



OPEN ACCESS

EDITED BY

Francisco Manuel Morales,
University of Granada, Spain

REVIEWED BY

Juan Pedro Martínez-Ramón,
University of Murcia, Spain
José Manuel Ortiz Marcos,
University of Granada, Spain

*CORRESPONDENCE

Bee Seok Chua
✉ chuabs@ums.edu.my

RECEIVED 05 January 2023

ACCEPTED 21 April 2023

PUBLISHED 12 May 2023

CITATION

Wider W, Chua BS, Mutang JA and Pan LC (2023) Secondary school students' school-related stressors during the coronavirus disease (COVID-19) pandemic in Sabah, Malaysia.
Front. Educ. 8:1138226.
doi: 10.3389/feduc.2023.1138226

COPYRIGHT

© 2023 Wider, Chua, Mutang and Pan. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Secondary school students' school-related stressors during the coronavirus disease (COVID-19) pandemic in Sabah, Malaysia

Walton Wider¹, Bee Seok Chua^{2*}, Jasmine Adela Mutang² and Lee Ching Pan²

¹Faculty of Business and Communications, INTI International University, Nilai, Negeri Sembilan, Malaysia,

²Faculty of Psychology and Education, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

Introduction: Due to the rapid spread of the COVID-19 pandemic and the disruption of education systems worldwide, secondary schools in Malaysia have shifted to online classes to ensure educational continuity. Therefore, it was necessary to investigate the various effects of the COVID-19 pandemic on secondary school students.

Methods: A self-reported survey with closed and open-ended questions was used to collect data involving 1,067 secondary school students from eight schools in Sabah, Malaysia. The participants were mostly male (53.4%), with a mean age of 14.8 (SD = 1.64). The study involved students from various levels/grades, including transition class, forms 1–5, lower six, and upper six.

Results: Students faced a variety of school-related stressors, including academic failure due to a poor online course; general mental health issues; a poor internet connection; a lack of in-person interaction; a SOP restriction; an inability to focus; too many homework assignments; burnout; becoming lazier; home conditions; and financial difficulties.

Discussion: The implications for classroom practice, policy formulation, and future research are examined.

KEYWORDS

COVID-19, movement control order, secondary school students, mental health, school-related stressors

Introduction

When COVID-19 was declared a pandemic, a disease that threatened globally, approximately 87% of students worldwide, or 1.5 billion students, were affected by school closures (Winthrop, 2020). Globally, schools in more than 180 nations have been closed (UNESCO, 2020). When schools are closed, it causes a disruption in the learning activities that take place inside the schools (Engzell et al., 2021). This generates the notion of devising a method to prevent further harm to distance learning activities (Child, 2020; UNESCO, 2020). Flattening the curves of the COVID-19 pandemic requires a lengthy period of time rather than a quick one. During the lockdown, home-based teaching and learning, also known as PdPR, was implemented so as to limit the amount of disruption caused to school activities (Annamalai, 2021). At this time, many educational institutions are making the transition from traditional classrooms to virtual ones (Lockee, 2021). Students are

required to practice social distance by participating in the virtual learning environment (Pelikan et al., 2021). Concerns exist as to whether these students will prepare for the new learning environment, such as maintaining a private space for student life, and whether they will be well-equipped to participate in virtual learning in terms of electronic devices and internet access (García and Weiss, 2020; Al-Maskari et al., 2022). Even for students with access, would the environment be conducive to learning? Given these disruptions, many predictions have been made regarding the impact of the pandemic on learning, activities, friendships, and mental health (Racine et al., 2020).

Theoretical framework

To gain a deeper understanding and tackle the stressors faced by secondary school students during PdPR, a combination of theoretical frameworks, including the socio-ecological model, the Technology Acceptance Model (TAM), and the self-determination theory, can be utilized. As per Bronfenbrenner (1999), the socio-ecological model provides a comprehensive understanding of human behavior by examining the interactions between different environmental levels, such as individual, interpersonal, organizational, community, and public policy. TAM, as described by Davis (1989), is significant as it “examines the ease of use and usefulness of technology, as well as other external factors that influence an individual’s acceptance and utilization of technology.” Self-determination theory, according to Deci and Ryan (2000), is a psychological framework that focuses on intrinsic motivation and the fulfillment of basic psychological needs such as autonomy, competence, and relatedness.

The socio-ecological model allows us to examine the multiple factors that impact students’ ability to adapt to PdPR during the pandemic, including socioeconomic status, personal beliefs, interpersonal relationships, and the larger organizational and community contexts (Bronfenbrenner, 1999; Means and Neisler, 2020; Olaniyan et al., 2021). TAM highlights how students’ attitudes and experiences with technology, such as a lack of access to appropriate devices or stable Internet connections, and difficulties adapting to new learning platforms, can contribute to school-related stressors (Davis, 1989; Coman et al., 2020; Maheshwari, 2021). Meanwhile, self-determination theory helps us understand how the pandemic and the shift to PdPR may hinder students’ ability to meet their psychological needs for autonomy, competence, and relatedness, leading to decreased motivation, disengagement, and stress (Deci and Ryan, 2000; Müller et al., 2021; Capon-Sieber et al., 2022). By evaluating how the pandemic has affected students’ sense of autonomy, competence, and relatedness within the context of PdPR, we can better understand the sources of academic stress and identify potential strategies to alleviate it (Al-Kumaim et al., 2021).

By combining these theoretical frameworks, we have compiled a list of potential school-related stressors affecting secondary school students during PdPR. These stressors include limited access to technology and reliable internet (Adnan and Anwar, 2020), difficulty adapting to new learning platforms (Dhawan, 2020), decreased autonomy (Šakan et al., 2020), decreased competence and motivation (Wong, 2023), isolation (Loades et al., 2020), the effect of socioeconomic status (Zhang et al., 2022), the impact of interpersonal relationships (Kallander et al., 2021), inadequate public policies (García and Weiss, 2020), disengagement (Borup et al., 2020),

decreased motivation (Díaz-Noguera et al., 2022), and the impact on mental health and overall well-being (Chaturvedi et al., 2021).

Therefore, the aim of this study is to investigate these school-related stressors from the perspective of the students who are most affected by PdPR. By identifying and addressing these stressors, we can contribute to the development of more effective strategies and interventions to support students’ learning, well-being, and overall success during these challenging times. Researchers can use the socio-ecological model (Bronfenbrenner, 1999), TAM (Davis, 1989), and self-determination theory (Deci and Ryan, 2000) to design targeted interventions that address the specific needs and concerns of students in this challenging educational landscape.

