the coursework submission, students were required to work in teams and produce engineering designs. The first coursework was marked through a presentation of their engineering design and the second coursework was based on their pavement design submitted in the PDF format. Similarly, a visualizer, document scanner, and digital drawing board were used as the teaching tools with a webcam switched on in the online classes.

3.3 Targeted Respondents

The target respondents for the survey were the students involved in these three courses. For the AutoCAD 2D workshop, there were two sessions of workshops for two different batches of Year 1 students. Year 1 students mostly are admitted with foundation studies and A-level qualifications. They were in physical class for only for few weeks and were later switched to online learning due to the restriction of the Movement Control Order (MCO) in Malaysia. The first session was attended by 29 students and the second session by 24 students. The content and conduct of each session was the same with the only difference being the time the class was conducted. The students opted for the session that suited their timetable but they were subject to availability due to a quota for each session.

For the Traffic Engineering course, there was only one session for this course that the 50 registered students attended at the same time. Each lecture was three hours long, with a total span of twelve weeks, which fulfilled the credit hours allocated for this course. Lastly, for the Highway and Pavement Design course, there were 19 students

in this course and all of them attended class at the same time since there was only one class time available. Similar to the Traffic Engineering course, each class was three hours long over a span of twelve weeks.

The Year 3 and Year 4 students were new to online learning as previously all their classes were conducted physically before the announcement of the MCO, when all learning switched to online learning.

3.4 Questionnaire Design

An online questionnaire was designed with questions revolving around the preference of the students on the mode of teaching and was conducted at the last class after the completion of their respective courses. The students were also asked about the challenges they encountered during the online class for the course or the workshop. At the end of the questionnaire, students were encouraged to provide general comments on the workshop or the course and give constructive feedback for further improvements for future courses and workshops. Table 1 summarizes all the questions asked in the online survey form.

3.5 Measures and Purpose of the Questionnaire

Question 2 helped to determine the mode of teaching and learning preferred by the students for their respective workshop or course. It was important for students to understand the mode of learning that suited them the most. This also helped the course convenor to adjust the class delivery to suit the target audience.

Question 3 helped to identify the challenges encountered by the students during online learning. As different students were subjected to different learning circumstances and environments, it was important for the lecturers to understand the difficulties faced by the students before deciding the most suitable method of teaching the course.

Question 4 encompassed 17 statements for students to Agree or Disagree with. All the statements were the assumptions or expectations of the course convenor (lecturer), but students may not agree with them. Hence, this question helped the course convenor understand the students more instead of making assumptions on the students' acceptance on the mode of teaching, the teaching style adopted, and the performance of the teacher.

Questions 5 and 6 provided opportunities for

Table 1.
Summary of the Questions Included in the Online Survey Form

No.	Question	Options for Answer
1	Please select your workshop or course	<p>CIVE 1012 Portfolio of Civil Engineering—AutoCAD workshop CIVE 3045 Traffic Engineering CIVE 4072 Highway and Pavement Design</p>
2	Your preference of learning method for this workshop or course	<p>Face-to-face class (attend physical lecture and tutorial class) Live-streaming online course including virtual labs, remote lab, video conferencing group discussion, computing demonstration class, example class, etc. Self-learning via prerecorded video Mixed mode of online class (combination of live-streaming class and prerecorded video) Hybrid class (combination of face-to-face and online classes)</p>
3	Major challenges encountered during the class (choose more than one)	<p>The class is not feasible for online learning The internet speed is slow and not stable Disturbance or distraction at home/hostel Time difference Workload is high Ineffective communication among group members Personal computer and laptop unable to support the online learning Lecturer unable to organize and deliver the online class effectively No internet or Wi-Fi services</p>
4	A list of 17 statement on the teaching and assessment for students to Agree or Disagree	<p>Online class is more effective than traditional physical class. Self-learning via prerecorded video is more effective than live-streaming lecture. Student learning time for online class is longer than face-to-face class. Online class is more flexible and less stressful than face-to-face class. Interaction between the lecturer and students in live-streaming class is good. Lecturer/Facilitator was effective in inspiring students to learn and grow as Civil Engineers. Lecturer/Facilitator was able to retain my study interest. Lecturer/Facilitator was prepared for the class. Lecturer/Facilitator was approachable after the online class. Teaching methods were effective and appropriate. Assessment methods were fair and appropriate. The setting and the live streaming class were impressive and attentive. The use of the visualizer/document scanner was effective in knowledge sharing and visualization of objects. The use of the digital drawing board or monitor was effective to highlight the key points. The presentation slides were well organized and easy to understand. The video recorded was of quality and very helpful for revision. Lecturer/Facilitator with webcam switched on was able to engage and interact with students more effectively.</p>
5	General comments for the class	<p>Students are free to answer anything. The answers were analyzed using Word Cloud Analysis.</p>
6	Constructive feedbacks for improvements	<p>Students are free to answer anything. The answers were analyzed using Word Cloud Analysis.</p>
7	Overall, Would You Recommend This Workshop Or Course To Your Juniors?	<p>Yes No Maybe</p>

students to comment on the class and provide constructive feedback for the course convenor to improve in the future. Word Cloud Analysis was used to identify the common comments given by the majority of the students.

At the end, the students were asked about their willingness to recommend the workshop or course to their juniors based on the teaching style and the mode of teaching they experienced. This question can help to determine if the students are genuinely satisfied with the learning outcome.

