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Technology Usage in Time of COVID-19 Pandemic among University Students: A Descriptive Study

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ABSTRACT

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The world is going through a difficult time due to the presence of COVID-19 pandemic. The pandemic has necessitated the use of online, virtual classrooms in place of face-to-face ones. This raises concerns about students' ability to adjust to the transition to online learning, considering their diverse socioeconomic backgrounds. Thus, it is critical to assess students' experiences with technology adoption in the current learning environment during a pandemic. The purpose of this study is to elicit information about students' experiences with gadgets, internet access, online tools, online class engagement, and online learning material during open and distance learning in times of pandemic COVID -19 via the crosstabulation analysis. This study involved students from two universities and three levels of study: foundation, diploma, and bachelor. Most foundation students were living in campus while most diploma and degree students were living off campus. This situation affects the experience faced by students in online learning in terms of their engagement, ease of using online tools and how they access materials. This study suggests that with good internet connectivity, students' satisfaction with online learning may rise when they can easily access all course materials, rewatch online lectures and become actively engaged with learning materials without lag. Thus, sustaining the quality of online education requires a strong internet connection that will lead to students satisfactory in online learning especially to those who are remotely learning online from home.

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1. INTRODUCTION

Countries around the world, including Malaysia, have responded to the strain of COVID -19 by implementing various containment measures. The educational sector was one of the first few sectors to experience a complete shutdown for all operations. Multiple schools, colleges, and millions of students were affected by the lockdown, as the educational sector's initial response was to completely cease operations.

In the COVID-19 scenario, where traditional classroom-based education is not possible, the only alternative means of acquiring knowledge and developing new skills is through online learning. Online learning environment enables knowledge to be transferred and acquired virtually through the use of various platforms. Because of the absence of a physical classroom, an online educator must strive to create a conducive environment for their students. Communication happens virtually in an online environment using email, Whatsapp, Telegram and video-conferencing through Google Meet, Skype or Webex. Whatsapp group was utilized as a means to tackle challenges in learning during the COVID-19 pandemic (Makruf & Tejaningsih, 2023). Morever, video conferencing can also serve to help create a sense of unity among learners, and to some extent, replace face-to-to-face communication in online learning (Jena, 2020). Nevertheless, in the post-pandemic period, both lecturers and students are still actively engaged in teaching and learning activities through online learning platforms such as video conferencing technologies and learning management systems (Prabawangi et al., 2021).

People have to admit that online learning has significant advantages like adaptability, mobility of knowledge despite locale, abundance of applications, knowledge, user-friendliness, affordability, and universal accessibility (Ngampornchai & Adams, 2016). But, the transition from offline to an online learning can be detrimental to students, who face greater difficulty adjusting to their new learning environment. The majority of issues with online learning environments stem from students' communities' lack of relevant digital learning resources (e.g. laptop/computer, broadband internet connection), a conducive home learning environment (e.g. a quiet study area or their desk), and parental support. This can lead to feelings of futility among students and may affect future learning.

Since online learning was implemented unexpectedly in Malaysia, it is critical to assess students' experience in adopting technology in the new learning environment during the pandemic. Thus, this study can help to guide the post-pandemic educational landscape and ensure that students are equipped to succeed in a world where technology is increasingly prevalent.

2. LITERATURE REVIEW

2.1 Online Learning

Online learning is synchronous and asynchronous learning that takes place over the internet, allowing students the ability to engage with resources in the online learning environment and with other learners and peers, respectively (Dong et al., 2020). Online learning enables students to exchange ideas, grow as an individual without regard for time constraints, and access to a more resilient learning environment (Hwang et al., 2020; Lage-Cal et al., 2020). Online learning requires educators and students to be technologically savvy, as this ability will significantly aid in creating a more conducive learning environment leading to good social interactions (Andel et al., 2020). In addition, online learning must consider students' financial circumstances, as well as the facilities and infrastructure that support online learning (Rusli et al., 2020). Limited

access to the Internet as well as technical and financial issues contributed to an underwhelming online learning outcome (Adnan & Anwar, 2020). This is especially prevalent in underdeveloped countries. Additionally, students identified responsiveness, an inadequacy of face-to-face interaction, and a lack of social interaction as online learning challenges (Adnan & Anwar, 2020; Zhong, 2020). Nonetheless, the demand for online education has increased as a result of its impressive characteristics, including its capacity to reach global audiences (Paul & Glassman, 2017), as well as its unique functionality (Picciano, 2009), accessibility (Kintu et al., 2017), and flexibility (Gilbert & Fisher, 2015). Online education is believed to be a valuable supplement not only to traditional classroom instruction, but also to instil the concept of lifelong learning (Adnan & Anwar, 2020).