Literature review

Home-based teaching and learning (PdPR) in Malaysia

The Malaysian government implemented the Movement Control Order (MCO) in March 2020 in response to the COVID-19 pandemic, which resulted in school closures and the subsequent adoption of Home-Based Teaching and Learning (PdPR) (Kamarudin et al., 2022). To support the transition, the Ministry of Education (MOE) launched various initiatives, including the use of online platforms such as Google Classroom and Microsoft Teams, as well as the development of educational television programs through the “TV Pendidikan” initiative (Izhar et al., 2021).

However, several obstacles arose, particularly in terms of technology access and internet connectivity. Many students, especially those in rural areas, face difficulties accessing stable internet connections and suitable devices for online learning, leading to concerns about a widening achievement gap between urban and rural students (Illias et al., 2020). Additionally, the sudden shift to PdPR highlighted the lack of readiness among teachers to implement online teaching strategies (Lukas and Yunus, 2021). Many educators lacked familiarity with digital tools and platforms, making it challenging to deliver engaging and interactive lessons (Kamarudin et al., 2022). They also faced difficulties in monitoring student progress and providing timely feedback, which is essential components of effective teaching and learning (Sim et al., 2021). Furthermore, teachers were expected to adopt new pedagogical approaches while overcoming their own technological limitations (Jiew et al., 2022). The lack of face-to-face interaction also had a negative impact on student motivation and led to an increase in instances of academic dishonesty (Wahab et al., 2022).

Despite these challenges, PdPR has also presented opportunities for educational innovation. Teachers have been compelled to explore gamification and the use of multimedia resources to maintain student interest and motivation (Al Breiki and Yahaya, 2021). The shift to PdPR has also emphasized the importance of self-directed learning, fostering greater student autonomy and responsibility for their own education (Zayapragassarazan, 2020). Teachers have also been given the chance to experiment with different teaching strategies, such as flipped classrooms and project-based learning (Tan et al., 2022), which have made learning more engaging and relevant while enabling students to acquire crucial 21st-century skills (Pimdee et al., 2023).

School-related stressors during PdPR

During the COVID-19 lockdown, students experienced academic-related stress, such as depression, due to school closure and lack of social interaction (Asanov et al., 2021). The uncertainty surrounding university placement or postsecondary school increases the anxiety of graduating high school students. In addition to preparing for the examination, the pressure is exacerbated by the inevitability of family and friend expectations when students are challenged to adapt to a virtual learning environment while confined to their homes (Cohen et al., 2020; Giannopoulou et al., 2020). Students' mental health is disrupted; they experience stress and depression in order to adapt to the transition from offline to online study mode, while also being anxious about the outbreak (Alemany-Arrebola et al., 2020; Asanov et al., 2021). A survey of students between the ages of 10 and 17 found that poor comprehension of online coursework led to demotivation, boredom, loneliness, and social isolation (Korzinski, 2020). This demonstrates that social interaction is essential for students to successfully pursue their online studies, despite working in isolation. Schwartz et al. (2021) found that students tend to be able to adapt to the virtual study mode during a COVID-19 lockdown if their parents or guardians are involved in their online school activities and express concern.

A vast body of literature has been covered in Malaysia, with an emphasis on institutions of higher education (e.g., Chandra, 2020; Ismail et al., 2020; Cosmas, 2022). Due to the similarities in characteristics between secondary schools and higher tertiary institutions, however, this paper will examine the perspective of secondary school students. Foong and Yit (2021) reported that Malaysian university students felt anxious about remote learning due to network instability and the less user-friendly design of the online platform. It consumes their time to navigate the system itself prior to entering the curriculum or theory. In addition, the students' daily routines cause anxiety due to home isolation. Sheela et al. (2020) conclude that the virtual learning environment is one of the variables that induce anxiety in college students. Several major stressors have a negative impact on the mental health of online students. For example, financial constraints, the complexity of virtual learning, and career and academic uncertainty.

Annamalai (2021) conducted a mixed-methods study to investigate Malaysian secondary school students' perspectives on online learning at home during social distance. Due to the abrupt change, students were unprepared to switch to virtual mode while adjusting to home isolation. Several themes, such as dissatisfaction with the online learning environment, are further supported by the qualitative results. The students also complain about being unable to concentrate due to cognitive overload, less interaction during online study creating a learning engagement gap, scheduling uncertainty for online classes, and technology issues. Zaki et al. (2021) concluded that secondary school students in Peninsula Malaysia experience mental health issues during social distance, such as limited daily activities impacting their emotions, fear of highly contagious disease, exhaustion from revising in a non-conductive learning environment, poor internet connection, home role conflict, and financial constraint. As a global consequence of the pandemic, classroom activities are disrupted. Due to a lack of engagement, remote learning is not an ideal option for students to achieve optimal performance in a western context. Managing the

virtual environment is also difficult (De Haas et al., 2020; Wilczewski et al., 2021). According to a survey conducted in Sabah, students' academic and non-academic activities were running smoothly, and their engagement with online study activities during lockdown was positive (Esa et al., 2021). In contrast to previous research (e.g., Zaki et al., 2021), the online study mode caused students to experience stress. The difference may lie in their capacity to accommodate devices required for online study setup. Non-conductive learning environments, such as a lack of technology or the inability to replicate offline-to-online teaching effectiveness, are evidently a concern and a barrier to full engagement and participation in virtual online activities (Kapasiasa et al., 2020).

Present study

Although the literature on the mental health of secondary school students during the pandemic is rapidly expanding (Racine et al., 2020), there has been a growing concern about the mental health of adolescents in Malaysia as they navigate through the uncertainties and isolation brought about by the pandemic and lockdowns (Hassan, 2022). Secondary schools in Sabah are considered to be among those lacking in technological exposure and access (Ministry of Education, 2016). Rarely could it be concluded that secondary school students in Sabah face the same problems as their counterparts. Consequently, the purpose of this study is to investigate the effects of the COVID-19 pandemic on secondary school students in Sabah, Malaysia. Specifically, this study aims to examine the secondary students' experiences with the transition to virtual learning, including their school-related stressors encountered during PdPR as a result of the COVID-19 pandemic. The COVID-19 pandemic may be associated with various school-related stressors for secondary school students, including limited access to technology and reliable internet connections, challenges in adapting to new learning platforms, decreased sense of autonomy, diminished competence and motivation, feelings of isolation, the influence of socioeconomic status and interpersonal relationships, inadequacy of public policies, disengagement, and effects on mental health and overall well-being.