4. RESULTS AND DISCUSSION

4.1 Mode of Teaching Preferred by Students

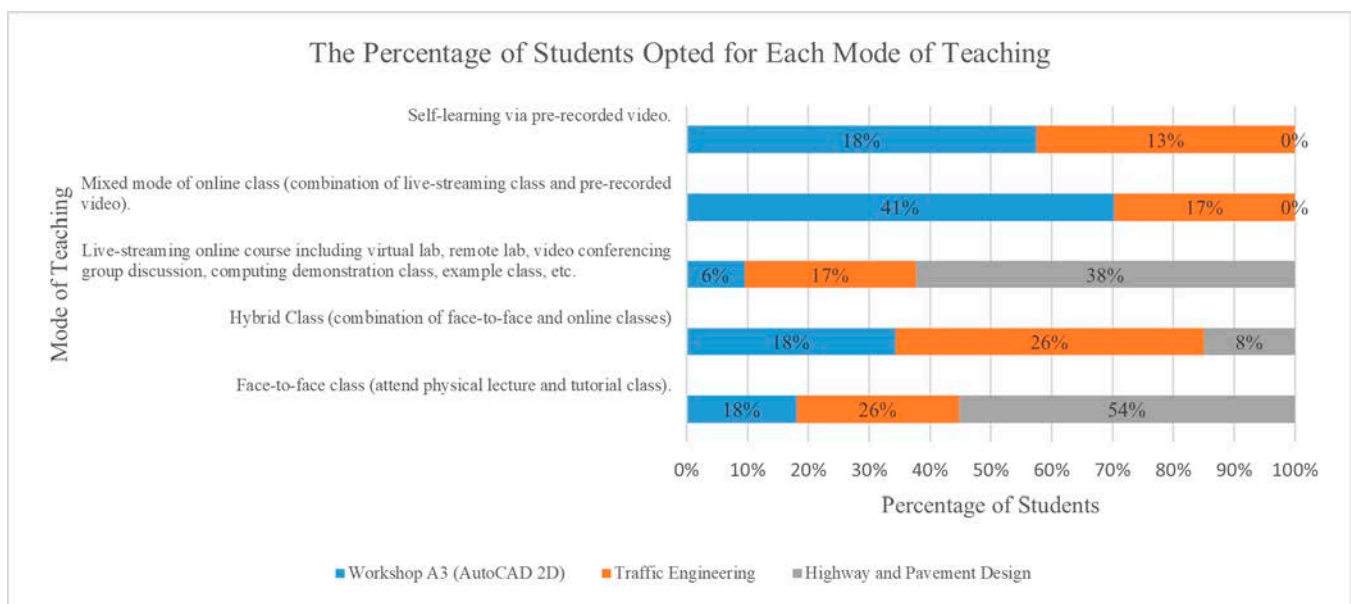
Figure 1 shows the mode of teaching preferred by the students from each class.

or the AutoCAD 2D workshop, 41% of the students, which was most of the class, preferred the Mixed Mode of Online Class. This is followed by the preference for Self-learning through Pre-recorded Video and then Hybrid Class and Face-to-Face Class, with 18% of students favoring each. Lastly, Live-streaming Online Course was the least preferred by the student in the AutoCAD 2D class at 6%. These results show that more students preferred the combination of live-streaming (online supporting clinic) and pre-recorded classes for this workshop. Because AutoCAD workshop is a computing workshop, it might have been difficult for students to

keep up with the lecturers' pace as they were not used to the new software. With pre-recorded video, they were able to follow at their own pace because they could pause the video whenever they wanted. In addition to the live-streaming (online supporting clinic) session, they can use the opportunity to ask questions for more clarification and to clear up any doubts they have during their own practice. When learning a new software, students would request more hands-on activities instead of watching and listening to the lecturers' demonstration. Learning at their own pace would be important for the students to fully master the software. This can also explain why using live streaming solely for the AutoCAD 2D workshop was the least preferred based on the result.

Whereas for the students from Traffic Engineering, Hybrid Class and Face-to-Face Class were the most preferred, with 26% for each. On the other hand, Mixed Mode of Online Class and Live-streaming Online Course were chosen by 17% of the students each. Finally, Self-learning through Pre-recorded Video was least preferred by the students in the Traffic Engineering Course. As Traffic Engineering has more lectures, students would favor Face-to-Face classes or at least a mix of Face-to-Face Classes and Online Classes. This is because physical classes encourage more interaction

Figure 1.
The Percentage of Students Who Opted for Each Mode of Teaching



between the lecturer and the students, and it is easier to ask questions directly of the lecturer when there are any doubts about the engineering concepts. With more interactions, students would be able to absorb the knowledge taught in class and therefore increases their enthusiasm in learning, as compared to sitting in front of the computer for three hours with the microphone and camera off.

For the Highway and Pavement Design Course, more than half of the class preferred Face-to-Face Class, 38% opted for Live-streaming Online Course, and 8% of the class preferred Hybrid Class. No student opted for Self-Learning through Pre-recorded Video and Mixed Mode of Online Class. Similar to the Traffic Engineering course, the majority of the students preferred face-to-face classes as this course was more lecture based. Students need more interaction when it comes to learning the topic and enhancing their understanding of it.

