

# THE CHALLENGES OF DIGITAL INEQUALITIES IN ONLINE AND REMOTE LEARNING ON B40 STUDENTS DURING THE COVID-19 PANDEMIC AND BEYOND

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## Abstract

This qualitative research study explores the challenges faced by B40 students in Malaysia during and after the COVID-19 pandemic, particularly in the context of online and remote learning. By conducting in-depth interviews with 20 informants, including both students and lecturers, this research discovered several challenges, such as difficulties related to access to digital devices, reliable internet connectivity, and communication barriers. These challenges significantly impact B40 students' educational progress and overall well-being. The study does not just identify the problems but also explores potential strategies and interventions to address these issues, offering both short-term solutions for pandemic times and long-term approaches for sustainable digital inclusion. This study employed interpretative phenomenological analysis (IPA) to further understand how individuals make sense of their lived experiences during the COVID-19 challenges. The findings highlighted the urgent need to tackle digital inequalities, not only for B40 students but for all, emphasizing the importance of effective interventions to minimize these disparities in the realm of online and remote learning. Policymakers and stakeholders are urged to prioritize creating an educational ecosystem that ensures equal opportunities for students, regardless of their socioeconomic status. By doing so, they can contribute to a future where all students have a level playing field in online and remote learning environments, fostering inclusivity and equity in the digital era and beyond.

**Keywords:** *Digital inequalities, B40, online learning, pandemic.*

## 1.0 Introduction

The COVID-19 pandemic triggered a seismic shift towards online and remote learning, an educational transformation necessitated by social distancing measures and in-person education constraints worldwide [1]. While it enabled the continuity of education, this transition laid bare the stark digital disparities, with underserved students in higher education being particularly affected [2]. In Malaysia, the pandemic's disruptive impact, combined with the government's Movement Control Order, led to the closure of various industries, including education. This compelled an abrupt shift to online and remote learning, relying heavily on virtual platforms to facilitate teaching and learning while physically separating educators and students. Although integrating information technology in education has potential benefits, it also exposes existing digital inequalities, deepening information gaps among learners [3].

Communication technologies can enhance the teaching and learning experience, fostering a positive educational environment. However, there is a dearth of comprehensive research examining the effectiveness

of online communication in fostering vital interactions among educators and students, and even among students themselves [4]. While online learning was already gaining momentum in higher education, the pandemic accelerated its widespread adoption, posing challenges for institutions to assess students' readiness due to the time constraints imposed by the urgent shift.

Furthermore, access to technology, including personal computers and the internet, is fundamental for successful online learning [5]. Yet, financial constraints and the absence of digital infrastructure in classrooms have hindered educators' ability to equip students with digital skills, especially in rural areas where limited internet services and outdated technology hinder academic progress [6]. Bridging the digital divide and addressing these issues is now paramount, as the pandemic continues to push educational institutions and learners towards online and remote learning, demanding solutions to ensure a more equitable educational experience for all. This research's primary aim is to uncover the specific challenges faced by B40 students during online and remote learning amid the pandemic, with the ultimate goal of reducing digital inequalities and fostering a more inclusive educational landscape.

## 2.0 Literature Review

### *Challenges faced by students in online and remote learning.*

In recent years, digital inequality, also known as the digital divide, has become a significant issue affecting the education sector, particularly during the global Covid-19 pandemic, where educational activities were halted to curb the virus's spread [7]. As Hsieh et al. [8] defined digital inequality for disadvantaged communities, while Sedyaningsih and Adara [9] further investigate into the concept of inequality in higher education, finding that geographical separation hampers interactions between educators and students in Indonesia. This lack of interaction deprived students of contextual learning experiences. Similarly, Amorighoye [10] noted that in Nigeria, young adult students faced similar challenges, lacking access to digital devices, which widened the communication gap in online and remote learning. Distance learning, often associated with flexible student attendance, poses barriers for many students who cannot afford it, requiring proper planning and curriculum adjustments to ensure a successful online and distance learning experience for both students and educators [11].