Methods

Participants

The current study employed a qualitative method using an open-ended questionnaire to quantitatively address the research questions. This methodology allowed the researchers to collect extensive data regarding students' experiences in an online learning environment while also gaining a thorough understanding of the phenomenon from the student's point of view. This study included 1,067 secondary school students (53.4% male) from eight schools in Sabah, Malaysia. The mean age of these participants is 14.8 (SD = 1.64). The highest level/grade was in form 2 which accounted for 29.3% of the total students, followed by form 5, form 4, form 1, form 3, upper six, transition class, lower six, and no answer. Prior to their participation, informed consent was requested from the school. Table 1 summarizes the demographic profile of respondents.

TABLE 1 Demographic information about respondents (N=1,067).

Demographic	Categories	Frequency	Percent (%)
Gender	Female	570	53.4
	Male	466	43.7
	No answer	31	2.9
Age	Mean = 14.8, S.D. = 1.64		
Race	Malay	50	4.7
	Chinese	51	4.8
	Kadazan Dusun	626	58.7
	Bajau	36	3.4
	Murut	102	9.6
	Melayu Brunei	34	3.2
	Iban	5	0.5
	Bidayuh	1	0.1
	Others	106	9.9
	No answer	50	4.7
Religion	Islam	364	34.1
	Buddha	41	3.8
	Hindu	4	0.4
	Christian	658	61.7
Schools	Maktab Sabah	94	8.8
	SMK Ranau	171	16.0
	SM St. Michael	200	18.7
	SMJK Lok Yuk	84	7.9
	SMK Sook	200	18.7
	SMK St. Patrick	92	8.6
	SMK St. Paul	81	7.6
	SMK Tulid	145	13.6
Level/grade	Transition class	6	0.6
	Form 1	157	14.7
	Form 2	313	29.3
	Form 3	152	14.2
	Form 4	192	18.0
	Form 5	203	19.0
	Lower six	3	0.3
	Upper six	30	2.8
	No answer	11	1.0

Instrument

This study was part of a large-scale research project that aimed to determine various aspects of the impact of the COVID-19 pandemic on secondary students in Sabah, Malaysia, during which home-based teaching and learning (PdPR) was implemented. For the purposes of this study, only the single open-ended question pertaining to school-related stressors is extracted from the data pool. We employed an *ad hoc* instrument with a single open-ended question in this study: “What school-related stressors are you experiencing due to the COVID-19 pandemic?” This question was created specifically to

address our research proposition, which investigates the association between the COVID-19 pandemic and various school-related stressors for secondary school students. Focusing on this single question allowed the researchers to immerse themselves in the data and develop a comprehensive understanding of the participants’ experiences, leading to richer and more detailed findings (Finlay et al., 2021). Other studies have also used a single open-ended item to assess students’ experiences during COVID-19. (e.g., Barrot et al., 2021; Akol, 2022; Saputra et al., 2022; Barrot and Fernando, 2023). The content, clarity, and accuracy of the instrument were validated using face validity by two experienced researchers.

Procedure

Before collecting data, the researchers contacted the selected school principals to discuss questionnaire administration. They proposed that school counselors administer the questionnaires to minimize disruption to the students’ learning. The questionnaires were disseminated by school counselors or designated teachers. All counselors and teachers involved in data collection were briefed on how to explain the purpose and confidentiality of the study, collect the data, and respond to questions from respondents. The counselors and teachers involved in data collection were also required to inform respondents of their right to refuse to answer any question or withdraw from the study at any time. To ensure confidentiality, completed questionnaires were stored in sealed envelopes or paper boxes that were inaccessible to anyone.

Ethical consideration

The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from INTI International University Research and Ethics Panel (Approval Code: INTI/FBC/2022/001).

Data analysis

We performed an analysis of the students’ responses to open-ended questions by categorizing the codes extracted from the transcripts using a multilevel coding technique (Birks and Mills, 2011). We extracted the pertinent codes from the responses of the participants and then categorized them based on the similarities or connections between the attributes and dimensions they shared. Then, we conducted an ongoing comparative and progressive evaluation of examples so that the previously identified subcategories could take shape.

Results

The objective of this study was to determine how the PdPR affected students’ school-related stressors. According to Table 2, the majority of students’ responses were associated with academic failure due to a poor online course (N=399) and general mental health issues (N=163). When asked about factors that contribute to academic

TABLE 2 Summary of students' responses on the impact of COVID-19 on their school-related stress.