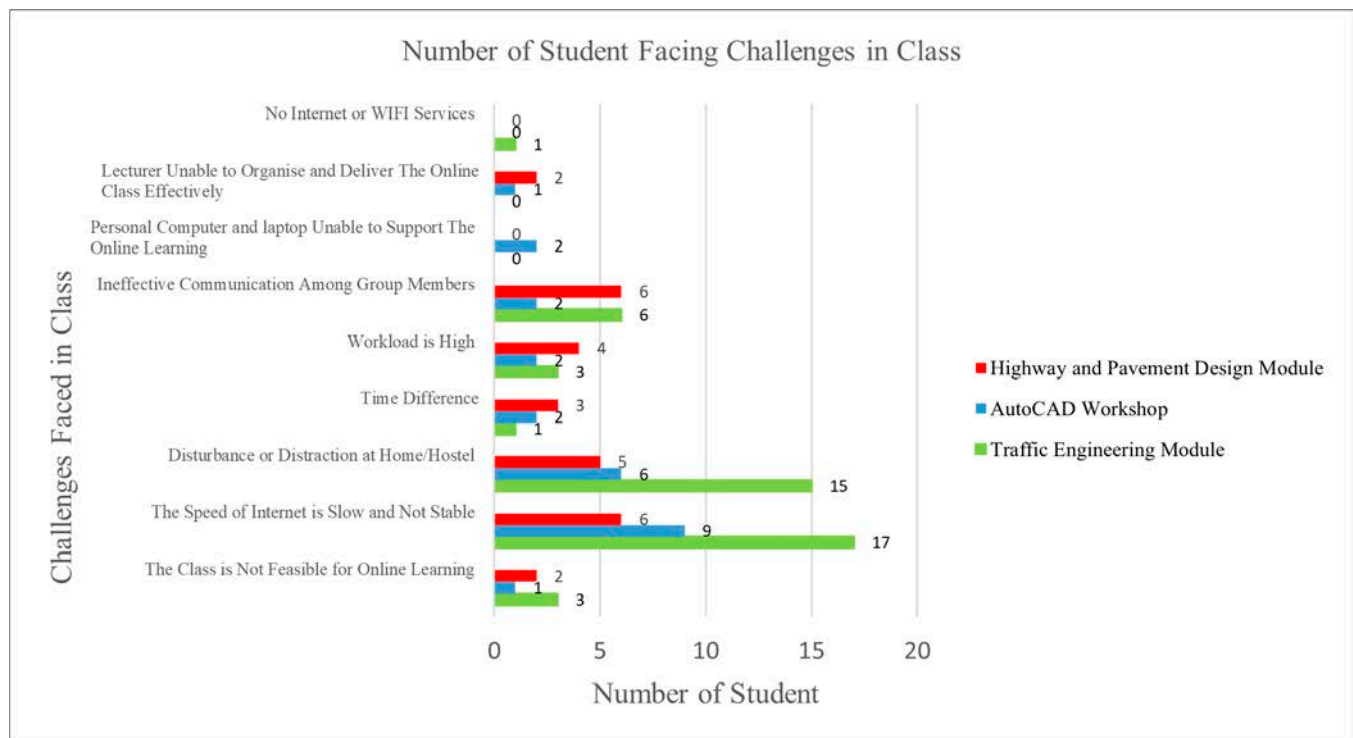
As a summary, pre-recorded video is preferred in the context of software-learning and face-to-face classes were more favored by students who wanted more interaction. However, the result was not clear cut in that 100% of the students did not opt for one mode of teaching and disliked the others. This

indicates that each student has a different mode of learning, and thus lecturers should consider integrating the benefits from all modes of teachings to suit each student's mode of learning. In addition to that, the result was also subjected to the circumstances the batch of students had experienced. For instance, the Highway and Pavement Design workshop was attended by the Year 4 Students, who had attended more than three years of physical, face-to-face classes. Hence, they might have adopted their learning style so that it helped them to excel in physical tests and classes. Thus, physical classes, or at least hybrid classes, would be most favorable to them. On the contrary, the AutoCAD 2D workshop was attended by the first-year Civil Engineering students, who had only attended less than a year of physical classes. They would be inclined to online learning and self-learning as they might have more easily adapted to this new learning style.

4.2 Challenges Faced by the Students in Online Learning

Figure 2 shows the number of students facing each challenge for each class. From the result, the major challenges faced by the students were the unstable internet speed and disturbance or distraction

Figure 2.
The Number of Student Facing the Challenges in Class



at home. Despite that, some students faced difficulties in communicating with their group members and some found that the workload for the workshop or course was high. As the class consisted of international students, there were also challenges on the time difference because some classes were too early for the international students even though they were conducted in the afternoon locally. A minority of students pointed out the inefficiency of the teaching delivery and two students from the AutoCAD 2D workshop reflected that their personal computer may not be able to support their online learning. Lastly, only one student faced problems with having no internet services. Figures 3, 4, and 5 show the percentage of students in their respective class facing each challenge.

The internet speed in Malaysia is indeed slower than in other countries in the Southeast Asian Region, according to Ng (2020). Also, Malaysia's 4G network can be accessed by 74.88% of the population but the speed was capped at 14.83 Mbps, in contrast to Singapore's internet speed of 44.31 Mbps. This also explains why most students were facing the issue of poor internet connection during the online class.

Despite that, as different students studied in different environments, it is predictable that students might face distractions or disruptions at

home. Since students are from different family backgrounds and have different responsibilities, they might not be able to distance themselves from household chores, errands, and other tasks they may be asked to do. Also, without direct supervision, they may be distracted by social media, games, or conversations outside of the class since it was not compulsory to have their video and microphone switched on during the class.

The results also show that students were having difficulties communicating to their groupmates for the assigned coursework. This is understandable because, as online students, they could only communicate through calls or text messages each time they faced difficulties. Multiple online meetings were also needed to ensure everyone was on the same page. Nevertheless, students would still prefer to sit in groups when doing their coursework as it is easier to communicate when problems arise.

Despite that, there were also some other challenges faced by a minority of the students, such as the incompatibility of their personal device to run their software, a conflict with the lecturers' style of teaching, being unable to cope with the workload, and so on. For these students, the lecturer can personally communicate with them to resolve the issues.

Figure 3.
The Percentage of Students Facing the Challenges in AutoCAD 2D Workshop

