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Open and Distance Learning (ODL): Preference and Perception of Students Towards Live Lecture and Pre-Recorded Video Lecture

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ABSTRACT

The outbreak of COVID-19 has forced many countries to close their educational institutions temporarily. It has transformed the educational system into adopting online-based learning. There are many challenges faced by students in online-based learning, such as slow internet connection and inconvenient learning environments. This has led to various online-based learning methods to address students' needs. This paper investigates the most preferred method among students and their perceptions.

An improvement in the learning level of students was investigated based on their perceptions. An online self-administered questionnaire was disseminated to students from three campuses of UiTM Sarawak (Samarahan, Samarahan 2, and Mukah). Data obtained from a sample of 1199 students was analyzed using descriptive statistics to measure students' perception of the method that they preferred. The results show that the mixed delivery method was the most preferred method among students for online learning, which accounted for 63.9%. This was followed by 28.7% of the students who preferred pre-recorded video lecture because it is more flexible and the remaining 7.4% of the students preferred live lecture because of the higher level of interactions and greater ability to concentrate. Live lecture and pre-recorded video were found to suit each other depending on students' time. These findings are beneficial to the learning institutions in providing better services to students through open and distance learning.

Keywords: *Online Learning; Open and Distance Learning; Live Lecture; Pre-recorded Video Lecture; Education System*

INTRODUCTION

Online learning has been globally recognized as one of the mechanisms in delivering teaching and learning. The concepts of online learning and their viability as an alternative to traditional face-to-face delivery (F2F) methods have been discussed constantly for more than 20 years. However, due to the recent COVID-19 pandemic, physical classroom teaching in schools, colleges, universities, and other educational institutions was not feasible, making online learning no longer an option but a necessity (Dhawan, 2020). Along with other countries, Malaysia has also embarked on this online learning journey to ensure that there is no interference in the education momentum.

Online learning is identified as a process that happens in a virtual classroom setting where both teachers and students interact (Amiti, 2020). Furthermore, online e-learning is generally described as experiencing learning using various electronic devices (e.g., computers, laptops, and smartphones) with internet access in synchronous or asynchronous learning environments (Zalat et al., 2021). Similarly, e-learning is defined as how

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teaching and learning are conducted using communication technology (Xie et al., 2018). In these environments, students can independently learn and interact with instructors and other students without the constraint of venue (Singh & Thurman, 2019).

Online learning can be categorized into either synchronous, asynchronous, or a mix of both environments. In a synchronous learning environment, instructors and students meet online on a specific platform to teach and learn a lesson (Amiti, 2020). It provides real-time communication, which can be cooperative in nature when incorporating exercises (Salmon, 2013). Such an environment enables live lecture to be conducted, where discussions and question-answer sessions that mimic the F2F scenario are held. Hence, it stimulates the genuine interaction between instructors and students regardless of being online.

On the other hand, in an asynchronous learning environment, students are provided with readily available materials in the form of audio or video lecture, handouts, articles, and PowerPoint presentations that are accessible anytime, anywhere (Perveen, 2016). While the pre-recorded audio or video lecture represent instructors in delivering lessons, informative handouts and articles help students learn better. Contrary to synchronous learning, asynchronous learning is not restricted to any time frame and is, therefore, more flexible. Furthermore, one can later respond to any given materials or assignments through respective platforms or Learning Management Systems (LMS). When both synchronous and asynchronous learning are applied within the classroom, it is known as the mixed delivery learning approach. This approach integrates the pedagogy of both learning environments and offers students a diverse learning experience which may escalate their interest in knowledge attainment.

However, these online learning environments come with their own challenges. In online education, appropriate tools or devices are vital in achieving the purpose of learning. Without proper application, the process of teaching and learning becomes inadequate. For the synchronous learning environment, for instance, the effectiveness of teaching delivery depends heavily on the quality of the internet connection.

There are many internet packages available for subscription for daily use. However, not all internet access types are sufficient for digital

learning activities (Means & Neisler, 2021). Besides that, the lack of electronic devices and having to deal with unconducive environments are among the constraints to attending live lecture (Aranas, 2021; Lapitan et al., 2021). In some developing countries, such as India, the lack of suitable devices, as well as internet connectivity, forms a big challenge in online learning (Muthuprasad, 2021). As an alternative, pre-recorded videos were utilized for their flexibility, convenience, and educational effectiveness (Islam et al., 2020), allowing students to progress at their own pace (Lapitan et al., 2021). Nevertheless, the need to access decent tools (e.g., computer and internet connection) remains inevitable.

While many studies have focused on the challenges and constraints associated with online learning, this paper aims to fill the research gap by presenting several approaches to address these challenges. A comparison of students' preferences for live lecture and pre-recorded video methods in online learning and their perceptions of these methods are also investigated. The findings will aid the management and institutions in providing better learning environments for students as well as promote sustainability in open and distance learning (ODL) (Mohd Noor et al., 2022).