Effective communication is crucial in teaching and learning, especially during the pandemic. Al-Kumaim et al. [12] found a lack of guidance for both students and educators in using computer software, leading to outdated teaching plans. Online learning presents communication barriers, though it offers advantages in overcoming geographical constraints. Gutiérrez-Santiuste et al. [13] found relatively low communication obstacles, and students generally viewed virtual instruction positively, despite technical issues. However, Sari and Nayir [14] argued that classroom management is vital in pandemic-era distance education as traditional success criteria don't always work well in virtual environments due to communication barriers from limited internet access and digital technologies, impacting students' readiness for remote learning.

Amid the Covid-19 pandemic, students were given greater autonomy for self-regulation in emergency remote learning (ERT), but this autonomy brought challenges such as uncertainty about isolation duration, home-based distractions, and decreased social interactions [15]. Despite higher education students potentially possessing effective cognitive and metacognitive strategies for self-regulation, they often struggled with motivation, support, and digital competencies [16]. Furthermore, learning at home presented additional hurdles like suboptimal study spaces, isolation, and resource management, as students lacked access to familiar university environments, potentially affecting their concentration [17].

Fadde and Vu [18] emphasize that online learning comes in various formats, such as fully synchronous, fully asynchronous, and blended, each presenting distinct challenges and opportunities; fully

asynchronous learning, while time-efficient, can lack the interactive feedback often associated with synchronous sessions, leaving educators and students desiring more immediate engagement. Gillet-Swan [19] points out that blended learning involves the scheduling of both online and in-person meetings, providing flexibility for collaboration but possibly leading to inefficiencies; however, learning from home can introduce more distractions than attending on-campus classes.

Meanwhile, Leow and Lee [20] research highlights that the impact of online discussions on students varies significantly, with the need to address communication barriers arising from inadequate digital facilities to enhance students' sense of belongingness and autonomy in glitch-free online learning environments. This improved experience fosters students' motivation to engage actively in virtual classes during remote learning. Conversely, a study involving 1,008 undergraduate students transitioning from in-person to virtual classes in Spring 2020 found that 57 percent struggled to sustain their interest during online lectures compared to physical ones, with 65 percent experiencing reduced opportunities for peer collaboration and 47 percent expressing difficulty in maintaining motivation [21].

Nevertheless, Boyarsky [22] noticed the rise of hybrid learning, blending in-person and remote methods to provide flexible learning experiences. This approach encourages engagement with learning materials, collaboration, and communication between students and educators, even when not physically in class. Real-time synchronous communication benefits group work, presentations, and discussions, while asynchronous methods offer supplementary instructions. Gurubatham and Williams [23] advocates for the enhanced value of hybrid learning, emphasizing curriculum quality over cost-cutting in Malaysian universities. This approach allows educators to engage in higher-order teaching processes aided by technology and ensures that universities stay relevant by fostering a sense of affiliation and belonging among students in the hybrid learning era.

The literature in this section mainly emphasizes the expectations from higher education instructors, despite some articles discussing student perspectives on addressing these challenges. Limited research focuses on strategies that students can use to alleviate communication barriers in remote learning during the pandemic. Extended pandemic-related school closures have consequences beyond immediate learning loss, impacting human capital and economic opportunities in the long run, emphasizing the need for a re-evaluation of traditional teaching methods, particularly during emergency situations, to address students' challenges.

### **3.0 Methodology**

This research adopts a qualitative approach, focusing on phenomenology, to explore into personal experiences related to digital inequalities in online learning during the Covid-19 pandemic. Through in-depth interviews, the study aims to gain a deeper understanding of how individuals have been affected by this issue and the factors that have influenced their experiences. The research is particularly interested in investigating the impact of digital inequalities on B40 students, shedding light on the challenges faced by both students and educators due to disparities in digital access. It mainly draws insights from 20 informants, including undergraduate students aged 18 to 25 from various Malaysian higher education institutions, with a specific emphasis on B40 students residing in urban and rural areas. The rationale of sample selection was due to the nature of higher education learning that requires more digital devices usage compared to other learning levels like primary and secondary education. Additionally, input from higher education lecturers is sought to understand their perspectives on digital inequalities in online learning during the pandemic.