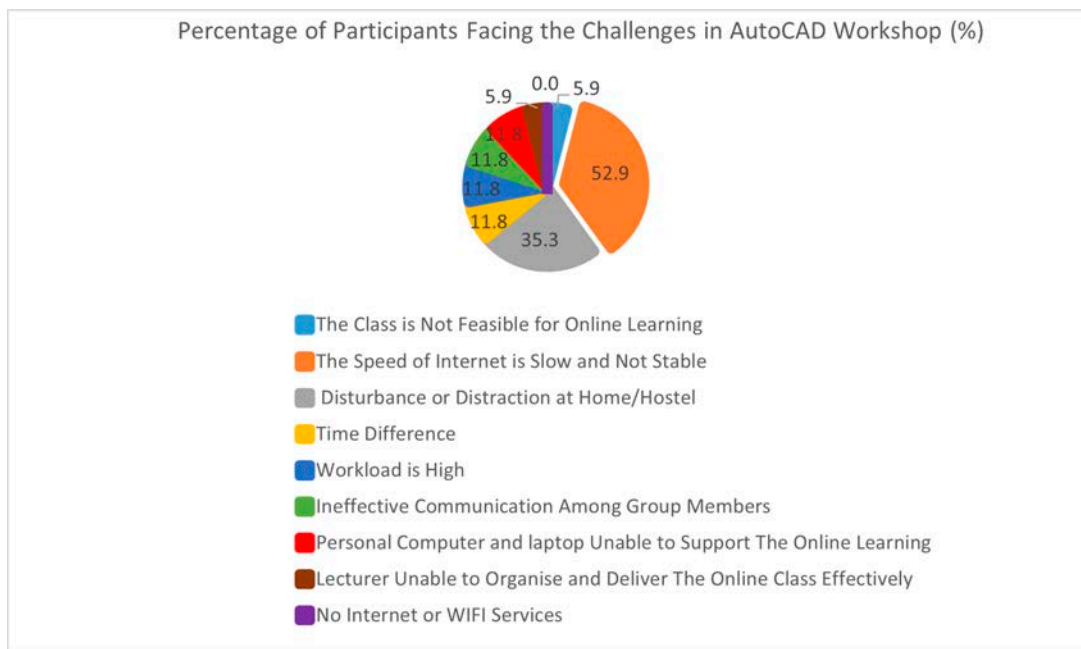


Figure 4.
The Percentage of Students Facing the Challenges in Traffic Engineering Course

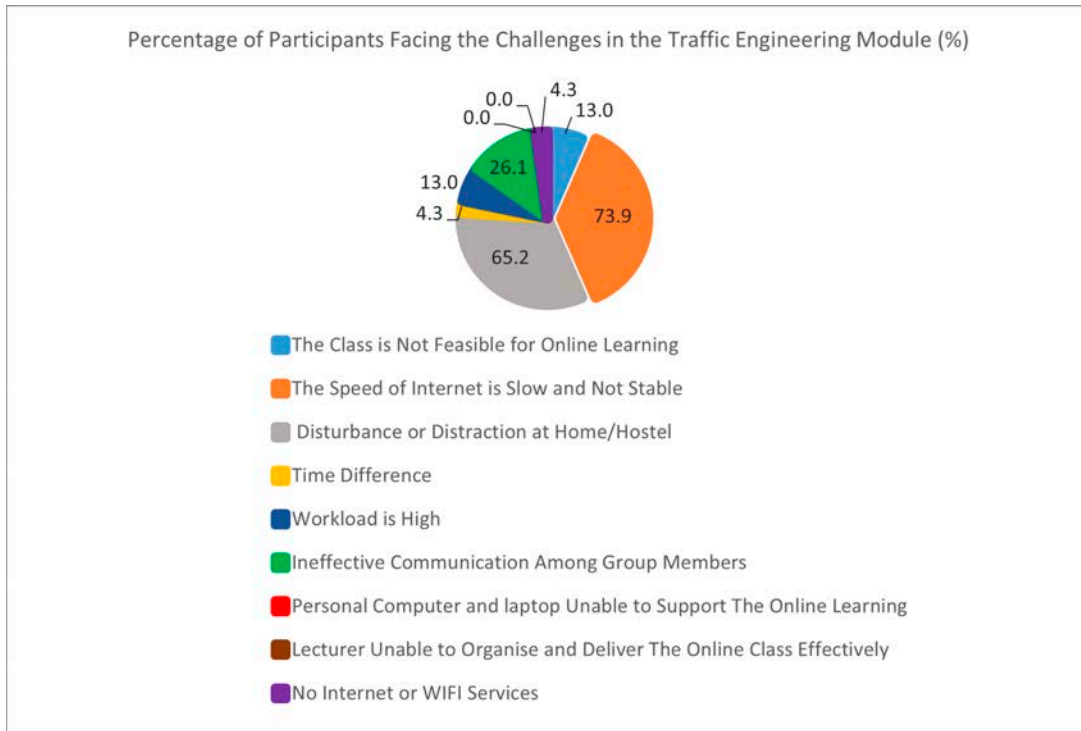
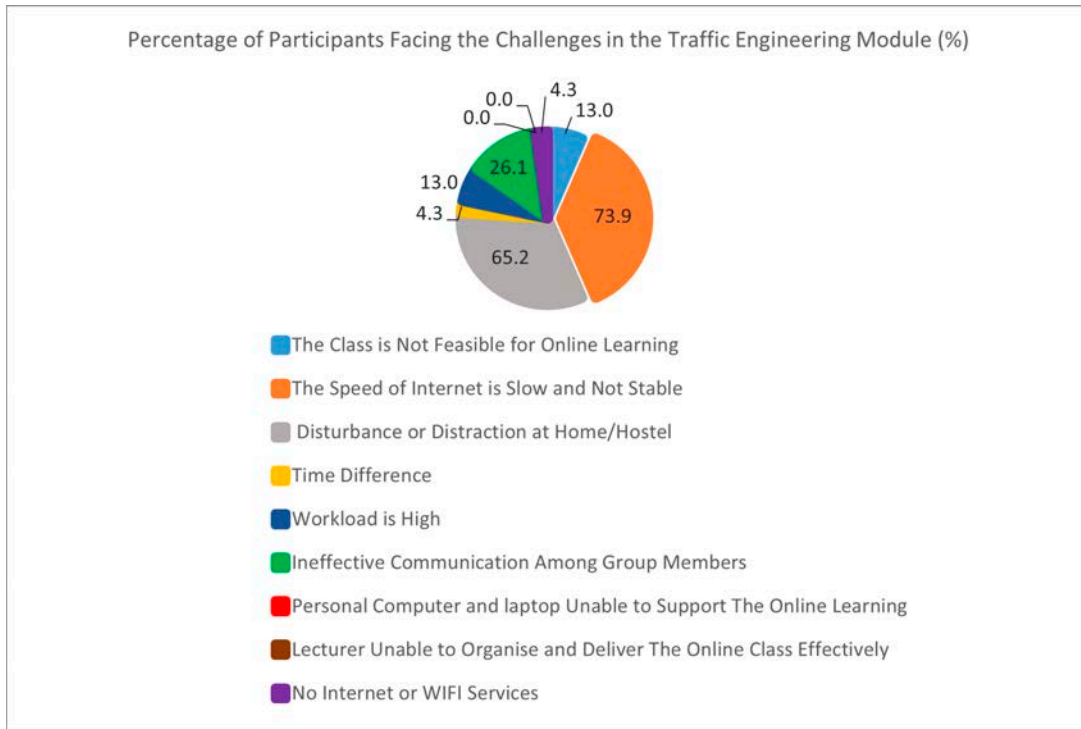