Themes	N	Sample responses
Academic failure as a result of a poor online class	399	Cannot understand cause me failing my subjects exam which made me more stress (U1_122)
		Banyak tertinggal pelajaran semasa PDPR (many lessons missed during the PDPR) (R2_17)
		Prestasi akademik semakin merosot (academic performance is deteriorating) (R3_249)
General mental health issues (depression, anxiety, and stress)	163	Headache, Pain in every body, slow thinking, stress, tired, anxiety attack, overthinking, and social anxiety (R1_33).
		Extremely high academic expectations, severe anxiety and feeling like a failure and disagree to my family for not meeting said expectations, even if they have acknowledged that they care more about my mental health than my grades (U1_111)
		Sangat teruk. Kerana saya telah menghadapi depression, stress, anxiety dan takut untuk berkomunikasi. Saya lagi suka sekolah bersemuka daripada duduk dirumah (very terrible. Because I have experienced depression, stress, anxiety, and fear of communication. I prefer face-to-face school rather than staying at home) (U2_11)
No effect	106	Tidak ada apa-apa tekanan (there is no pressure) (R1_17)
		Saya tiada tekanan berkaitan persekolahan (I have no school-related stress) (R3_233)
		Saya tidak ada mengalami tekanan apa-apa (I am not experiencing any pressure) (U2_51)
Bad internet connection	95	Pembelajaran secara dalam talian sukar untuk diikuti kerana masalah talian internet di kawasan tempat tinggal menyebabkan saya sukar untuk mengikuti pembelajaran (online learning is difficult to follow due to internet connection issues in my residential area, making it hard for me to participate in the learning process) (R2_112)
		Masalah internet (internet problem) (U1_91)
		Internet lags (U1_188)
Lack of in-person interaction (teachers, friends)	89	Not being able to communicate with friends and teachers easily to solve a certain problem (U1_20)
		Susah untuk bertanya soalan kepada guru (it is difficult to ask questions to the teacher) (R2_121)
		About my social life and never talking to other people except my family or by phone so i will get nervous when talking to other people (U1_141)
No response	73	
SOP restriction	69	Setiap hari memakai pelitup mulut dan SOP (wear a face covering every day and follow the SOP) (R1_103)
		Penjarakan SOP (social distancing SOP) (U1_14)
		Tidak dapat keluar bermain badminton dan bersiar-siar bersama keluarga (unable to go out to play badminton and stroll with family) (U2_10)
Cannot focus	64	Difficulty in focusing in online class (U1_156)
		Sukar untuk focus pembelajaran melalui online (difficult to focus on learning through online) (R2_157)
		Kurang fokus kerana tidak belajar bersemuka (less focused because not learning face-to-face) (R3_270)
Too many homework assignments.	42	Got a lot of homework more than face to face classes (R3_229)
		Having to wake up early for PDPR, too much of homework (U1_68)
		Mendapat kerja sekolah yang banyak (getting a lot of school work)(R1_5)
Burnout	22	Burnout everyday. After the Covid-19 Pandemic, everyday became difficult for me. I felt very tired and had no motivation to go to school like (R3_204)
		Tidak dapat menyiapkan kerja sekolah kerana tidak bersemangat (unable to complete school work due to lack of motivation) (R4_80)
		Tiada semangat belajar (no motivation to study) (U1_104)
Getting lazier	13	Tidak dapat menyiapkan modul kerana malas (unable to complete the module due to laziness) (R5_57)
		PKPD, membuat lebih malas untuk belajar di rumah (PKPD, making it more lazy to study at home) (R1_13)
		Getting lazier than before (U1_35)
The atmosphere in the house is not conducive to learning	5	Suasana dalam rumah buat saya semakin tidak bersemangat (the atmosphere inside the house makes me lose motivation) (R2_114)
		Saya tidak dapat menumpukan perhatian sepenuhnya kerana sering terganggu dengan keadaan persekitaran di sekeliling saya (I cannot fully concentrate because I am often disturbed by the surrounding environment) (R4_39)
		Banjir (U2_77)
Financial	2	Kewangan (financial) (U2_74; U2_76)
Total	1,067	

failure as a result of taking online classes, the majority of respondents cited the inability to comprehend the lesson (U1_122), falling behind (R2_17), and deteriorating academic performance (R3_249). Concerning their overall mental health, the majority of students (e.g., R1_33, U1_111, and U2_11) reported a range of mental health challenges, such as headaches, anxiety attacks, and feelings of failure. In contrast, a substantial number of participants ($N=106$) indicated that they experienced no stress or pressure related to schooling. In addition, 95 of the participants reported issues with their poor internet connectivity, making it difficult for participants to follow online learning. For example, their home's location did not have a reliable internet connection, resulting in a decrease in internet speed (e.g., R2_112, U1_91, and U1_188). The following student responses revealed difficulty in communicating with friends and teachers and a lack of in-person interactions ($N=89$). For example, if a student has a question about his or her academics, the student was unable to effectively communicate this question to their peers and teachers (e.g., U1_20, R2_121, U1_141). In addition, participants mentioned the challenges of adhering to Standard Operating Procedures (SOPs) ($N=69$) has induced academic performance anxiety. For instance, R1_103, U1_14, and U2_10 identified putting on a face mask and physically separating themselves from one another as sources of stress in their academic experience. The results also revealed that COVID-19 made it more difficult for some students ($N=64$) to concentrate, which negatively impacted their capacity for online learning. Online classes (such as U1_156, R2_157, and R3_270) were primarily responsible for the inability to concentrate. During this time, some students ($N=42$) commented that they received an excessive amount of homework in their online classes compared to their physical classes (e.g., R3_229, U1_68, R1_5). In addition, some respondents reported feeling burnt out, with a lack of motivation to attend a school or complete tasks ($N=22$). For example, students in R3_204, R4_80, and U1_104 reported feeling exhausted, uninspired, and unmotivated to attend class. A few participants felt that they became lazier during the pandemic and had difficulties completing tasks ($N=13$). Participating in online classes at home (e.g., R5_57, R1_13, and U1_35) has the tendency to make students more passive. There were few respondents who found their home environment to be distracting or unsuitable for learning ($N=5$). Students (R2_114, R1_131, and U2_77) have stated that the atmosphere at home is vastly different from that in the classroom and that this is the reason why they are not motivated to learn. Simultaneously, a couple of participants mentioned financial issues as a concern ($N=2$; for example, U2_74, U2_76). The number of respondents who did not respond was 73 in total.

Discussion

This study investigates the school-related stressors that students encountered during the implementation of home-based teaching and learning (PdPR). The findings support the proposition that the COVID-19 pandemic is associated with various school-related stressors for secondary school students. These stressors include limited access to technology and reliable internet connections, difficulties adapting to new learning platforms, a decreased sense of autonomy, reduced competence and motivation, feelings of isolation, the impact of socioeconomic status, the influence of interpersonal

relationships, inadequacy of public policies, disengagement, and effects on mental health and overall well-being. The quality of their learning experiences, mental health, poor internet connections, and interaction were identified as the most significant school-related stressors, while money was found to be the least stressful factor. The need to adhere to COVID-19 lockdown protocols also contributed to students' academic stress, with their inability to focus and understand the curriculum disengaging the learning process. Additionally, the study found that students' academic stressors included having too many homework assignments, experiencing burnout, feeling lazier, and dealing with an unsupportive learning environment at home.