In line with the shift in the education system due to the COVID-19 pandemic, UiTM Sarawak Campus has made a collective decision to transform the delivery of knowledge to the online mode, known as ODL. While the F2F approach may still be preferred by a portion of students, online learning is deemed by some to be the safest choice to reduce the risk of being infected and to keep everyone safe from the COVID-19 virus. Having said that, the acceptance and preference of students towards ODL also vary from one to another.

Multiple studies have been conducted to study the preference of students for online learning. For example, Muthuprasad et al. (2021), Saidi et al. (2021), and Lakhani et al. (2020) found that students preferred live lecture to online learning. However, Islam et al. (2020) and Syynimaa (2019) discovered that pre-recorded videos are preferable as well by students. The contradiction of these findings gives no precise preference of students' preference for online learning. In addition, some studies showed that both methods were accepted. According to the students, live lecture promoted a sustainable work rate and encouraged engagement whilst video lecture was a convenient revision tool that allowed students to work at their

own pace (Ranasinghe & Wright, 2019). Furthermore, the students who participated in the study by Xie et al. (2018) felt that the presence of instructors and prompt feedback given during a class made learning better, but at the same time, they also felt more comfortable using asynchronous communication tools as those could easily be accessed offline.

Nevertheless, some studies have revealed that synchronous learning environments are more favorable. For instance, the study of Lakhani et al. (2020) revealed that there is a higher preference for online live sessions as compared to pre-recorded video sessions. In contrast, some studies showed that the asynchronous learning environment, which deals with pre-recorded video lecture as one of the methods, is preferred. For example, the study by Islam et al. (2020) discovered that students showed more interest in pre-recorded video lecture compared to live ZOOM lecture. The existence of these various methods of online learning, such as live lecture and pre-recorded video lecture, caused difficulty for students who come from different backgrounds due to slow internet connections, low internet quota, lack of facilities, and inconvenient learning environment. Due to such constraints, lecturers also face difficulties in fulfilling students' needs and ensuring that the delivery of knowledge is successfully attained. Thus, the choice of an appropriate method could help to overcome these issues.

The inconclusiveness of the findings of previous studies has driven us to explore further the perspective of synchronous and asynchronous learning environments among students. Specifically, this study aimed to investigate the preference of students between live lecture and pre-recorded video lecture for online learning, as well as to identify the reasons for their preference, their perception of their most preferred learning method, and the extent to which the students perceive how the most preferred method may improve their learning. This study was guided by the following research questions:

i) What are students' preferences concerning the teaching delivery methods for online learning and their reasons?
ii) What are students' perceptions towards their most preferred ODL method?
iii) To what extent do live lecture and pre-recorded video lecture improve the learning based on students' perceptions?

LITERATURE REVIEW

To further understand the perception of students towards live lecture and pre-recorded video lecture, several studies concerning these approaches were reviewed. Thus, this section will comprehensively discuss the issues regarding these two methods in online learning.

Live Lecture

According to Islam et al. (2020), one important element of live lecture is that the use of live ZOOM lecture allows for more interactions between the lecturer and students, which may lead to long-term memories for the learners. Nevertheless, this is dependent on the motivation of the students, as the live lecture are only more effective in delivering the initial information. The equivalent importance of online live lecture to F2F lecture will provide more structured learning and be helpful in the workload management of the students.

Muthuprasad et al. (2021) conducted an online survey on the perceptions and preferences of agricultural students towards online learning. Their study found that most of the students preferred to have live lecture with a frequency of twice a week and a duration of 45 minutes for each class. Besides that, it was reported that the majority of students attended online classes using their smartphones. Thus, the study asserted that the platform and materials used should be accessible via smartphones. Moreover, the study revealed that a lack of good internet connection was ranked as the biggest interference for live lecture, followed by data limit and data speed. Despite that, online learning was still preferred over suspending classes or providing reading materials until the pandemic was under control.

Similarly, Means and Neisler (2021) conducted surveys on the perceptions of students on remote teaching and learning. Similar to the findings of previous studies, traditional classroom teaching was found to have shifted to remote or online learning due to the COVID-19 pandemic. The study showed that about half of the students were satisfied with their course being completely conducted online. Also, students from non-science, technology, engineering, and mathematics courses tended to prefer online instructions. In addition, most of the students reported that they had no problems accessing their online courses but had difficulties when it came to

video conferencing, which required a high bandwidth. As a result, about 16% of students were 'often' or 'very often' absent from synchronous learning.

Correspondingly, Saidi et al. (2021) reported that 46% of the participating lecturers and students preferred to have synchronous online learning or scheduled live lecture. It was also found that the most preferred platform to have this live lecture was Google Meet. Moreover, both the lecturers and students were contented with Google Classroom as their LMS and WhatsApp as their medium of chat. Nevertheless, the study asserted that the lecturers and students should be given the flexibility to choose appropriate approaches and platforms to embrace different methods of an online learning environment.