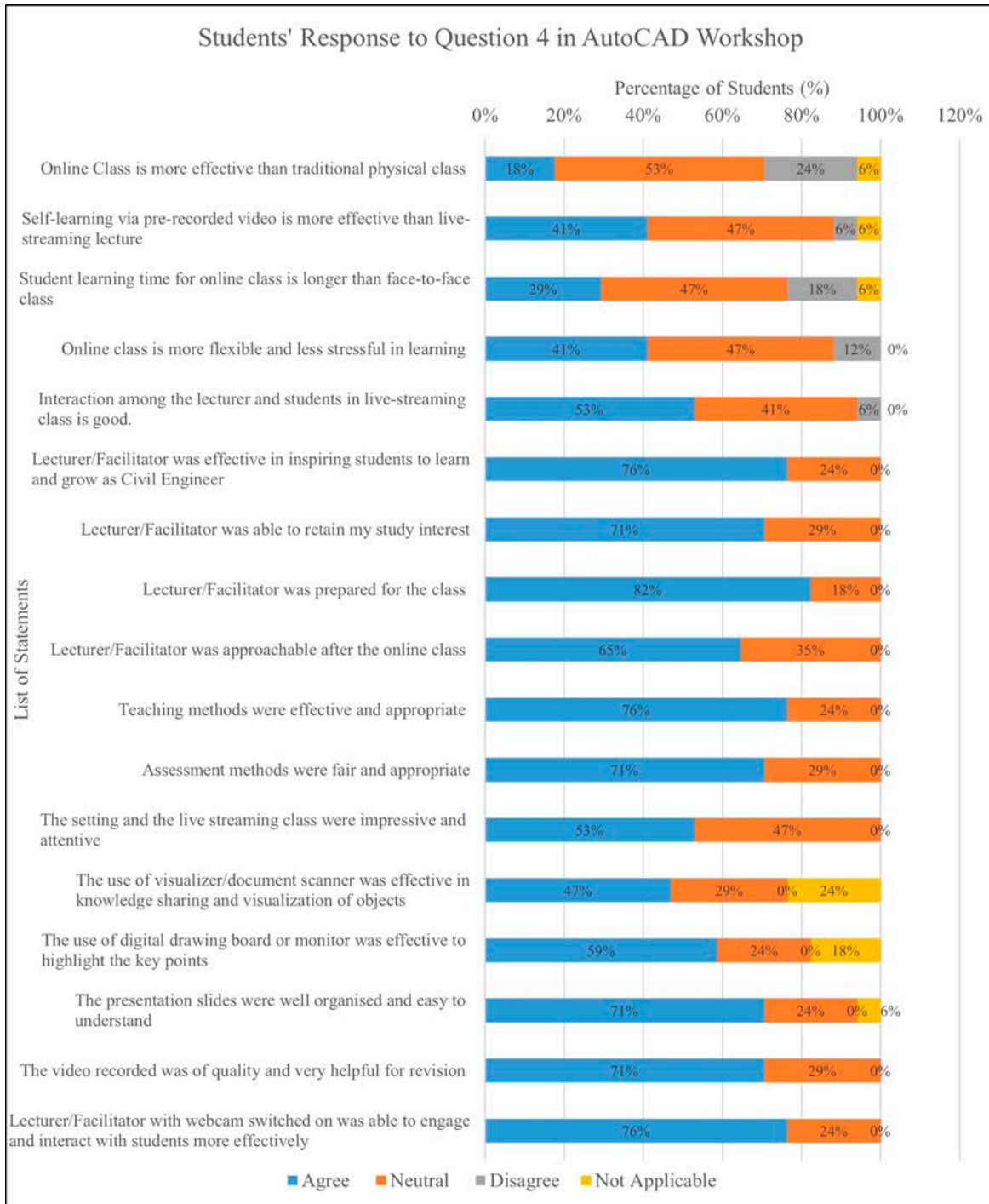
Figure 5.
The Percentage of Students Facing the Challenges in Highway and Pavement Design Course



In summary, face-to-face classes might seem to be less advantageous in terms of addressing problems such as poor internet connection, distraction at home, and difficulty in communicating online at this stage. However, these challenges are also unavoidable in physical classes, and the new

students' preference for them may change when the technology and the internet connection improve. Therefore, it is best if the lecturer can communicate with a new group of students about their learning preference to make the best arrangement for future classes.

Figure 6.
Students' Response for Question 4 in AutoCAD 2D Workshop



4.3 Students' Responses to Question 4, the List of Statements

Figures 6, 7, and 8 show the students' responses to Question 4, the list of 17 statements, for AutoCAD

2D workshop, Traffic Engineering and Highway, and Pavement Design, respectively.