According to the findings, the majority of students cited poor online classes as the primary cause of their academic failure, which distracted them and eventually led to stress. It appears that the quality of online learning is still insufficient to deliver optimal performance. Similar incidents have been reported in both the western and eastern contexts (e.g., De Haas et al., 2020; Foong and Yit, 2021; Wilczewski et al., 2021; Zaki et al., 2021). The students also stated that their comprehension skills were harmed as a result of the poor quality of online study mode, and they felt left behind, eventually deteriorating their academic performance. An environment that is not conducive to learning, such as one that is disrupted by technology, can cause anxiety and a lack of concentration (Kapasias et al., 2020). Social interaction is regarded as an important psychological factor in students' motivation to pursue learning activities (Sung and Mayer, 2012). Unfortunately, the limited social activities during the pandemic lockdown resulted in students feeling stressed. The students were concerned about the online learning method because the interaction with the teacher was difficult, so difficult that the students eventually stopped asking questions online. It is feared that if students are unable to ask questions or simply listen to the teacher with little interaction, they will be unable to learn effectively through online learning (Annamalai, 2021).

During the COVID-19 lockdown, students appeared to be bothered by the standard operating procedure of wearing masks whenever they went outside. Limiting outdoor activities and family time, similar to pre-social distance life, has a negative impact on students' mental health overall. Nonetheless, some students commented that not having an impact on their academic or personal lives meant they could go about their normal lives. These students may be conducting online research in a conducive learning environment, as Esa et al. (2021) discovered parents capable of preparing an online study setup and providing students with private space, allowing them to experience less hassle. The findings also revealed that students were feeling burned out and becoming lazier about completing their homework. When compared to an offline classroom, students appear to be overburdened with homework. Students' engagement in studying suffers when they are unable to ask questions immediately or study face-to-face. Indeed, their mental health is deteriorating. Their counterparts in Peninsula Malaysia faced similar circumstances, with students complaining about the absence of physical classrooms being substituted for overloading homework through virtual classrooms (Annamalai, 2021). Aside from that, family expectations for students to perform well academically during lockdown cause stress. Previous research has shown that family role is one of the stressors when it comes to academic performance because the family is unaware of the complexities of studying online at home combined with individual role (Cohen et al., 2020; Giannopoulou et al., 2020).

In the context of Malaysian secondary schools, the applicability of the data on secondary students' challenges during the pandemic can provide valuable insights for the country's education system, which is overseen by the federal government, specifically the Ministry of Education. Since individual states and territories coordinate the details of their school systems, they can use this information to address the specific needs and challenges faced by students in online learning during the pandemic.

Malaysia has implemented national ICT in education policy initiatives to promote digital education, recognizing the significant role of information and communication technologies (ICTs) (Zainal and Zainuddin, 2020). However, studies have shown varying degrees of success in policy implementation, with some challenges persisting. The data on students' experiences can be used to evaluate the effectiveness of these initiatives and identify areas for improvement. For instance, the themes related to academic failure due to poor online classes, bad internet connections, and the inability to focus on online learning could help Malaysian schools develop targeted interventions to improve the quality of online education. The findings related to mental health issues, burnout, and lack of in-person interaction could inform the development of support systems to address the well-being of students. It's essential to consider the specific context of Malaysian schools and adapt the findings to the local needs and circumstances. By understanding these challenges and addressing them, Malaysian schools can enhance the overall learning experience for students during the pandemic and beyond.

Recommendations

The application of the socio-ecological model (Bronfenbrenner, 1999), the Technology Acceptance Model (TAM) (Davis, 1989), and self-determination theory (Deci and Ryan, 2000) can help us better understand and address the complex stressors faced by secondary school students during PdPR in the pandemic era. By utilizing these theoretical frameworks, researchers, educators, and policymakers can develop targeted strategies and interventions aimed at alleviating school-related stressors and promoting students' learning, well-being, and overall success in these unprecedented times. It is essential that stakeholders collaborate and adopt a multifaceted approach to address the diverse challenges posed by the pandemic, ensuring that students receive the support they need to excel academically and emotionally.

Secondary school is a crucial stage in a student's education as it determines their future. However, school-related stress among these students is a prevalent issue that cannot be ignored. Stress can have a negative impact on students' physical and mental health, as well as their academic performance. Effective coping strategies are needed to manage school-related responsibilities and stress effectively. Bronfenbrenner's (1999) socio-ecological model underscores the importance of addressing stressors at the organizational, community, and public policy levels. Providing students with lessons on exam preparation, including the development of study skills and memory strategies, is a practical action that can reduce exam-related anxiety and improve students' academic performance. Furthermore, secondary school guidance and counseling departments should provide enhanced services, such as the formation of social support groups that include not only students but also teachers and administrators. This will aid in the development of interpersonal

skills, such as communication and information-sharing, and make students feel more comfortable expressing their emotions. Counseling centers can also host workshops, seminars, and conferences on "stress management techniques" and "time management" to equip students with a variety of coping strategies, particularly in light of the COVID-19 pandemic. Ensuring stable and reliable internet access for all students, including collaborating with telecommunications providers to offer affordable internet packages or even free Wi-Fi in low-income and rural areas, should be a top priority. Schools can provide laptops or tablets to students who cannot afford them, ensuring that all students have access to online learning resources. By addressing the technological barriers identified by the TAM (Davis, 1989), students will be better equipped to engage in PdPR and experience reduced stress.

Self-determination theory (Deci and Ryan, 2000) emphasizes the importance of fostering a sense of autonomy, competence, and relatedness in students. Schools and colleges can use hybrid learning models, smaller class sizes, or staggered schedules to create opportunities for safe in-person interaction while following safety protocols. Face-to-face interaction between students and instructors can enhance learning outcomes and reduce feelings of isolation. Participating in extracurricular activities and courses that provide an introduction to stress management is another practical strategy for coping with school-related stress. By providing students with tutoring and changing the way information is presented, teachers can create a healthy learning environment that reduces school-related stress. During their secondary school years, students must develop the social and emotional skills necessary to be resilient and succeed in educational environments. Parents also play a significant role in their children's activities and stress management. It is crucial for parents to guide and instruct their children to help them make positive decisions for their future. Parents should consider their children's interests and abilities before pushing them to pursue an unappealing field of study. A supportive family environment, both in educational settings and at home, can make learning enjoyable.

Providing students with effective coping strategies, improving counseling services, promoting in-person interaction, enhancing internet accessibility, and fostering a healthy learning environment are practical measures that can be implemented by secondary schools, counseling centers, parents, and teachers. By reducing school-related stress and improving academic performance, these initiatives will ultimately benefit society as a whole. It is essential that stakeholders collaborate and take a comprehensive approach to address the unique challenges posed by the pandemic, ensuring that students receive the support they need to thrive academically and emotionally during these unprecedented times.