On the other hand, Cao et al. (2021), who studied post-pandemic reflections on online Mathematics instructions by interviewing teachers and conducting tests among students, reported that even though the students preferred to have a live broadcast class that enabled them to ask questions in the chat without the need to turn on their camera, they still attained low grades in their Mathematics test. Cao et al. (2021) found that there were two categories of students in general, namely “good” and “bad”. It was revealed that the “good” students were able to maintain their grades mainly due to being decently self-disciplined. From the study, it was concluded that a teacher’s skills in integrating online technologies with instructions should be improved to produce more interactive and interesting online learning while fostering independent online learning skills among students.

Pre-recorded Video Lecture

Several studies have been conducted to investigate the advantages and disadvantages of pre-recorded lecture and their effects on the performance of students. Syynimaa (2019) conducted a study by replacing half of the live lecture with pre-recorded videos to observe the effects. As a result, the study showed that the pre-recorded videos had a statistically significant positive effect on the grades of the students. Additionally, the satisfaction levels of the students were also noted to be higher.

Islam et al. (2020) explored the effectiveness of pre-recorded video lecture as it was found to be preferred over live ZOOM lecture due to their

flexibility, convenience, and educational effectiveness. It was shown that 53.8% of the students preferred pre-recorded lecture, 7.7% favored live ZOOM lecture, and 30.8% would rather have both. The highest percentage of the preference of students for pre-recorded lecture supported the perception that it is a more effective method in online learning.

As educators are concerned with the decline in medical school lecture attendance, Cardall et al. (2008) felt the need to ascertain the perceptions and motivations of students concerning live lecture as opposed to accelerated, pre-recorded video lecture. The study revealed that students were equally or even more interested in the accelerated, pre-recorded video lecture. The students' responses indicated that the decisions to attend lecture or view pre-recorded video lecture were driven primarily by the objective of satisfying their professional goals.

A study by Brockfeld et al. (2018) compared video lecture and live lecture to determine the approach that provides the most effective learning experience for the clinical part of a medical examination. According to the study, pre-recorded video lecture and live lecture both prepared the participants equally well for the clinical part of the medical examination. Moreover, video lecture was shown to increase the quality of the teaching, which will benefit the students. The study also revealed that faculties might want to make pre-recorded video lecture complementary by partly replacing conventional live teaching since the use of video lecture may help university lecturers focus more on research mediation and even improve practical training through distance learning. Finally, the study concluded that while a high-quality video lecture may involve an expensive production process as compared to a single live lecture, it is considered to be cost-effective because it can be used repeatedly anytime and anywhere.

On the other hand, the study by Topale (2016) found that pre-recorded video lecture had little influence on the preferences of students' participation. Pre-recorded video lecture was deemed to be beneficial due to their impact on efficient, active, and self-directed learning. The study showed that although more than 28% of the students felt that pre-recorded video lecture increased their performance significantly, 1.1% felt that their grades had dropped due to the use of the recordings. Meanwhile, 58% felt that there was little or no difference in their grades with the use of pre-recorded video lecture.

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As discussed earlier, there are many issues to be accounted for when choosing appropriate methods to deliver knowledge via online education. The subject matter, background, and flexibility of students, as well as the capabilities of teachers, are among the factors that are important in assessing online learning methods. This study was carried out to further discuss the preferences of students on live lecture and pre-recorded video lecture for online learning.

METHODOLOGY

This study involved undergraduate students from three campuses of UiTM Sarawak (Samarahan, Samarahan 2, and Mukah) in the semester of March-August 2021. Due to the time constraints, students from these campuses were considered as the primary samples as they promised a higher response rate.

An online self-administered questionnaire was developed based on the adaptation of items from a previous study (Islam et al., 2020). Some modifications to the items were done to fit the objectives of this study. The questionnaire consisted of three main sections, which included the demographic profiles, the students' perceptions towards live lecture (8 items), and pre-recorded video lecture (8 items) as well as the improvement level of students' learning based on their favored method of learning during ODL. Students' perceptions of each method were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Students' perceptions were purely dependent on their own beliefs and opinions, regardless of whether they have personally experienced them. Cronbach's alpha test of reliability for all items was used to measure students' perception of the method that they preferred. All items proved to be reliable, with a high value of Cronbach's alpha value that exceeded 0.9.

The link to the online questionnaire was disseminated among students in early June until the end of July 2021 over three campuses to gather the input needed, mainly through sharing on WhatsApp and other social media platforms. A total population of 7950 diploma and degree students who enrolled during the study period was targeted. This study aimed for at least 367 responses, based on a population of 8000 Krejcie and Morgan table's (1970). A sample of 1199 students completed the survey,

and their responses were analyzed using descriptive analysis (frequency, percentages, and mean score). The non-probability convenience sampling technique was used due to the inaccessibility to the complete students' lists during the period of study. Besides that, research surveys or questionnaires that require probability sampling are very limited when using an online contact mode (Fricker, 2017). The results from this study should be interpreted and generalized based on the context of the data collected.