2.2 Factors of Students Success in Online Learning

Education industries are increasingly embracing emerging technologies such as video conferencing tools (e.g. Zoom, Microsoft Teams, or Google Hangout) as tools for distance learning (Martin, 2005). However, the process of transitioning from the traditional mode of instruction to the online mode should be carefully planned by higher education institutions. Students who are comfortable with a structured and primarily teacher-centered education may find the transition to Online Distance Learning (ODL) environment a more unstructured, student-centered learning environment extremely challenging (Banna et al., 2015). Hence, human-technology interaction is critical for establishing the necessary connections in online learning environments (Tirri et al., 2013; Wang et al., 2014). The technology system should be viewed as an environment that enables students to participate in educational activities at any time and from any location (Bouhnik & Carmi, 2014).

In an online environment, students frequently face difficulties and stress (Fauzi et al., 2021). One such difficulty is that, while frequent interaction is desirable, it may not always be possible, particularly for students who live outside of urban areas and do not have regular access to computers or the internet. The primary obstacles of online education during the COVID-19 pandemic were connected to weak internet connection, difficulties with time management, staying motivated, managing distractions, adjusting to unfamiliar technology, and experiencing a lack of social interaction (Yahaya et al., 2022). The requirement for skills in information and communication technologies (ICT) are also an important factor for a successful ODL. Student's success in online learning depends on their proficiency in Information and Communication Technology (ICT) and their ability to find and post relevant information (Hillman et al., 1994), while both Dzakiria, Mohd Idrus and Atan (2005) and Weidlich and Bastiaens (2018) point out that in the digital age, students who don't possess the requisite skills may inadvertently be left behind. In addition, ICT skills are an important factor affecting students' learning (Callum & Jeffrey, 2013), especially for female students (Jiménez-Cortés et al., 2017; Mokiwa & Phasha, 2012).

Besides ICT, other challenges which hinder an effective online learning from occurring include the absence of training, facilities, and infrastructure, as well as students' ability to prepare and learn using learning tools (Munezero et al., 2016). Therefore, it is imperative that adequate learning resources are made available online to ensure its success (Asmawati Ismail et al., 2020). Students must possess exceptional self-discipline when it comes to time management, as there are no instructors present to guide students face-to-face. Instructors must also go through adequate training to help them create suitable teaching materials for the students (Kumar & Owston, 2016). In addition, majority of students are unprepared for online learning, with the primary barrier being a lack of internet access (Ismail et al., 2020).

Nonetheless, the demand for online education has increased as a result of its impressive characteristics, including its capacity to reach global audiences (Paul & Glassman, 2017), as well as its unique functionality (Picciano, 2009), accessibility (Kintu et al., 2017), and flexibility (Gilbert & Fisher, 2015). To succeed in online learning, which is becoming more popular and expected to adapt to future challenges, students must possess creativity, initiative, self-motivation, focus, and self-discipline (Al-Shamaileh et al., 2022). Online education is believed to be a valuable supplement not only to traditional classroom instruction, but also to instil the concept of lifelong learning (Adnan & Anwar, 2020).

3. METHODOLOGY AND MATERIALS

3.1 Sampling Technique

The data was obtained from 323 respondents who had completed a self-administered questionnaire using the non-probability convenience sampling technique. The samples were from second semester foundation students in March-July 2021 semester from Universiti Malaysia Terengganu (UMT). This study also involved second semester students from Diploma of Accounting program and fifth semester students from Bachelor of Accounting from Universiti Teknologi Mara (UiTM) Terengganu who enrolled in March - July 2021 semester. The reason for applying this sampling technique was two-fold. Firstly, it facilitated the acquisition of raw data for further analysis. Secondly, it saves time and money by randomly selecting responses.

3.2 Data Collection

The questionnaire was created using Google Forms and the link for the form was distributed among target students in the class via a WhatsApp group. Survey items were classified using the Likert Scale, with 1 representing strong disagreement and 5 indicating strong agreement.

3.3 Instrument

A survey was conducted to assess students' experiences with technology adoption in a new learning environment during a pandemic. The questionnaire is divided into two sections: demographic information and technical experience in online learning. Table 1 shows four items from the demographic section.