Limitations and future research

While the results are significant, there are a few limitations that must be considered. First, there may be a disparity in secondary school student participation between urban and rural areas due to the relative lack of internet access and equipment in rural areas compared to their urban peers. Consequently, the findings regarding school-related stressors, such as learning experience, mental health, interaction, and mobility, may not be generalizable to all secondary school students in Sabah. For future research, sample selection could

be improved by employing stratified sampling method to divide schools into urban and rural categories. Although the number of respondents in this study was large, it is important to note that the representativeness of the findings may be limited. This is because the study only included a total of eight secondary schools in Sabah and did not provide information on the total number of students in the area, the percentage represented by the selected students, or whether the sample achieved a significant degree of representativeness. Conducting survey research during the COVID-19 pandemic has presented various challenges, such as ethical concerns, recruitment difficulties, and changes in survey responses due to the pandemic's impact on people's health concerns (Weiner et al., 2020). In our study, we aimed to understand secondary school students' school-related stressors during the COVID-19 pandemic in Sabah, Malaysia, and utilized purposive sampling to select participants who met our criteria, rather than aiming for a random or representative sample. To increase the representativeness of the sample, future studies could consider using a more rigorous sampling method, such as stratified random sampling.

Conclusion

Schools chose to run virtual learning activities after being forced to close due to the global COVID-19 outbreak. Given the circumstance of being unable to physically attend class but relying on online studies, exposed to various cases concerning students' mental health. The literature on the mental health of secondary school students during the COVID-19 lockdown is rapidly expanding in the western context (Racine et al., 2020). Exploration in the Asian context is critical because the virus outbreak has a global impact. This gap has led to the idea of investigating how COVID-19 affected the students' academic pressure during p PdPR in Sabah, Malaysia. Our study has derived school-related stressors based on a combination of theoretical frameworks, including the socio-ecological model, the technology acceptance model, and the self-determination theory, thereby providing support for the earlier proposition. Our study reported a list of potential school-related stressors for secondary school students during PdPR. In addition, the study revealed that the most significant school-related stressors are the quality of learning experiences, mental health, poor internet connections, and interaction. A number of key themes emerge from the open-ended survey questions. Students appeared to be failing academically as a result of the ineffectiveness of online study activities. Students were unable to focus and comprehend the curriculum due to a lack of interaction with teachers, which disengaged the learning process. This caused them to be concerned about their academic performance. Furthermore, technological disruptions, such as a poor internet connection in their home area, discourage them from revising. The lack of face-to-face social interaction with teachers, as well as the constant need to be aware of and apply the COVID-19 lockdown

References

Adnan, M., and Anwar, K. (2020). Online learning amid the COVID-19 pandemic: Students' perspectives. *J. Pedagog. Sociol. Psychol.* 1, 45–51. doi: 10.33902/JSP.2020261309

standard operating procedure, is the source of their academic stress. Excessive homework reduces their ability to absorb and focus while studying online. Some students find that studying online at home is not a conducive learning environment. Given these unfavorable circumstances, students appear to be too tired and lazy to engage in and stay on track while doing online study activities at home. Performing the study online mode allows teachers, school administration, and students to investigate what is lacking and what can be done to overcome the shortage in a virtual classroom. Engagement and interaction appear to be critical in keeping students from becoming distracted. Allowing students to contribute more to the conversation would help to maintain the momentum of the classroom activities. Instead of expecting students to perform well, it would be preferable if parents could participate by demonstrating concern for the students' learning activities.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The study was conducted in compliance with ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from INTI International University Research and Ethics Panel (Approval Code: INTI/FBC/2022/001).

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Akol, W. (2022). Teachers' challenges amidst the pandemic: basis for strategic intervention program. *Int. J. Res. Stud. Educ.* 11, 83–95. doi: 10.5861/ijrse.2022.b033