RESULTS AND DISCUSSION

In this section, the findings from this study are briefly discussed with an introduction of the respondents' demographic. A discussion is then made based on the reasons of respondents' preferred method for ODL and concentrated on their perceptions of the methods that are favored the most. Finally, students' perceptions of learning level improvement between live and pre-recorded video lecture based on the three methods was briefly compared.

Demographic Background

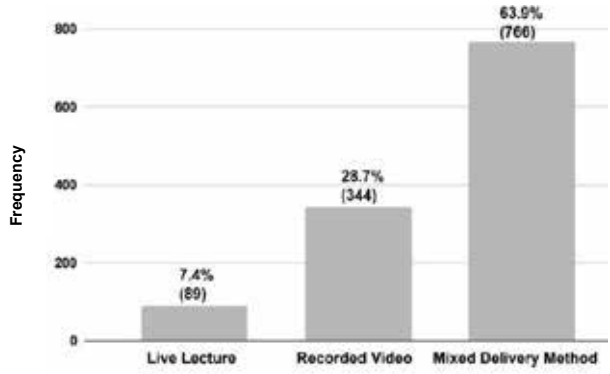
Table 1 summarizes the descriptive statistics of the respondent's demographics. The majority of the respondents in this study are male, accounting for 69.9% of the total participants, while 30.1% of them are female. In relation to the location of their house during the online learning phase, 45.4% of respondents reported they are from urban areas, 36.8% are from sub-urban areas, and the remaining 17.8% are from rural areas.

Table 1
Descriptive statistics of students' demographics

Variable	Frequency	Percentage
Gender		
Male	838	69.9
Female	361	30.1
Location of house		
Rural	213	17.8
Urban	545	45.4
Sub-Urban	441	36.8
Total	**1199**	**100.0**

Figure 1 shows the respondents' preference for their online learning method. More than half (63.9%) of the respondents opted for the mixed delivery method, which is the combination of live and pre-recorded video lecture. These students clearly exhibited a keen interest in these two methods at the same time since they might have benefited from the best of both worlds. This is consistent with the findings by Chen et al. (2021), who stated that combining synchronous and asynchronous components of distance education may improve student learning for future courses held online. Brockfeld et al. (2018) also agreed that both formats were equally effective.

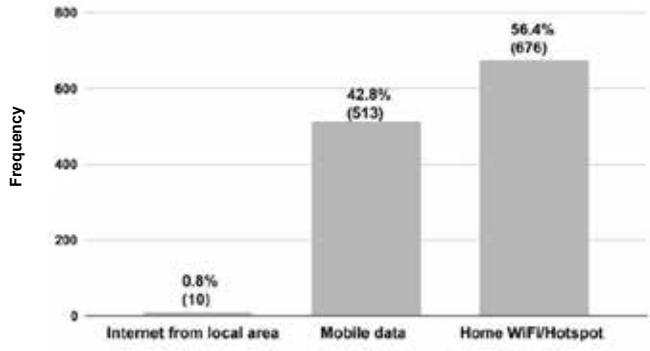
Figure 1
Respondents' preference for online learning method (n=1199)



Meanwhile, 28.7% of the students preferred pre-recorded video lecture only and the remaining 7.4% preferred to have live lecture only during the ODL. The result demonstrated that recorded video is well-liked and accepted in online learning, which is also in line with the studies done by Sarker et al. (2019) and Scagnoli et al. (2019). As depicted in Figure 1, we can see that there is a great difference between students who prefer pre-recorded video lecture and live lecture. The contributing factor will be further discussed in the next section.

With interesting products offered by some telecommunication companies, it is not surprising that more than half of the total respondents (56.4%) own their home Wi-Fi and hotspot, as shown in Figure 2. 42.8% of the respondents used their mobile data, and only 0.8% of them had to use the internet from their local area, maybe due to the limited internet access.

Figure 2
Source of internet used by respondents during the online learning phase (n=1199)



Reasons for the preferred ODL Method

Of the 1199 students who took part in this study, 89 of them or 7.4% opted for live lecture only for the ODL. The top reason, as voted by 41.6% of these 89 students, was because there was more interaction and a greater ability to concentrate during learning, as shown in Figure 3. Apart from this, 21.3% of them believed that a live lecture class allows them to ask questions to the lecturer instantly and hence enables them to get instant feedback from the lecturer to strengthen their understanding of the lesson discussed.