### 3.1 Data Analysis

In qualitative research, researchers actively engage in simultaneous data collection and analysis, employing constant comparison and reflexivity to iteratively refine research questions and methodologies based on emerging insights, thereby enhancing validity and trustworthiness [24]–[26]. The current research, aiming to explore the challenges of digital inequalities in online and remote learning on b40 students during the covid-19 pandemic and beyond, aligns with the flexible nature of the IPA approach discussed earlier. IPA's adaptability allows for an in-depth exploration of the experiences and contextual intricacies of both students and educators, promoting understanding of the challenges they face in the digital learning landscape [27].

### 4.0 Findings and Discussion

In this study, Interpretative Phenomenological Analysis (IPA) was used to explore and interpret the participants' subjective experiences, events, and conditions. Unlike other research methods that aim for concise statements, IPA delves into the rich, subjective meanings individuals associate with their experiences [27]–[29]. This depth-first approach enables a comprehensive understanding of the complexities of the human experience. The analysis yielded a framework with three main superordinates, each with smaller subordinates. This structured approach helps organize and comprehend the diverse responses and perspectives shared by the participants, allowing for a comprehensive presentation of the insights derived from the interviews.

**TABLE 1**

Superordinate And Subordinates For Challenges Brought By Digital Inequalities In Online And Remote Learning Faced By The B40 Students During The Covid-19 Pandemic.

Superordinate	Subordinates
Access to Communication	Absence of spontaneous interactions
	Difficulty in group collaboration
	Limited in-class participation
	Unclear instructions
Access to Technology	Inadequate devices
	Insufficient storage
	Lack of personal devices
Access to the Internet	Limited Internet connectivity
	Bandwidth and speed issues
	Affordability constraints

#### A. Access to communication

The shift to online and remote learning has brought communication challenges to the forefront, particularly the issue of miscommunication within computer-mediated communication, which is vital for online learning [30]. Communication barriers are inherent to the communication process and can be amplified in the context of distance communication, as seen in online and remote learning. Educational institutions have employed various strategies for online education, including asynchronous resources available on university websites and synchronous methods involving real-time video conferences or webinars, which transmit substantial data, audio, and video to remote students [31], [32].

In online and remote learning, various communication challenges emerge, such as the lack of

spontaneous interactions, issues with group collaboration, limited in-class participation, and unclear instructions. These nuanced aspects present significant obstacles in remote education's communication framework and require careful research and attention.

*a. Absence of spontaneous interactions*

In traditional in-person classes, communication is nearly instant, facilitating student connections, quick feedback, and resolving confusion. However, online learning's asynchronous nature can lead to delayed responses, creating opportunities for miscommunications and misunderstandings [33]. Virtual interactions in distance education may not effectively nurture strong communication skills, as students primarily engage through screens.

Throughout our study, informants frequently voiced frustration regarding their inability to receive immediate clarification during virtual classes, despite using features like the 'raise hand' or chat box for inquiries.

*During lockdown, online classes have had a detrimental impact on students' self-esteem, making it difficult for them to focus because they prefer in-person classes. In physical classes, they can communicate face-to-face and have real interactions. However, in online classes, students often can't turn on their cameras due to internet issues, and at times, they can't even join the class. (Lecturer 8)*

*If it's an online class, there are options to "raise your hand" or use emojis, but some lecturers may not notice when students do that. So, the video conferencing platform doesn't really help much. However, for regular meetings, it's fine, but for classes, it's not very suitable. (Student 10)*

*I prefer regular classes because I can easily ask the lecturer when I don't understand something. Online classes have obstacles like internet issues, and sometimes the lecturer doesn't hear me when I try to communicate. In regular classes, there's better two-way communication, making it easier for me to grasp the subject, which is why I find them more helpful than online classes. (Student 8)*

Additionally, language barriers were a notable impediment to spontaneous communication in virtual classes, particularly for students who struggled to express themselves comfortably in English. These barriers not only hindered individual expression but also had the potential to disrupt the overall class dynamic by fostering misunderstandings and misinterpretations, leading to confusion and frustration among peers.

*I'm better with English, but my friends have trouble understanding the course leader's English-heavy teaching. They don't want to tell the course leader about it and think the lecturer will clarify things later. (Student 2)*

This finding gouged the communication challenges and drawbacks of online learning. It is characterized by delayed and asynchronous interactions that lead to misunderstandings and hinder immediate clarification. Language barriers exacerbate these issues, impacting the class dynamic as students struggle to express themselves comfortably in English. Often, students avoid addressing these challenges with the lecturers. In contrast, the preference for face-to-face interaction in physical classes highlights the need to address communication challenges in online and remote learning to enhance the overall educational experience.