- Al Breiki, M., and Yahaya, W. A. J. (2021). Using gamification to promote students' engagement while teaching online during COVID-19. Teaching in the post COVID-19 era: world education dilemmas, teaching innovations and solutions in the age of crisis. *Front. Psychol.* 12, 443–453. doi: 10.1007/978-3-030-74088-7_44
- Alemay-Arrebola, I., Rojas-Ruiz, G., Granda-Vera, J., and Mingorance-Estrada, A. C. (2020). Influence of COVID-19 on the perception of academic self-efficacy, state anxiety, and trait anxiety in college students. *Front. Psychol.* 11:570017. doi: 10.3389/fpsyg.2020.570017
- Al-Kumaim, N. H., Alhazmi, A. K., Mohammed, F., Gazem, N. A., Shabbir, M. S., and Fazea, Y. (2021). Exploring the impact of the COVID-19 pandemic on university students' learning life: An integrated conceptual motivational model for sustainable. *Sustainability* 13:2546. doi: 10.3390/su13052546
- Al-Maskari, A., Al-Riyami, T., and Kunjumuhammed, S. K. (2022). Students academic and social concerns during COVID-19 pandemic. *Educ. Inf. Technol.* 27, 1–21. doi: 10.1007/s10639-021-10592-2
- Annamalai, N. (2021). Online learning during COVID-19 pandemic. Are Malaysian high school students ready? *Pertanika J. Soc. Sci. Hum.* 29, 1571–1590. doi: 10.47836/pjsh.29.3.06
- Asanov, I., Flores, F., McKenzie, D., Mensmann, M., and Schulte, M. (2021). Remote-learning, time-use, and mental health of Ecuadorian high-school students during the COVID-19 quarantine. *World Dev.* 138, 105225–105233. doi: 10.1016/j.worlddev.2020.105225
- Barrot, J. S., and Fernando, A. R. R. (2023). *Unpacking engineering students' challenges and strategies in a fully online learning space: the mediating role of teachers*. United States: Education and Information Technologies, 1–23.
- Barrot, J. S., Llenares, I. I., and Del Rosario, L. S. (2021). Students' online learning challenges during the pandemic and how they cope with them: the case of the Philippines. *Educ. Inf. Technol.* 26, 7321–7338. doi: 10.1007/s10639-021-10589-x
- Birks, M., and Mills, J. (2011). *Grounded Theory: A Practical Guide*. SAGE Publications.
- Borup, J., Jensen, M., Archambault, L., Short, C. R., and Graham, C. R. (2020). Supporting students during COVID-19: developing and leveraging academic communities of engagement in a time of crisis. *J. Technol. Teach. Educ.* 28, 161–169.
- Bronfenbrenner, U. (1999). "Environments in developmental perspective: theoretical and operational models" in *Measuring environment across the life span: Emerging methods and concepts*. eds. S. L. Friedman and T. D. Wachs (Washington, DC: American Psychological Association), 3–28.
- Capon-Sieber, V., Köhler, C., Alp Christ, A., Helbling, J., and Praetorius, A. K. (2022). The role of relatedness in the motivation and vitality of university students in online classes during social distancing. *Front. Psychol.* 12:6393. doi: 10.3389/fpsyg.2021.702323
- Chandra, Y. (2020). Online education during COVID-19: perception of academic stress and emotional intelligence coping strategies among college students. *Asian Educ. Dev. Stud.* 10, 229–238. doi: 10.1108/AEDS-05-2020-0097
- Chaturvedi, K., Vishwakarma, D. K., and Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: a survey. *Child Youth Serv. Rev.* 121:105866. doi: 10.1016/j.childyouth.2020.105866
- Child, T. L. (2020). Pandemic school closures: risks and opportunities. *Lancet Child Adolesc. Health* 4:341. doi: 10.1016/S2352-4642(20)30105-X
- Cohen, A. K., Hoyt, L. T., and Dull, B. (2020). A descriptive study of COVID-19-related experiences and perspectives of a national sample of college students in spring 2020. *J. Adolesc. Health* 67, 369–375. doi: 10.1016/j.jadohealth.2020.06.009
- Coman, C., Țiru, L. G., Meseșan-Schmitz, L., Stanciu, C., and Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: students' perspective. *Sustainability* 12:10367. doi: 10.3390/su122410367
- Cosmas, G. (2022). First-year Uuniversity students' psychological well-being through seven weeks of online learning during the COVID-19 pandemic. *Postmod. Open.* 13, 465–479. doi: 10.18662/po/13.1Sup/1436
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* 13, 319–340. doi: 10.2307/249008
- De Haas, M., Faber, R., and Hamersma, M. (2020). How COVID-19 and the Dutch "intelligent lockdown" change activities, work, and travel behaviour: evidence from longitudinal data in the Netherlands. *Transp. Res. Interdiscip. Perspect.* 6:100150. doi: 10.1016/j.trip.2020.100150
- Deci, E. L., and Ryan, R. M. (2000). The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. *Psychol. Inq.* 11, 227–268. doi: 10.1207/S15327965PLI1104_01
- Dhawan, S. (2020). Online learning: a panacea in the time of COVID-19 crisis. *J. Educ. Technol. Syst.* 49, 5–22. doi: 10.1177/0047239520934018
- Díaz-Noguera, M. D., Hervás-Gómez, C., la Calle-Cabrera, D., María, A., and López-Meneses, E. (2022). Autonomy, motivation, and digital pedagogy are key factors in the perceptions of Spanish higher-education students toward online learning during the COVID-19 pandemic. *Int. J. Environ. Res. Public Health* 19:654. doi: 10.3390/ijerph19020654
- Engzell, P., Frey, A., and Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proc. Natl. Acad. Sci.* 118:e2022376118. doi: 10.1073/pnas.2022376118
- Esa, N. A. A. M., Aloysius, C. F., Kusijih, E., and Shengwen, L. (2021). Factors that influence the ability of secondary school students in using online education in Malaysia. *Malays. J. Bus. Econ. (MJBE)*. 8, 95–108. doi: 10.51200/mjbe.vi.3326
- Finlay, J. M., Kler, J. S., O'Shea, B. Q., Eastman, M. R., Vinson, Y. R., and Kobayashi, L. C. (2021). Coping during the COVID-19 pandemic: a qualitative study of older adults across the United States. *Front. Public Health* 9:643807. doi: 10.3389/fpubh.2021.643807
- Foong, M. M., and Yit, H. N. (2021). Perception towards e-learning and COVID-19 on the mental health status of university students in Malaysia. *Sci. Prog.* 104, 1–18. doi: 10.1177/00368504211029812
- García, E., and Weiss, E. (2020). *COVID-19 and student performance, equity, and US education policy: Lessons from pre-pandemic research to inform relief, recovery, and rebuilding*. Washington, DC: Economic Policy Institute.
- Giannopoulou, I., Efstathiou, V., Triantafyllou, G., Korkoliakou, P., and Douzenis, A. (2020). Adding stress to the stressed: senior high school students' mental health amidst the COVID-19 nationwide lockdown in Greece. *Psychiatry Res.* 295:113560. doi: 10.1016/j.psychres.2020.113560
- Hassan, H. (2022). *Covid-19 lockdown sees rising mental health concerns among teens in Malaysia*. The Straits Time.
- Ilias, A., Baidi, N., Ghani, E. K., and Razali, F. M. (2020). Issues on the use of online learning: An exploratory study among university students during the COVID-19 pandemic. *Univ. J. Educ. Res.* 8, 5092–5105.
- Ismail, N. S., Bakar, N. M. A., and Wafa, S. W. W. S. S. T. (2020). Online learning challenges during pandemic COVID-19 in Malaysian higher learning institution. *Univ. J. Educ. Res.* 8, 7151–7159. doi: 10.13189/ujer.2020.081282
- Izhar, N. A., Al-Dheleai, Y. M., and Ishak, N. A. (2021). Education continuation strategies during COVID-19 in Malaysia. *Int. J. Acad. Res. Bus. Soc. Sci.* 11, 1423–1436. doi: 10.6007/IJARBS/v11-i4/9840
- Jiew, F. F., Chin, K. E., and Jupri, A. (2022). Mathematics teachers' online teaching experience in times of school closures: the case of Malaysia. *Malays. J. Learn. Instr.* 19, 59–84. doi: 10.32890/mjli2022.19.1.3
- Kallander, S. W., Gordon, R., and Borzekowski, D. L. (2021). "People will continue to suffer if the virus is around": a qualitative analysis of sub-Saharan African Children's experiences during the COVID-19 pandemic. *Int. J. Environ. Res. Public Health* 18:5618. doi: 10.3390/ijerph18115618
- Kamarudin, K. H., Hassan, A. G., Mohamed, A., Yahya, A. S., and Rashid, M. F. (2022). *Stay-at-home: impact of pandemic covid-19 on the use of indoor space in Malaysian households*. In: IOP conference series: Earth and environmental science, IOP Publishing.
- Kaparonaki, C. K., Patsali, M. E., Mousa, D. P. V., Papadopoulou, E. V. K., Papadopoulou, K. K. K., and Fountoulakis, K. N. (2020). University students' mental health amidst the COVID-19 quarantine in Greece. *Psychiatry Res.* 290:113111. doi: 10.1016/j.psychres.2020.113111
- Kapasaa, N., Paulb, P., Royc, A., Sahac, J., Zaveric, A., and Mallickc, R. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Child Youth Serv. Rev.* 116, 105194–105195. doi: 10.1016/j.childyouth.2020.105194
- Korzinski, D. (2020). *Kids and COVID-19: Canadian children are done with school from home, fear falling behind, and miss their friends*. Available at: <http://angusreid.Org/covid19-kids-opening-schools/>.
- Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafraan, R., Brigden, A., et al. (2020). Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J. Am. Acad. Child Adolesc. Psychiatry* 59, 1218–1239.e3. doi: 10.1016/j.jaac.2020.05.009
- Lockee, B. B. (2021). Online education in the post-COVID era. *Nat. Electron.* 4, 5–6. doi: 10.1038/s41928-020-00534-0
- Lukas, B. A., and Yunus, M. M. (2021). ESL Teachers' Challenges in Implementing E-learning during COVID-19. *Int. J. Learn. Teach. Educ. Res.* 20, 330–348.
- Maheshwari, G. (2021). Factors affecting students' intentions to undertake online learning: an empirical study in Vietnam. *Educ. Inf. Technol.* 26, 6629–6649. doi: 10.1007/s10639-021-10465-8
- Means, B., and Neisler, J. (2020). *Suddenly online: A national survey of undergraduates during the COVID-19 pandemic*. Washington, DC: Digital Promise.
- Ministry of Education. (2016). *Malaysia education blueprint 2013-2025*. Available at: <https://www.pmo.gov.my/wp-content/uploads/2019/07/Malaysia-Education-Blueprint-2013-2025.pdf>.
- Müller, F. H., Thomas, A. E., Carmignola, M., Dittrich, A. K., Eckes, A., Großmann, N., et al. (2021). University students' basic psychological needs, motivation, and vitality before and during COVID-19: a self-determination theory approach. *Front. Psychol.* 12:775804. doi: 10.3389/fpsyg.2021.775804
- Olanian, A., Isiguzo, C., and Hawk, M. (2021). The socioecological model as a framework for exploring factors influencing childhood immunization uptake in Lagos state, Nigeria. *BMC Public Health* 21:867. doi: 10.1186/s12889-021-10922-6
- Pelikan, E. R., Korlat, S., Reiter, J., Holzer, J., Mayerhofer, M., Schober, B., et al. (2021). Distance learning in higher education during COVID-19: the role of basic