Meanwhile, 14.6% indicated that the ease of communication with lecturers was their main reason for opting for live lecture for online learning. This was due to students' understanding that the lecturer has other classes and other matters to attend to as well. So, for them, it is better to have live lecture so that any questions or problems can be asked verbally, as compared to messages that may lead to a different interpretation of the messages being sent. In terms of understanding the lecture, 13.5% voted that live lecture were more comprehensible than pre-recorded video lecture. Only 9% of the students were certain that they spent more time learning if the lecture was conducted live.

Figure 3
The main reason for choosing the live lecture method only (n=89)

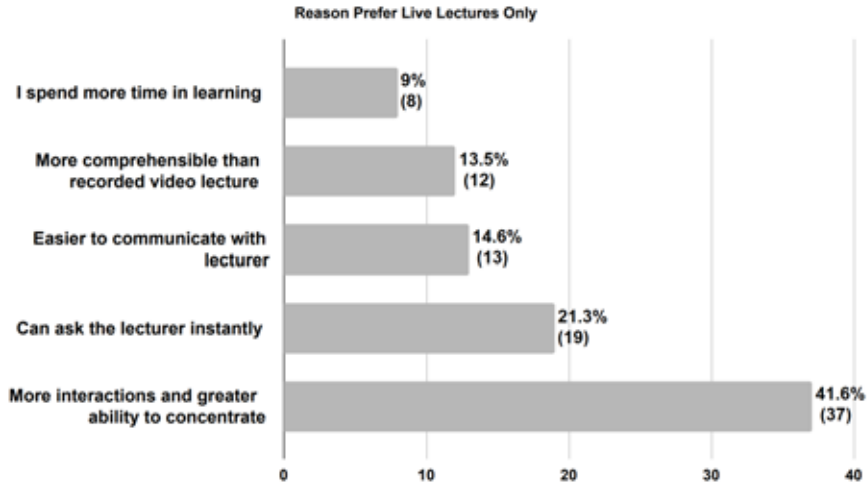


Figure 4 portrays the main reasons why 344 students chose pre-recorded video lecture only as their preferred approach. It can be clearly seen that 82.3% of these students chose the video method as it can be watched repeatedly in their own time. This indicates how much the video method promotes flexibility and adjustability in learning, where students can learn comfortably at their own pace. Meanwhile, 8.4% of them expressed a slight preference for the option of the video method that makes them understand better. Videos are controllable by students, and this provides a peaceful state of mind as pausing or rewinding lessons is possible, creating a calm environment. Following that, 6.7% felt that the video method acts as a replacement for missed lecture, 2.3% believed that video lecture was more interesting and not tiring and the remaining 0.3% agreed that this method supplements live lecture.

The reasons for missed lecture are reported in Table 2. Based on feedback received from 23 students who voted pre-recorded video as a replacement for missed lecture, 87% of them expressed that network problems are the cause, while 47.8% reported issues related to personal matters. Commitment to part-time jobs and waking up late to class,

especially for classes that begin at eight o'clock in the morning, also made up 17.4% of the responses.

Figure 4
The main reason for choosing pre-recorded video lecture method only (n=344)

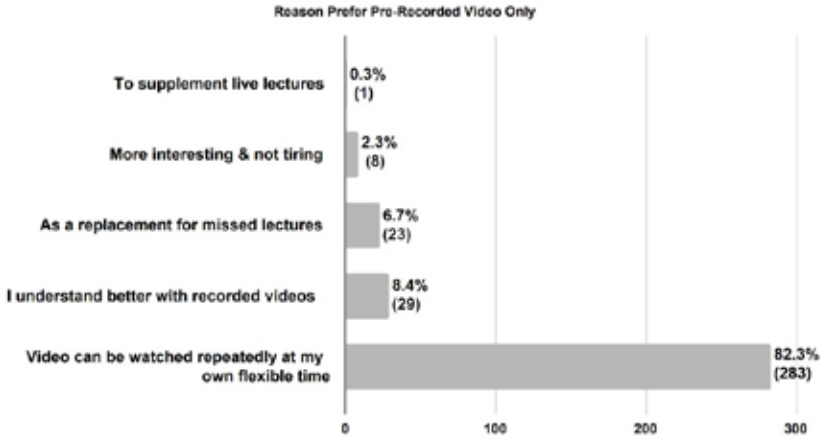


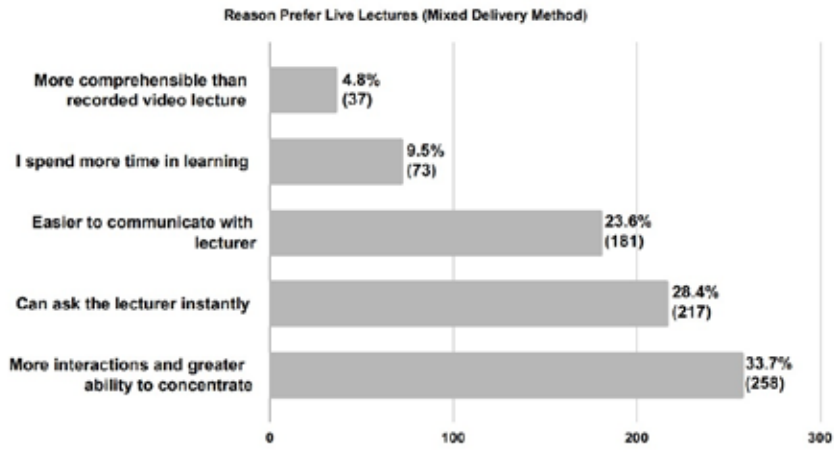
Table 2
Reasons for missing live lecture (n=23)