*b. Difficulty in group collaboration*

Online group work is challenging due to the lack of nonverbal cues and face-to-face discussions, which are essential for building rapport and trust among group members [34]. Students often prefer working alone due to difficulties in scheduling group meetings, differences in skills and task delegation, and disruptive behavior. The absence of regular attendance and in-person interactions worsens the situation, leading to ineffective collaboration. B40 students, who face device and internet access challenges, are particularly affected by these issues, hampering their participation in group activities.

*In the first semester, everyone wanted to excel and do their best on assignments. However, I had a problem with my group assignment because I couldn't fully focus on it. My group mates called me a "free rider" since I consistently submitted my part at the last minute. Another group member did most of the work, and I wasn't very competent at that time. (Student 1)*

*The issue is primarily with one groupmate who has an attitude problem. They consistently fail to contribute to assignments, even after reporting the issue to the lecturer, who gave them a chance to improve. (Student 3)*

Aside from that, some students took advantage of the absence of face-to-face interaction by disappearing from their groups without explanation. Pre-existing social circles among students could also lead to discomfort when working with those outside their group. If not addressed, this behavior could impact students' academic performance.

*In my class, my classmates often form groups without discussing it in the class group chat. This leaves my friends and me with less competent and reliable group members, making us feel left out and outcasted. (Student 4)*

*I remember this person was a free-rider from start to finish. I had to compile 10 pages of proof of her not contributing, which I sent to the lecturers. She might have been upset, but I didn't mind. I have a 50/50 relationship with most peers, but I can't stand these free riders. (Student 7)*

*We have a "free rider" in our group, and I don't hesitate to inform the lecturer, even if they're part of our group. During group assignments, this member doesn't participate, remains silent, and is unresponsive in our group chat, like a sleeping partner. (Student 8)*

Effective strategies for improving online group work should focus on providing tools, equal technology access, and a fair and welcoming environment for students. Implementing these strategies enhances online collaboration and benefits students from various backgrounds, regardless of their locations. This research emphasizes the significance of these strategies in enhancing the online group work experience for a diverse range of students.

*c. Unequal in-class participation*

In the context of remote learning, whether synchronous or asynchronous, the level of student engagement is a critical factor, significantly impacting the quality of their educational experience [35]. Engagement is a linchpin of effective learning, yet during the pandemic, online and remote learning has

revealed a stark disparity in engagement levels, particularly among students from low-income households [36]. Rather than seeking assistance when encountering challenges, students from marginalized backgrounds often grapple with their difficulties in silence or resort to alternative resources that may not adequately support deeper learning [37].

In our study, we observed a similar trend where B40 students face obstacles in active participation in synchronous virtual classes. Limited access to devices and reliable internet connections often hinders their full engagement and timely assignment completion. Unfortunately, some educators unintentionally prioritize students with better resources, leaving those in more challenging circumstances on the periphery of attention during online classes.

*We depend on past year questions, and the lecturer provides detailed feedback for correction, which applies to both in-person and online settings. However, only a few students are selected for this process online, allowing others to relax. The unstable internet connection during that period made it hard to concentrate online. (Student 3)*

*In physical classes, the lecturer personally helps with code issues at your table, but online, you're on your own, and if they miss your messages, they won't ask what's wrong. (Student 5)*

Aside from that, online and remote learning can lead to larger class sizes, making participation challenging. For example, one informant had to attend a massive online lecture with 800 students, making it nearly impossible to communicate effectively with peers or lecturers.

*Last semester, I had two classes with 800 students each, one for philosophy and the other for psychology. In the psychology class, online lectures on WebEx were challenging. Microphone issues, a crowded comment section, and difficulties getting questions noticed made it frustrating. I had to resort to emailing the lecturer for answers. (Student 7)*

In essence, unequal participation is not merely a matter of uneven engagement; it is a significant concern that can impact students' satisfaction and motivation in virtual learning environments, ultimately affecting the quality of their educational experiences and their ability to reap the full benefits of collaborative learning. Addressing this challenge is pivotal in creating a more inclusive and motivating virtual learning environment for all students.