Table 1: Items for Demographic Section

ITEMS	
Gender	Female Male
Level of Education	Degree Diploma Foundation
Where is your location during online learning?	Home Institution
Gadget that you use the most for online learning	Computer Handphone Laptop Tablet

As indicated in Table 2, we generated seven relevant and appropriate items for technology usage experience in the online learning section of the survey for the purposes of this research study.

Table 2: Items for Technology Usage Experince in the Online Learning Section

ITEMS	
How would you describe the ease of accessibility of network and internet?	Depending on the situations Easy Hard
How would you describe the ease of using online tools?	Depending on the situations Easy Hard
How would you describe the ease of accessing online learning materials?	Depending on the situations Easy Hard
Do you find virtual class engaging?	Yes No
What education method that you prefer the most?	Face to Face Virtual All above Lecture video from other instructor accessible on YouTube
Which of the following materials would you mostly prefer to study for virtual classes?	Materials from internet Power point Slide Reading forms the reference book Summarized handout by instructor Watching the video record of the lecture
Do you think virtual classes save time?	Yes No

4. RESULT AND DISCUSSION

4.1 Demographic Analysis

This research surveyed a total of 323 students from UiTM Terengganu and Universiti Malaysia Terengganu. Students' information for all the sample in this study is shown in Table 3. The majority of students are female with a portion of 71.5%, while 28.5 percent are male .In terms of education levels, 25.7% of all samples are degree students, 30.3% are diploma students and 44.0% are foundation students. 191 students (59.1%) are at home during online learning while the remaining 132 students (40.8%) are in their institution. Most of them live away from campus and study online learning remotely.

Gadget that students use during online learning was also investigated. It was discovered that 247 students (76.5%) use laptops for online study, which accounts for most students. 66 students (20.4%) use their handphones followed by 9 students (2.8%) who use their tablet and only 1 student (0.3%) uses computer in online learning.

In terms of network and internet's accessibility, 228 students (70.6%) comprise the majority who responded that the ease of network and internet depends on the situation. Students may occasionally have convenient access to the internet when the connection is good and strong, but when there is a problem, such as home network traffic, external network congestion, weak Wi-Fi, latency and throttling, the internet connection may be slow and unstable, making it difficult for students to be connected. 89 students (27.6%) have an easy accessibility of network and internet while 6 students (1.9%) have a hard accessibility of network and internet.

176 students (54.5%) reported that the ease of using online tools also depends on the situation which makes up majority of the respondents. To use online tools, internet connection must be strong and stable. Since majority of the students reported that the ease of accessibility of network and internet depends on the situation, thus it can be arguable that the ease of using online tools also depends on the situation. 134 students (41.5%) stated that it is easy to use online tools while 13 (4.0%) stated that it is hard to use online tools.

Students that participate in online learning are required to access online learning materials. So, it is important to assess the ease of accessing online learning materials. 161 students (49.8%) agreed that it is easy to access online learning materials followed by 148 students (45.8%) stated that the ease of accessibility to online learning materials depends on the situation. 14 students (4.3%) reported that it is hard to access online learning materials.

Interestingly, despite the difficulties students encounter during online learning, the majority of respondents (208 students, 64.4%) believe that virtual classes are engaging while the remaining 115 students (35.6%) views virtual classes are not engaging. Though most of the students find that virtual class is engaging, only 115 (35.6%) students prefer virtual education.

Most students, 144 (44.6%), prefer to watch a video recording of the lecture. This is possibly because students may repeatedly watch the video content if they do not comprehend a certain concept. Moreover, most students think that virtual classes save time, with 248 students (76.85%) agreeing.

Table 3: Demographic Analysis

Variables	Sample, (%)
Gender	
Female	231 (71.5)
Male	92 (28.5)
Level of Education	
Degree	83 (25.7)
Diploma	98 (30.3)
Foundation	142 (44.0)
Where is your location during online learning?	
Home	191 (59.1)
Institution	132 (40.8)
Gadget that you use the most for online learning	
Computer	1 (0.3)
Handphone	66 (20.4)
Laptop	247 (76.5)
Tablet	9 (2.8)
How would you describe the ease of accessibility of network and internet?	
Depending on the situations	228 (70.6)
Easy	89 (27.6)
Hard	6 (1.9)
How would you describe the ease of using online tools?	
Depending on the situations	176 (54.5)
Easy	134 (41.5)
Hard	13 (4.0)
How would you describe the ease of accessing online learning materials?	
Depending on the situations	148 (45.8)
Easy	161 (49.8)
Hard	14 (4.3)