From the survey, most of the students agreed or were neutral in their response to the list of statements

Figure 7.
Students' Response for Question 4 in Traffic Engineering Course

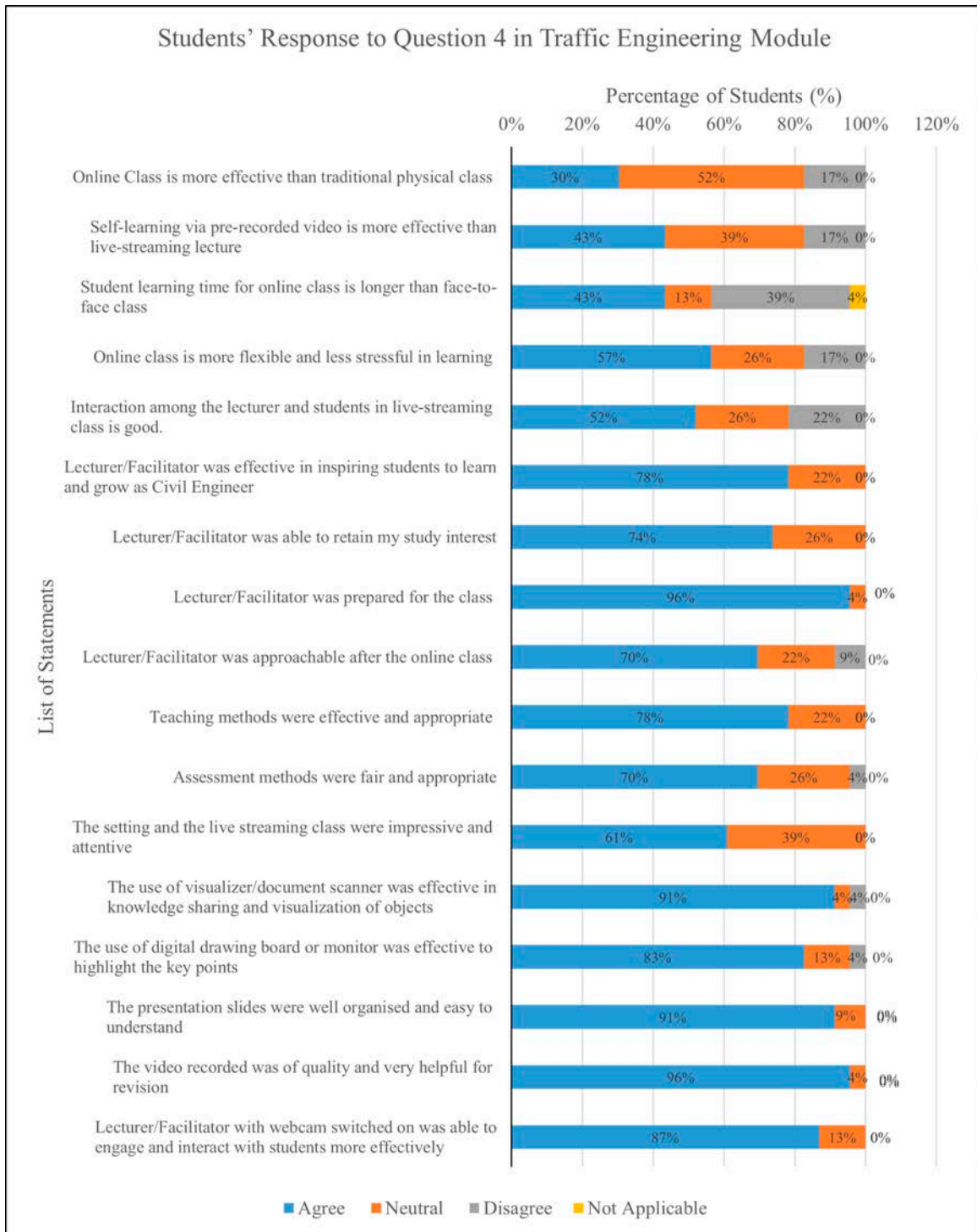
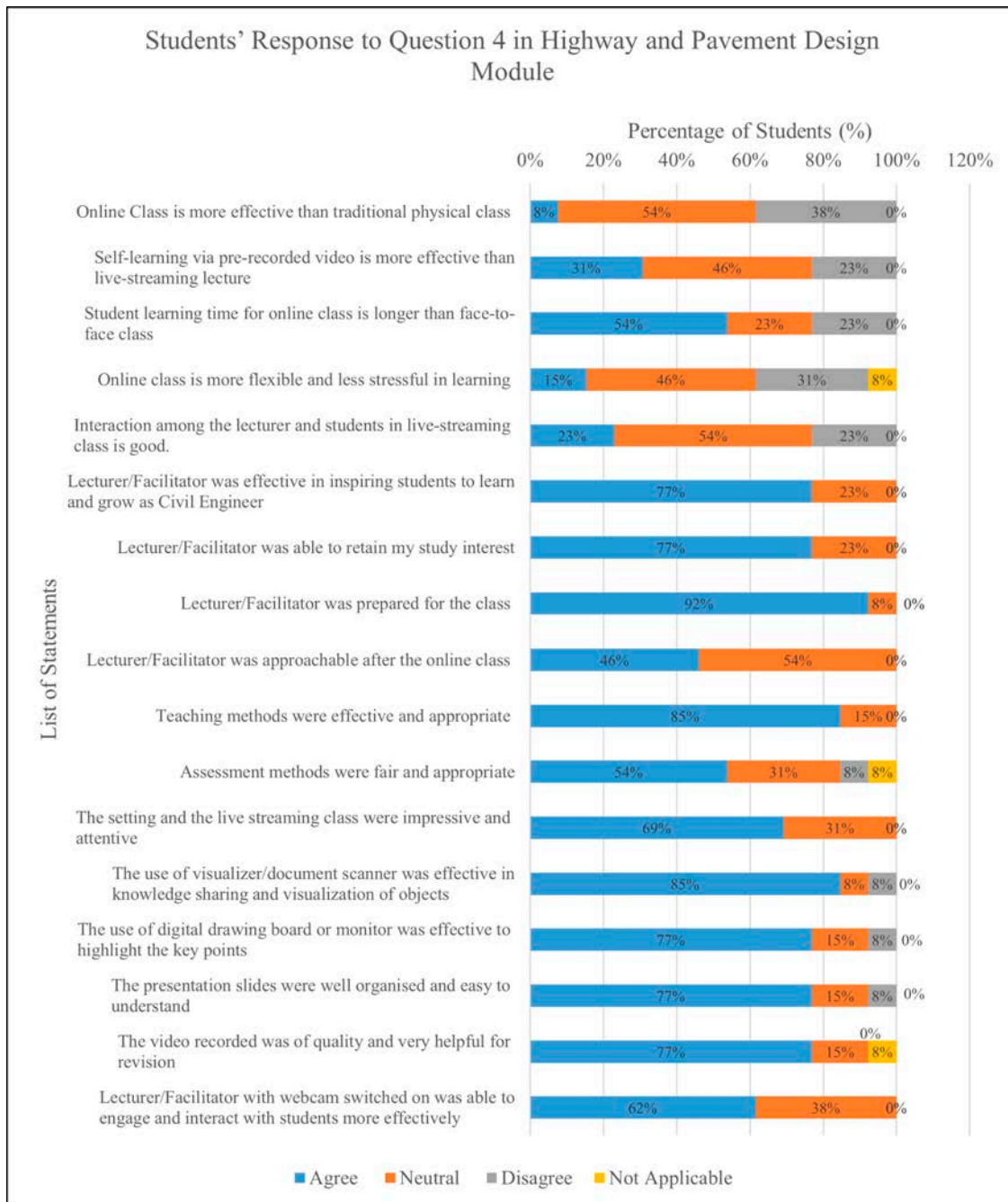