#### *d. Unclear instruction*

In successful classrooms, clear instructions and expectations are crucial. However, in online and remote learning, many students were not provided with adequate explanations of in-class tasks [38], [39]. This lack of clarity led to difficulties in understanding topics and completing assignments, as mentioned by several informants in this study. Some instructors seemed to assume students could deduce assignment guidelines from live lectures or that they would revisit these instructions in recorded formats. In one instance, this situation created a deadlock, prompting students to seek alternative resources for assignment understanding.

*In online classes, instructions were unclear, especially when some lecturers were absent. We had varying preferences for file renaming, but one lecturer didn't provide any guidance. When we sought clarification but got no response, we assumed we could rename files as needed. When the lecturer returned and scolded us for not renaming the files, it was surprising as we had tried to seek clarification, but he was unavailable. (Student 1)*

*In-person classes have better reception than online ones. Reviewing pre-recorded content in online classes doesn't always improve understanding. Online classes allow immediate questions, which is an advantage. However, some lecturers use pre-recorded content, which can be unfair to current students as it doesn't address current concerns. (Student 10)*

Apart from having trouble understanding the instructions, a number of individuals mentioned that the assignment is difficult due to the materials, expectations, and the absence of guidance from their lecturers.

*Simple assignments are easy to understand, but with complex ones like business plans, we get confused about the format. Lecturer-provided examples don't always clarify our doubts, and when we seek help, the responses may not satisfy us as students, so we often end up figuring it out on our own. (Student 2)*

Unclear instructions in online and remote learning are a major challenge affecting students' educational experiences. This issue can lead to confusion, frustration, and hindered learning outcomes. To enhance the effectiveness of remote education, educators should provide clear and comprehensive instructions, offer timely feedback, and maintain open communication channels with students. Encouraging students to seek clarification and investing in resources and training for educators and students are essential steps to address this challenge.

### *B. Access to technology*

While developed countries were well-prepared for online learning, developing nations struggled to meet the basic requirements for e-learning [40]. Online learning became a promising beacon overnight to ensure there were no disruption towards students' learning process [41], [42]. However, unequal accessibility to online platforms across the globe made it nearly impossible for students to participate in online learning due to the lack of online devices and remote connections including South Asian countries [41], [42]. This study had subcategorised three main challenges in the tools and devices category, namely inadequate devices, insufficient storage, and lack of personal devices.

#### *a. Inadequate devices*

While a substantial 99 percent of students possess devices capable of accommodating their academic needs, some students still encounter challenges, like missed deadlines or classes, due to device malfunctions or inadequacies [43]. In line with Gierdowski [43] findings, this study revealed that several informants interviewed shared similar experiences. They reported that their devices struggled to keep pace with the demands of online learning, often exhibiting performance issues, including mid-lecture lags or disruptions during assignments. These inadequacies led to problems such as overheating, malfunctioning, sluggish performance, and unexpected shutdowns. Consequently, some students were forced to skip classes or submit assignments late, disrupting their learning experience.

The use of inadequate devices plays a pivotal role in impacting students' motivation for online learning. Inadequate and outdated devices often struggle to efficiently run modern learning applications and platforms, leading to frustrating experiences characterized by slow loading times, software crashes, and technical difficulties. As a result, students may become demotivated, with these challenges disrupting the flow of their learning and eroding their enthusiasm for their studies.

*Using apps like Eclipse during online classes, my laptop slows down significantly, which isn't a problem in physical classes with lab PCs. This slowdown in online classes forces*



*me to attend class on my phone while running the apps separately on my laptop to avoid lag and slowdown issues. (Student 5)*

*Many students with less advanced laptops or computers face difficulties using the software because it demands a lot of RAM. This makes the app slow, causes lag on their laptops, and can be exhausting to deal with. However, for us, there are no issues because our lecturers have provided around 20-30 tutorial videos for us to use the app effectively. (Student 4)*

The statements above illustrate the issue, as students expressed dissatisfaction with using specific apps for online classes, particularly Eclipse, due to their laptops slowing down. They explained that if they were in physical classes, they would use lab PCs, but using their slow laptops created difficulties. To cope, they had to attend class on their phones and open the apps on their laptops separately to prevent lag and slowness. Students with less advanced computers found that other software, which required a lot of RAM, caused their laptops to lag and made the experience tiresome. In contrast, other students had no issues using the app and benefited from tutorial videos provided by their lecturers.