Reasons for Missing Live Lecture	Frequency	Percentage
Network problem	20	87
Part-time job	4	17.4
Woke up late for class	4	17.4
Forgot timetable	1	4.3
Personal matters	11	47.8

Figures 5 and 6 portray the reasons for choosing live lecture and pre-recorded videos as reported by 766 out of 1199 students who preferred a mixed delivery method. As shown in Figure 5, 33.7% of these students indicated that there is more interaction and a greater ability to concentrate by attending live lecture. Meanwhile, 28.3% of them suggested that live lecture allowed them to ask any questions instantly to the lecturer, and 23.6% mentioned that it is easier to communicate with lecturers as compared to pre-recorded video lecture. However, based on the responses, they still believe that pre-recorded video lecture is better, as indicated by the last item

in the questionnaire, where 22.9% claimed that pre-recorded video lecture is better than live lecture. As depicted in Figure 5, only 9.5% of the students said that they spend more time learning if a live lecture is conducted. Therefore, this tells us that students will spend more time learning if pre-recorded video lecture are used.

Figure 5
Reasons for choosing live lecture (prefer mixed delivery method)



As shown in Figure 6, 83.8% of 766 students indicated that pre-recorded video lecture allowed them to watch the video repeatedly in their own time. Thus, this may be one of the main reasons why students prefer pre-recorded video lecture over live lecture. Only 7.6% used pre-recorded video lecture as a replacement for their missed live lecture, 4.6% claimed the video makes them understand better, 2.6% agreed that videos supplement the live lecture and remaining 1.4% believed that video lecture were more interesting and not tiring.

Based on feedback received from 58 students who voted pre-recorded video as a replacement for missed lecture, the majority of 91.4% missed their lecture due to network problems, 44.8% due to personal matters, 27.6% for waking up late for class, and 17.2% for forgetting their timetable and the remaining 6.9% did part-time jobs during ODL.

Figure 6
Reasons for choosing pre-recorded video lecture (prefer mixed delivery method) (n=766)

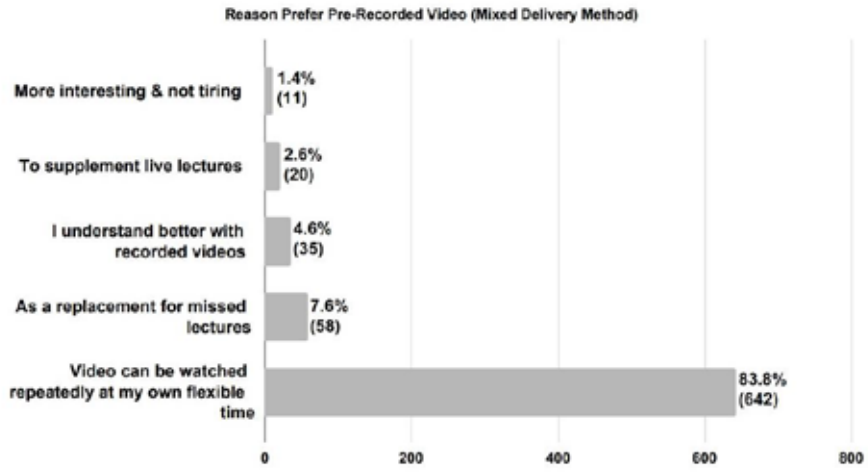


Table 3
Reasons for missing live lecture (prefer mixed delivery method)

Reasons for Missing Live Lecture	Frequency	Percentage
Network problem	53	91.4
Part-time job	4	6.9
Woke up late for class	16	27.6
Forgot timetable	10	17.2
Personal matters	26	44.8

The result indicates that the network issue was the primary cause of students missing live lecture. The finding is congruent with the findings of Andoh and Henaku (2020) and Nisha et al. (2021), where internet connectivity or network problems are among the most significant obstacles experienced by students and are generally acknowledged concerns. Due to the importance of internet connectivity in online learning, students who experience internet connectivity issues face difficulty in giving their best commitments to online learning. Pre-recorded video lecture, on the other hand, would serve as a substitute for live lecture if they were missed, as noted by the students as one of the reasons for their preference.