Figure 8.
Students' Response for Question 4 in Highway and Pavement Design Course



provided. Agreeing with the statement shows that the lecturers' assumption was correct and being neutral shows that the students do not agree to the statement entirely but not enough to disagree with it. Neutrality is still an affective state as having no strong reaction is still a type of felt experience (Gasper, 2018).

For this study, we focused on and discussed only

statements related to online learning, with students' agreeing less than 60%, which are:

- Online class is more effective than traditional physical classes.
- Self-learning through prerecorded video is more effective than live streaming lecture.
- Students' learning time for online class is

longer than for face-to-face class.

- Online class is more flexible and less stressful for learning.
- Lecturer and students' interaction in the live-streaming class was good.

From the results, the majority of the students stayed neutral or disagreed that online learning is more effective than traditional, physical classes. This might be due to the various challenges they faced as mentioned in the previous section and the fact that physical classes are not replaceable in terms of learning enhancement. As this was an engineering course, most students did not strongly agree that self-learning through prerecorded video is more effective than live-streaming lectures. When comparing both modes of teaching, live streaming offers the opportunity for students to ask questions immediately in the class, and more students can benefit from the answers to the questions raised.

The majority of the students also were neutral or disagreed that the learning time for online class

is longer than for face-to-face class. The learning time for both modes of teaching might be the same as students might need the same time to digest the new engineering concepts or pick up new software, which is dependent on the students' learning capability. Similarly, when a subject is difficult and requires more time to understand, online classes would not be more flexible or less stressful compared to physical class, as reflected in the results. Lastly, most students were neutral on the statement that the interaction between the lecturer and the students was good. Students did not show a strong disagreement or agreement on this as they might understand that given limited resource and restriction on the online platform, the lecturer tried their best to interact with the students, even though it might not be as good an interaction as in physical classes.

4.4 Students' Comments on the Online Class

Figure 9 shows the Word Cloud Analysis we did based on the comments of the students. From the analysis, most of the students commented