It is important for universities to considering students' home learning environments when designing courses to ensure accessibility across various devices and to provide technical support, addressing these technological challenges to maintain and enhance students' motivation and overall success in the digital learning environment. This approach creates a more inclusive and effective educational experience.

#### *b. Insufficient storage*

The issue of inadequate storage on students' devices in online education is a persistent challenge, especially in computer-centred learning where digital resources demand ample space. Cloud storage, as highlighted in the studies of Alimboyong and Bucjan [44] and Al- Malah et al. [45], plays a crucial role in facilitating collaboration between educators and students. the adoption of cloud technology can significantly improve access to digital education, emphasizing the need to address the storage problem for seamless online learning experiences [46]. However, it is important to note that only a few participants in the study faced problems with limited computer storage that hindered their online learning experience. Some of them had to use external devices to store large educational materials like recorded lectures, which consume a lot of computer space. Others resorted to deleting older or rarely used files and applications to create room for their online learning materials.

*In my degree program, we heavily rely on resource-intensive software like Microsoft Visual Studio for programming and Multisim for circuit analysis. I recently upgraded my computer with an SSD and more RAM, but storage remains a challenge as some software installations can consume a significant amount of space, easily filling up my limited 250GB SSD. (Student 10)*

*Storage is indeed a hassle. I'm a bit of a gamer alongside my studies, with games like PUBG and APEX on my phone. To manage storage, I keep only the games I'm really into and delete the rest, as modern games can take up 6-8GB each. This way, I make room for my study materials. (Student 3)*

*Eclipse is for advanced coding but demanding on my laptop, so I don't use it much. For group assignments, I write my code separately and have a friend copy it into their Eclipse. I think a computer with at least 8GB of RAM is essential. (Student 5)*

Students have faced ongoing computer storage challenges, particularly in technical applications like Microsoft Visual Studio, Multisim, and Eclipse. These applications are accessible but resource-intensive, often exceeding 20-40GB per installation. Some students have upgraded to SSDs and expanded their RAM to cope with these demands, but storage limitations persist. The key takeaway is the importance of providing adequate hardware and storage solutions to meet academic and coding software demands. Considerations include cloud-based solutions, larger storage capacities, and educating students on effective storage management and system optimization to enhance their learning experiences.

*c. Lack of personal devices*

In Malaysia, the Ministry of Education promptly responded by launching a survey during the initial phases of the pandemic and the subsequent Movement Control Order (MCO). This survey revealed a pressing concern – a substantial portion of students encountered challenges in obtaining the necessary hardware and electronic devices crucial for participating in remote learning during the pandemic [47]. Chan et al. [47] highlighted this issue, noting the staggering statistic that nearly 36.9 percent of students lacked the personal electronic devices essential for engaging in remote learning. This situation disproportionately affected low-income families, who were often ill-equipped to ensure that their children could actively participate in the online learning environment. The primary issue for these families was their inability to provide the necessary electronic devices, which led to the adoption of sharing arrangements [48]. These sharing arrangements involved multiple family members, including students, relying on a single device, thus significantly limiting access to online education.

This study found a similar trend, where students from low-income households, especially those in the B40 income group, had to share devices with family members. This lack of personal devices and the need to share posed significant challenges for these students in attending online classes. They often had to miss classes, affecting their attendance, or negotiate with instructors for alternative attendance options, like viewing pre-recorded lectures.

*B40 students in our faculty face the most challenges, with over 50 students in this category. Mentors assessed their readiness and limitations, finding that many lacked laptops. It took over two weeks to raise the issue, and eventually, aides were allocated. B40 students often struggle, relying on borrowed or shared laptops or smartphones due to limited facilities. (Lecturer 4)*

*Many QIU students are from the B40 category and face device-related issues for online classes. The university allowed them to borrow needed devices without extensive advertising, following a philosophy of 'leave no one behind.' Lecturers personally assisted some students, even using their own devices to help them. (Lecturer 6)*

The first two quotes shed light on the challenges faced by B40 students in adapting to online learning. The first quote reveals how a lecturer reached out to these students, assessing their readiness, and securing necessary aids like laptops. The second quote highlighted the university's commitment to inclusivity by providing devices to students in need.