Do you find virtual class engaging?	
No	115 (35.6)
Yes	208 (64.4)
What education method that you prefer the most?	
Face to Face	208 (64.4)
Virtual	115 (35.6)
Which of the following materials would you mostly prefer to study for virtual classes?	
All above	5 (1.5)
Lecture video from other instructor accessible on YouTube	24 (7.4)
Materials from internet	9 (2.8)
Power point Slide	89 (27.6)
Reading forms the reference book	8 (2.5)
Summarized handout by instructor	44 (13.6)
Watching the video record of the lecture	144 (44.6)
Do you think virtual classes save time?	
No	75 (23.2)
Yes	248 (76.8)

4.2 Crosstabulation Analysis

A subsequent study is conducted to determine the difference in student technology usage amongst students with varying levels of education by means of crosstabulation analysis which can be seen in Table 4.

In the current COVID-19 pandemic, the most effective way of education is virtual. The majority of foundation students (88.7%) lived within the institution, while only 11.3% were at home. Foundation students were among those who were exposed to online learning from the beginning of their study and did not have experience in face to face learning. Foundation students were encouraged to stay in campus. Although foundation students lived in campus, instructional sessions continue to be conducted remotely. Foundation students expressed an equal preference for face-to-face and virtual education, with 48.6% preferring face-to-face and 51.4% preferring virtual. There is a possibility that good internet connectivity played an important role in the preference to virtual class since only 2.1% of foundation students finds it hard to access the internet. With degree and diploma students, the situation is partly reversed. The university provided flexibility for diploma and degree students who were unable to be present at the institution to continue learning sessions from home. Degree and diploma students were not permitted to return to their respective universities unless the university directs so. 97.6% degree students and 95.9% diploma student learnt from home. This shows that the majority of diploma and degree students studied online at home. The majority of degree and diploma students were second-year students who have experienced the university's face to face learning environment. As a result, diploma and degree students prefer to study in a physical classroom rather than a virtual one since they already encountered the convenience of learning in campus. When the lesson is conducted remotely, there are limits to learning from home such as internet connectivity, time constraints, and inappropriate device tools which probably was what the diploma and degree students experienced.

In terms of class engagement, 60.2% of diploma students and 76.8% of foundation students rated the virtual class as engaging, while 71.4 % of diploma students and 94.4 % of foundation students rated the virtual class as time-saving. This is because students do not have to spend much time preparing for class, can listen repeatedly to video recordings anywhere and at any time or read the lecturer's notes if they are confused about a subject. Only 48.2% of degree

students considered virtual classes engaging, while the remainder found them unappealing. 53% of the degree students, on the other hand, felt that virtual classes can save time. This is likely related to the fact that degree students did not enjoy virtual learning, thus they will not view virtual learning as engaging or time-saving.

With respect to the convenience of network and internet connection during online learning, 71.1% degree students, 79.6% diploma students and 64.1% foundation students makes up the majority of students who stated that it depends on the situation. It is assumed that students will occasionally have convenient internet access when the connection is strong and stable, but when there is a problem, such as home network traffic, external network congestion, weak Wi-Fi, latency, or throttling, the internet connection may be slow and unstable, making it difficult for students to connect.

Internet connectivity is important in determining the ease of using online tools in an online learning environment. Most degree and diploma students agrees that the convenience of using online tools depends on their situation. Since most of them are at home, they will be unable to use online tools for learning if there is an internet problem. On the other hand, 55.6% of foundation students indicated that it was easy to use internet tools for educational purposes. Most of them are in campus, and given the fact that internet connectivity are good at campus, they will have an easy access to online tools. The students location will also indirectly affect the ease of obtaining online learning material. It can be seen that most foundation students have an easy access to online learning materials.