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Students' Perceptions Towards Most Preferred ODL Method (Mixed Delivery Method)

Students' perceptions of live and pre-recorded video lecture were investigated among 766 students who opted for the mixed delivery method. Tables 4 and 5 show that while students favored the mixed method for online learning, most of the items asked in the pre-recorded video lecture section received greater votes of 'agree' to strongly agree'. This is also supported by the last item, where the percentage of students who agreed that pre-recorded video lecture method is better (53.5%) (see Table 5) is higher than live lecture (43.6%) (see Table 4).

Table 4
Students' perception towards live lecture (n=766)

	Item (Live Lecture)	1 Strongly Disagree	2 Disagree	3 Neither	4 Agree	5 Strongly Agree
1	This method was helpful for learning the material and concepts.	2 (0.3%)	7 (0.9%)	121 (15.8%)	380 (49.6%)	256 (33.4%)
2	This method improves my understanding in learning the material and concepts.	2 (0.3%)	5 (0.6%)	150 (19.6%)	351 (45.8%)	258 (33.7%)
3	The given learning objectives are achievable with this method	2 (0.3%)	2 (0.3%)	159 (20.7%)	383 (50%)	220 (28.7%)
4	I found it more interesting of having this method for online learning.	3 (0.4%)	10 (1.3%)	209 (27.3%)	322 (42%)	222 (29%)
5	I can manage my time efficiently when I choose this method	6 (0.8%)	27 (3.5%)	204 (26.7%)	289 (37.7%)	240 (31.3%)
6	This method improves my online learning skills.	3 (0.4%)	20 (2.6%)	212 (27.7%)	318 (41.5%)	213 (27.8%)
7	I believe that this method is better.	13 (1.7%)	61 (8%)	358 (46.7%)	201 (26.2%)	133 (17.4%)

Table 5
Students' perception towards pre-recorded video lecture (n=766)

	Item (Pre-Recorded Video)	1 Strongly Disagree	2 Disagree	3 Neither	4 Agree	5 Strongly Agree
1	This method was helpful for learning the material and concepts.	0	4 (0.5%)	69 (9%)	345 (45.1%)	348 (45.4%)
2	This method improves my understanding in learning the material and concepts.	0	3 (0.4%)	113 (14.8%)	327 (42.6%)	323 (42.2%)
3	The given learning objectives are achievable with this method	0	8 (1%)	140 (18.3%)	343 (44.8%)	275 (35.9%)
4	I found it more interesting if have this method for online learning.	1 (0.1%)	15 (2%)	228 (29.8%)	286 (37.3%)	236 (30.8%)
5	I can manage my time efficiently when I choose this method	6 (0.8%)	22 (2.9%)	170 (22.2%)	266 (34.7%)	302 (39.4%)
6	This method improves my online learning skills.	1 (0.1%)	14 (1.8%)	193 (25.2%)	302 (39.5%)	256 (33.4%)
7	I believe that this method is better.	2 (0.3%)	43 (5.6%)	311 (40.6%)	229 (29.9%)	181 (23.6%)

Students were able to learn the topic of the lesson and increase their understanding by listening to pre-recorded video lecture due to the flexibility that comes with this method. This shows how much the method encourages adaptability in learning and allows students to learn at their own pace. This is corroborated by many researchers, including Islam et al. (2020), Brookfield et al. (2018), and Cardall et al. (2008), who revealed that this approach had a positive impact on students' interests and learning process, and ability.

Furthermore, the percentage of students who neither agreed nor disagreed with live lecture being better than the others was slightly higher compared to pre-recorded video lecture. This suggests that students do not have much of an opinion or have only a limited degree of interest in live

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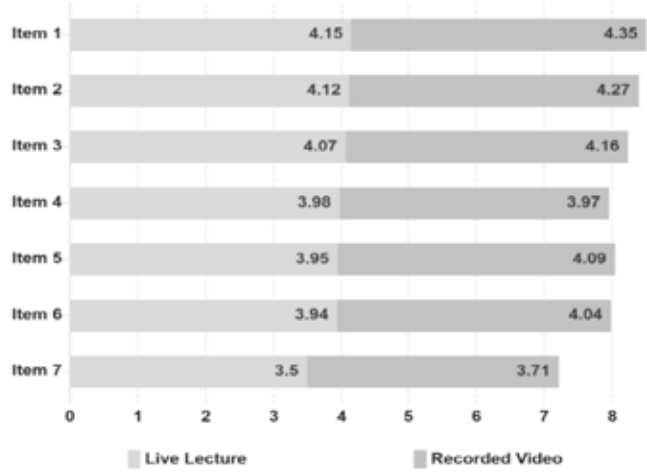
lecture compared to pre-recorded video lecture. Apart from this, we can also see that 9.7% of the students disagreed that live lecture is a better method for them while 5.9% disagreed that pre-recorded videos is a better method.