*During the early stages of the pandemic, my brother and I had to take turns attending our online classes because they often clashed. We discussed our situation with our lecturers, and they understood. This arrangement has continued for over a year to ensure we both have a chance to attend our classes. (Student 1)*

*In 2020, I shared my laptop with my school-going younger sibling. Last year, one of my other siblings got a new phone, and the old one was passed down to the school-going sibling. We have three siblings studying at the university, so if one doesn't have a class, we rotate the use of the phone and laptop - whoever's free can use the available device. (Student 9)*

The quotes depict students taking turns to share limited devices and their adaptability in managing device usage within the family. These situations highlight the lack of personal devices, particularly among low-income students. Educational institutions and educators are working to address this issue by lending devices and assisting B40 students, emphasizing the need for continued support, affordable devices, and digital access for low-income students.

### *C. Access to the Internet*

One of the central challenges of online learning lies in equitable access to the Internet. While online education has emerged as a vital alternative to ensure the continuity of the teaching and learning process, it has revealed a stark digital divide, particularly impacting marginalized students. Many of them cannot afford internet subscriptions, or they encounter connectivity issues stemming from their geographical location. Even when they do have access to the internet, issues related to connection speed and bandwidth further exacerbate the problem [49]. Furthermore, the quality of internet connectivity between campus and students' homes plays a crucial role in the digital divide, impacting student-lecturer communication during online lessons by revealing challenges related to high-speed broadband accessibility, including limited bandwidth, inadequate coverage, and slow internet speed [16].

To bridge this digital gap and ensure a more inclusive educational experience, it's imperative to address these connectivity disparities. Efforts should be made to provide affordable internet options and infrastructure improvements that can enhance both coverage and connection speeds. Furthermore, educational institutions and policymakers should prioritize the development of strategies and support systems that cater to students facing internet-related challenges, ultimately fostering a more equitable learning environment.

#### *a. Limited Internet connectivity*

Despite Malaysia's advancements in various sectors and its aspiration to compete at a global level, it lags behind in terms of internet accessibility and telecommunication coverage compared to its neighbouring countries [50]. Online learning offers flexibility in scheduling and access, contingent on reliable internet connectivity, yet it introduces concerns encompassing internet inaccessibility, data quota constraints for specific applications, and potential impacts on students' psychological well-being [51].

*In my rural village, internet disruptions are common, and sometimes there's no connection at all. To access the internet, we must travel 45 minutes to Kuching, as there are no nearby cybercafes. Many friends in my village face similar issues, so when our class schedules overlap, we travel together to Kuching to use a café with WiFi access, which costs us RM10 per trip - a significant expense for me. (Student 1)*

*My main issue is the unstable village internet. We rely on mobile networks, with Maxis as my current provider. Finding a signal can be challenging, and the strongest is near the cemetery. There's no WiFi in my village, and nearby WiFi doesn't cover our area, so it's*

*not an option. I usually use my data hotspot for my laptop, but if the signal is weak, I use my phone. (Student 3)*

*I recall some students had to present from their cars, and one student even recorded her presentation in a rubber tapping estate with the jungle as a backdrop. It was quite touching to see the lengths they went to in order to continue their education. It was an eye-opening experience. (Lecturer 9)*

The study found that students across Malaysia, especially in rural areas, face significant challenges in accessing the internet. Many have to travel long distances to reach hotspots, often located in unconventional places, like cemeteries. Some students even resort to sitting in their cars by the roadside to secure an internet connection for online classes. This highlights the stark digital disparities in the country and the extraordinary efforts students make to access education online.

#### *b. Bandwidth and speed issues*

Online education has become increasingly prevalent, offering an alternative to traditional in-person teaching. However, it relies heavily on strong and stable internet connectivity. Webinars and online lectures, for instance, have proven effective in replacing physical classroom sessions. Still, they pose significant challenges for students with limited access to reliable internet, often due to geographic factors [52].