Figure 9.
Students' Comment for the Workshop Analyzed Using Word Cloud Analysis

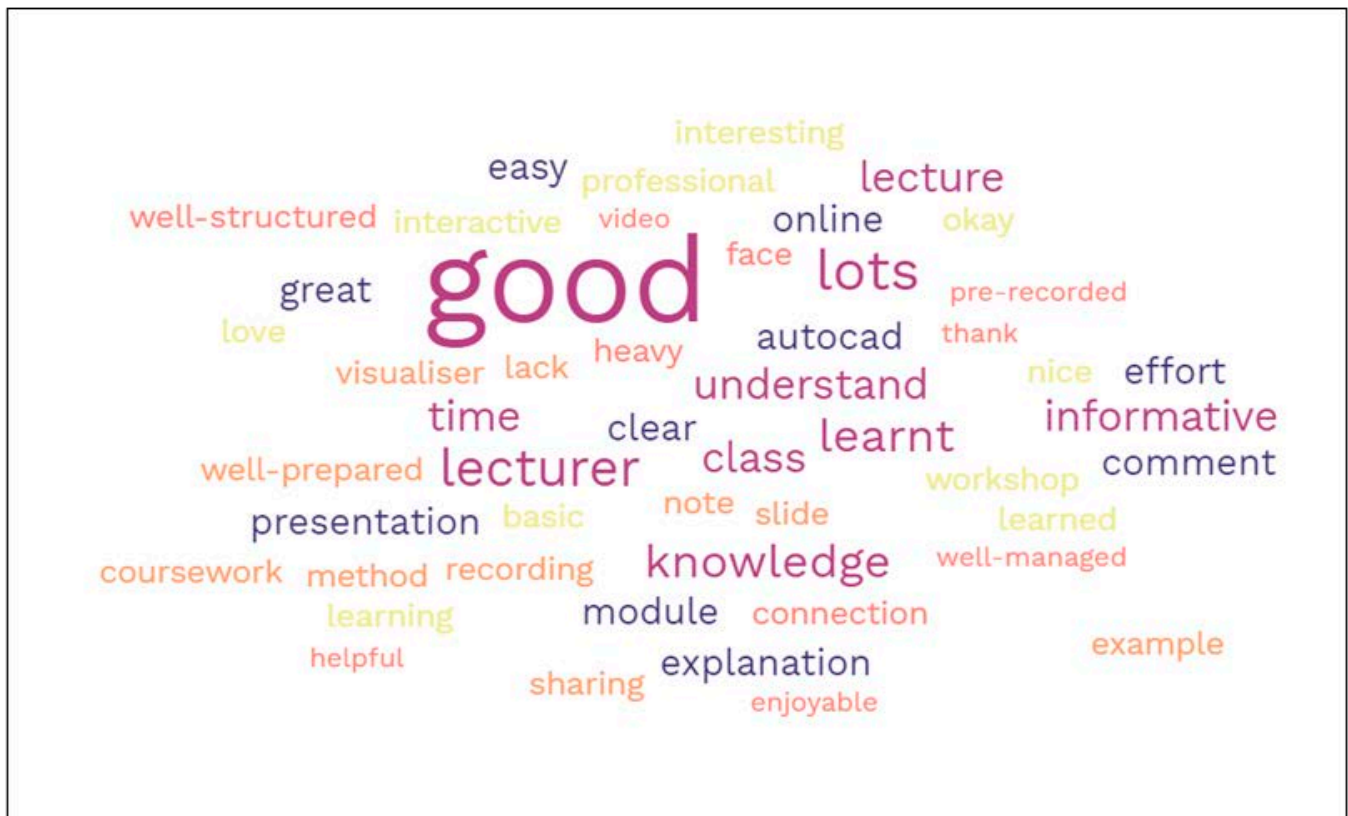


Figure 10.
Students' Suggestion for Improving the Workshop Analyzed Using Word Cloud Analysis



“Good” for this section. Many reflected that the classes were well-prepared, informative, impressive, easy to understand, and that they learned a lot from there. Many positive comments were given by the majority of the students as shown in the analysis. A lot of them also thanked the lecturer for being willing to make the effort of using additional digital tools such as the visualizer and OBS and for implementing various styles of presentation. However, some also commented that the screen resolution when doing screen-sharing was low and blurry and therefore the lecturer would need to adjust that.

4.5 Students' Constructive Feedback on the Online Classes

Students gave some constructive feedback that we analyzed using Word Cloud Analysis and is shown in Figure 10. From the analysis, most students mentioned that the classes were good enough and therefore had no other feedback for improvement. There was also some other feedback related to online learning, such as to:

- consider the Macbook user;

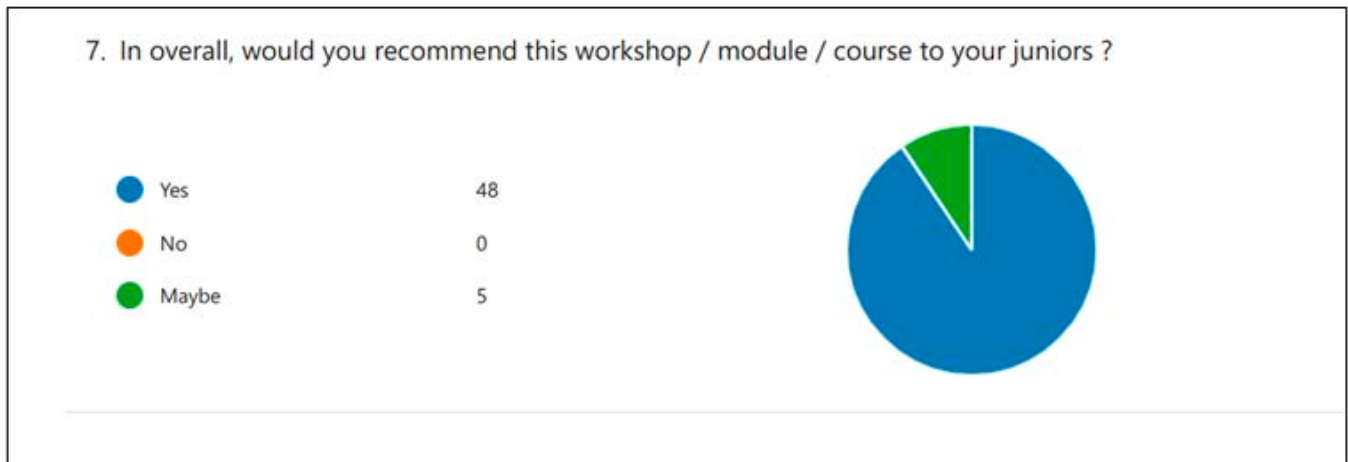
- improve screen-sharing quality on Microsoft Teams;
- incorporate more software tutorial in the prerecorded video;
- include more physical classes;
- include more hands-on practical session on SIDRA intersection;
- implement a stricter mode of assessment; and
- reduce the class duration.

With these comments, the course convenor can make necessary adjustments to improve the current mode of teaching.

4.6 Willingness of Students to Recommend the Workshop

From the result, most of the students were willing to recommend the workshop or course to their juniors. This shows that the students were satisfied with the course overall and the mode of teaching did not cause a major problem to their learning experience. Hence, the online classes were still considered successful overall despite the need for some minor improvements to be made.

Figure 11.
Students' Willingness to Recommend the Workshop or Course to Juniors



5. CONCLUSION

In conclusion, the students were satisfied with the mode of teaching but they still longed for physical classes because there are elements in the face-to-face class that online classes cannot replace. The use of OBS in enhancing the online class was evidenced by the students' feedback, which was very encouraging. For the computing classes, prerecorded classes with the addition of live-streaming classes were more preferred since students can follow at their own pace when learning the new software. Teaching through live streaming allows students to ask questions while prerecordings help students learn at their own pace. For the lecture-based course, physical classes or a mix of physical and online classes were more favored by the students as physical classes can be more interactive. For future improvement, course convenors can adjust the delivery of the class for different target audiences. For instance, lecturers can use mixed modes of teaching to enhance delivery while trying to reach every student. Also, lecturers can communicate to the students personally whenever issues arise. The major challenges for students in online learning were poor internet connection and distractions in their respective learning environments. Thus, these students might opt for physical classes so they can learn in a better environment. From this study, we observed that classes can be conducted with hybrid and mixed modes, but it is important to have the teacher there as either a "guide on the side" or "sage on the stage."

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