Table 4: Crosstabulation Analysis

	Level of Education		
	Degree	Diploma	Foundation
Where is your location during online learning?			
Home	81 (97.6)	94 (95.9)	16 (11.3)
Institution	2 (2.4)	4 (4.1)	126 (88.7)
Gadget that you use the most for online learning			
Computer	0 (0.0)	1 (1.0)	0 (0.0)
Handphone	27 (32.5)	21 (21.4)	18 (12.7)
Laptop	55 (66.3)	74 (75.5)	118 (83.1)
Tablet	1 (1.2)	2 (2.0)	6 (4.2)
How would you describe the ease of accessibility of network and internet?			
Depending on the situations	59 (71.1)	78 (79.6)	91 (64.1)
Easy	22 (26.5)	19 (19.4)	48 (33.8)
Hard	2 (2.4)	1 (1.0)	3 (2.1)
How would you describe the ease of using online tools?			
Depending on the situations	46 (55.4)	67 (68.4)	63 (44.4)
Easy	31 (37.3)	24 (24.5)	79 (55.6)
Hard	6 (7.2)	7 (7.1)	0 (0.0)
How would you describe the ease of accessing online learning materials?			
Depending on the situations	36 (43.4)	61 (62.2)	51 (35.9)
Easy	37 (44.6)	33 (33.7)	91 (64.1)
Hard	10 (12.0)	4 (4.1)	0 (0.0)
Do you find virtual class engaging?			
No	43 (51.8)	39 (39.8)	33 (23.2)
Yes	40 (48.2)	59 (60.2)	109 (76.8)
What education method that you prefer the most?			
Face to Face	67 (80.7)	72 (73.5)	69 (48.6)
Virtual	16 (19.3)	26 (26.5)	73 (51.4)

Which of the following materials would you mostly prefer to study for virtual classes?			
All above	1 (1.2)	1 (1.0)	3 (2.1)
Lecture video from other instructor accessible on YouTube	3 (3.6)	13 (13.3)	8 (5.6)
Materials from internet	1 (1.2)	0 (0.0)	8 (5.6)
Power point Slide	13 (15.7)	13 (13.3)	63 (44.4)
Reading forms the reference book	4 (4.8)	2 (2.0)	2 (1.4)
Summarized handout by instructor	6 (7.2)	8 (8.2)	30 (21.1)
Watching the video record of the lecture	55 (66.3)	61 (62.2)	28 (19.7)
Do you think virtual classes save time?			
No	39 (47.0)	28 (28.6)	8 (5.6)
Yes	44 (53.0)	70 (71.4)	134 (94.4)

5. CONCLUSION

Learning sessions have been held in Malaysia for more than a year due to the COVID-19 pandemic. The students faces a variety of obstacles when it comes to obtaining knowledge from the lecturers. Classes are taught in a variety of methods, including by posting video lectures on YouTube, as well as power point notes, summary handouts, video links, and other online resources that the lecturers may provide. Thus, it is important to evaluate students experience of using and apprehending online learning tools during the pandemic.

Interestingly, this study revealed that though majority of diploma and degree students believe that virtual classes save time and provide an engaging learning environment for open and distance learning during the COVID-19 pandemic, they continue to prefer face-to-face instruction. This is most probably due to the difficulties of university students experience during the pandemic, such as limited internet access, unsuitable learning settings, difficult-to-find learning resources for reference, and equipment and gadgets that are very limited. This is in contrast to the preferences of foundation students, the majority of whom prefers online learning. It is hypothesised that since foundation students are on campus, they have easy access to the internet and so have no difficulty learning online, resulting in a preference for online learning..

It is conclusive that an internet connection is critical for maintaining the quality of online education. This survey discovered that the majority of foundation students had a favourable attitude about using online tools and gaining access to online learning materials compared to diploma and degree students. This is related to the students' location. The majority of foundation students live on campus, where internet access is plentiful, whereas degree and diploma students live in their homes, where internet access is very limited.

6. LIMITATION

There are several limitations to this study. The sample size is relatively small, and convenience sampling was used, which may limit the generalizability of the findings to a larger population. Regarding the level of maturity, it is important to acknowledge that maturity levels vary from person to person and cannot be generalized based solely on academic levels. However, typically, diploma and bachelor students are expected to have a certain level of maturity as they have completed their previous education and are pursuing more specialized or advanced programs. On the other hand, foundation students may need more support in developing their maturity levels because they are new to higher education. However, it's essential to acknowledge that maturity is a complex concept influenced by various factors, including

personal experiences and upbringing, and not solely determined by academic level and that it may influence the result of this study.

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AUTHORS' CONTRIBUTION

NHMN carried out the introduction and literature review sections. NSAB collected and refined the data and NS performed the data analysis. NHMN and NSAB also wrote the methodology section. NHMN, NSAB, NS and AAA finalized the findings and discussion section. AAA coordinates and helped draft the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

None declared.

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