In the context of internet connectivity, it's crucial to distinguish between bandwidth and speed. Bandwidth refers to the range of frequencies that can be processed, encompassing the lowest and highest attainable frequencies, which affects signal processing. In contrast, speed, in simpler terms, reflects how quickly internet tasks can be completed, and it is directly influenced by the available bandwidth [53]. The issues were illustrated in the findings discovered below:

*When a lecturer activates features like the whiteboard, it puts extra strain on the receiver's bandwidth because it's essentially another application within an application. For example, when using Zoom for an interview, having only microphones on consumes less bandwidth. But with microphones, cameras, screen sharing, and additional apps, multiple layers of applications run. In classes, it's important to ensure no other tabs are open alongside these factors, requiring careful consideration. (Lecturer 2)*

*I use it often, and even for recording meetings, the file size ends up quite large. A two-hour meeting can create a video file over 1GB, and downloading it takes a long time, possibly over an hour, depending on home internet speed. On campus, there's no issue; the Wi-Fi is better. However, during my foundation year, there were Wi-Fi problems, possibly due to lack of upgrades. (Student 10)*

*For my course, we must download many applications. Subjects like "Maths for Computer Science" or Java coding require downloading software and environments. This is challenging because these apps are large, and my home Wi-Fi is slow. It can take two to three hours to download one, which is difficult as physical class provides faster options through university Wi-Fi or the lab. (Student 5)*

The study showed that students frequently face bandwidth problems during online classes, leading to disruptions like frozen screens and lag. Furthermore, the use of multiple features in live classes, such as

cameras, microphones, whiteboards, and simultaneous recording, can strain older devices, affecting the quality of online learning experiences.

*c. Affordability constraints*

The rapid shift to online learning during the COVID-19 pandemic created significant challenges for students, particularly those from low-income households. With face-to-face teaching cancelled and campuses closed, students were thrust into a new reality where their home internet settings often fell short of the requirements for online learning [54]. Many of these students, lacking access to home Wi-Fi, had to rely on mobile data and mobile hotspots to connect to their online classes. As the study indicates, some students had to travel to areas with stronger internet signals to use mobile data or hotspots effectively.

To cope with internet issues, students turned to mobile data plans, but this came with problems. These plans are costly, with basic prepaid plans starting at 25 Malaysian Ringgit monthly [55]. When they reached their data limits, they often had to share with family members, depleting the plan and requiring frequent top-ups. This financial burden added to the challenges faced by low-income households. Several informants emphasized this issue.

*We rely on mobile data as we lack home Wi-Fi. I use a prepaid plan with limited data and slow internet speed. A 3mbps package wasn't sufficient, especially for long classes that used a lot of data. When my brother used the hotspot, our data ran out quickly. During final exams, the internet cut off due to data depletion. The RM45 package led to monthly expenses of RM100 or more, even with a slightly more expensive RM65 package, which still wasn't enough. (Student 1)*

*We rely solely on mobile data without any Wi-Fi. I use Celcom, which costs RM35 per month for a 10GB plan. However, it doesn't last a full month, maybe just two weeks. I often have to ask my sibling for a hotspot, which can sometimes lead to arguments. During an urgent exam, I had to top up again after the internet seemed to disappear. (Student 8)*

*Some classes use Google Meet, and some lecturers provide video lectures. I collect and download the video lectures on the weekend because it saves me the cost and effort of going to Kok Lanas to download them and also conserves mobile data. (Student 9)*

Mobile data serves as a workaround for students lacking home Wi-Fi, but it introduces financial challenges due to costly plans and limited data. Low-income households find it difficult to afford, resulting in frequent data sharing and top-ups, worsening their financial burden. This issue affects many students, emphasizing the need for affordable and unlimited data access for equitable education.

## **5.0 Conclusion**

In summary, this study has identified three significant challenges faced by low-income students during the Covid-19 pandemic and online learning. These challenges relate to access to technology, the internet, and communication. While these issues affect all students, they are particularly challenging for those from low-income backgrounds. To create a fair and inclusive educational landscape, policymakers must address these digital disparities, ensuring that every student, regardless of their socioeconomic status, has equal opportunities to succeed in online and remote learning environments.

## 6.0 References

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