Figure 7
Mean of student's perception towards live and pre-recorded video lecture (n=766)



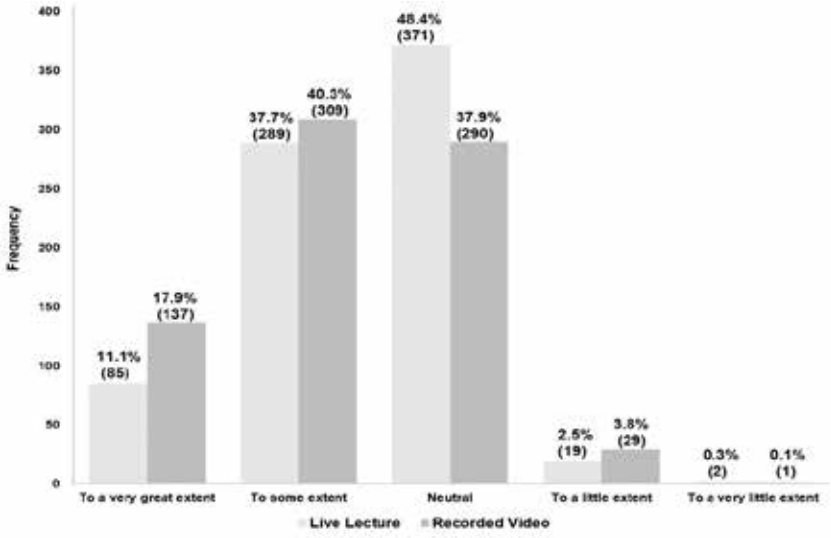
To sum up, even though a high number of students prefer the mixed delivery method, pre-recorded video lecture is preferable compared to live lecture. From all the items asked about their perception of each method, Figure 7 reveals that the mean for each item for pre-recorded video lecture was higher except for the fourth item ("I found it is more interesting to have this method for online learning"). Nevertheless, the difference is insignificant, marginal by 0.01.

Students' Perceptions of Learning Level Improvement

Students' perceptions of learning level improvement between live and pre-recorded video lecture, as illustrated in Figure 8, show that the mixed delivery method contributed to an improvement in their learning. This result is discussed based on the responses from students who prefer the mixed delivery method (n=766), where 48.8% and 58.2% of them indicated that live lecture and pre-recorded video lecture improved their learning from some extent to a very great extent, respectively. The results in this study agree with Pei and Wu (2019), who found online learning to have its own

advantages in enhancing students' learning. Nevertheless, 48.4% and 37.9% of the students were neutral about whether live or pre-recorded video lecture improved their learning during ODL while less than 4% of the students felt that their level of learning improved to a little or very little extent for both methods.

Figure 8
Student's perceptions of learning level improvement between live and pre-recorded video lecture (n=766)



The sustainability of online learning should also be emphasized besides focusing on online learning methods. Technology competency and literacy among students should be taken into consideration as digital skills are emerging as key tools to achieve the objectives of sustainable development (Colás-Bravo et al., 2021). This is vital so that students can continue their learning process efficiently with the latest technological advancements and developments. Students must also be prepared to embrace technological changes for the online learning to be sustainable. Additionally, students must have access to equipment and facilities that will enable their participation in online learning. Development and enhancements of telecommunications networks are one of the most crucial components in online learning that must be prioritized, especially in rural

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areas, to ensure the sustainability of online learning. Telecommunications infrastructure with a focus on high bandwidth connectivity needs to improve (Palvia et al., 2018). Therefore, local authorities play important roles in providing excellent internet connection speeds especially in rural areas, so that the gap between online learning experiences among students in rural and urban areas is curtailed.

CONCLUSION

The transformation of learning delivery has given rise to several approaches in online education. The ODL implementation in UiTM Sarawak since the outbreak of COVID-19 has witnessed challenges in online education among students and lecturers. A total of 1199 responses from students of UiTM Sarawak have been evaluated statistically to measure the students' preferences for live lecture and pre-recorded video lecture. The data reveal that students prefer mixed methods followed by pre-recorded video lecture, and the least preferred method is live lecture.

The statistical analysis shows that students prefer live lecture because they provide a higher level of interaction and are more conducive to concentration. For pre-recorded video lecture, students found that it was more flexible to watch the video multiple times at their convenience. Live lecture and pre-recorded videos did improve students' learning levels to some extent. This is supported by their perceptions that this method improves their understanding of the material and concepts. Students believe that using a mixed delivery method will help overcome the ODL challenges, which establish that live lecture and pre-recorded videos complement each other. These findings promote learning opportunities through ODL and assist institutions in providing better services to students. However, the findings of this study could only be generalized within the scope of UiTM Sarawak students as data was collected using non-probability sampling. Further research could be conducted on the lecturers' ability to identify the best method to meet the needs of students in order to encourage ODL sustainability at a higher level.

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The authors confirm the equal contribution in each part of this work. All authors reviewed and approved the final version of this work.

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CONFLICT OF INTERESTS

All authors declare that they have no conflicts of interest.

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