- psychological needs and intrinsic motivation for persistence and procrastination—a multi-country study. *PLoS One* 16:e0257346. doi: 10.1371/journal.pone.0257346
- Pimdee, P., Ridhikerd, A., Moto, S., Siripongdee, S., and Bengthong, S. (2023). How social media and peer learning influence student-teacher self-directed learning in an online world under the 'New Normal'. *Heliyon* 9:e13769. doi: 10.1016/j.heliyon.2023.e13769
- Racine, N., Cooke, J. E., Eirich, R., Korczak, D. J., McArthur, B., and Madigan, S. (2020). Child and adolescent mental illness during COVID-19: a rapid review. *Psychiatry Res.* 292:113307. doi: 10.1016/j.psychres.2020.113307
- Šakan, D., Žuljević, D., and Rokvić, N. (2020). The role of basic psychological needs in well-being during the COVID-19 outbreak: a self-determination theory perspective. *Front. Public Health* 8:583181. doi: 10.3389/fpubh.2020.583181
- Saputra, E., Saputra, D. B., Handrianto, C., and Agustinos, P. (2022). EFL students' perception towards online learning: what to consider? *Indones. J. Engl. Lang. Teach. Appl. Linguist.* 7, 123–140. doi: 10.21093/ijeltal.v7i1.1242
- Schwartz, K. D., Cortens, D. E., McMorris, C. A., Makarenko, E., Arnold, P., Bavel, M. V., et al. (2021). COVID-19 and student well-being: stress and mental health during return-to school. *Can. J. Sch. Psychol.* 36, 166–185. doi: 10.1177/08295735211001653
- Sheela, S., Karuthan, C., Kamilah, K., Mohammad, N., Gul Mohammad, B., Heba Bakr, K., et al. (2020). Psychological impact of COVID-19 and lockdown among university students in Malaysia: implications and policy recommendations. *Int. J. Environ. Res. Public Health* 17, 6206–6219. doi: 10.3390/ijerph17176206
- Sim, S. P. L., Sim, H. P. K., and Quah, C. S. (2021). Online learning: a post COVID-19 alternative pedagogy for university students. *Asian J. Univ. Educ.* 16, 137–151. doi: 10.24191/ajue.v16i4.11963
- Sung, E., and Mayer, R. E. (2012). Five facets of social presence in online distance education. *Comput. Hum. Behav.* 28, 1738–1747. doi: 10.1016/j.chb.2012.04.014
- Tan, C. S., Zakuan, N., and Abd Aziz, M. I. (2022). Recent trends of blended learning and flipped classroom in Malaysia. *Arab World Engl. J.* 2, 290–301. doi: 10.2139/ssrn.4036764
- UNESCO. (2020). *COVID-19. Education disruption and response*. Available at: <https://en.unesco.org/covid19/educationresponse>.
- Wahab, R. A., Mansor, N., Halid, S., and Rahman, R. A. (2022). The impact of Covid-19 on academic dishonesty: Malaysian evidence. *Int. J. Acad. Res. Acc. Financ. Manage.* 12, 176–185. doi: 10.6007/IJARAFMS/v12-i2/12917
- Weiner, D. L., Balasubramaniam, V., Shah, S. I., Javier, J. R., Gul Mohammad, B., Pediatric Policy Council. (2020). COVID-19 impact on research, lessons learned from COVID-19 research, implications for pediatric research. *Pediatr. Res.* 88, 148–150.
- Wilczewski, M., Gorbaniuk, O., and Giuri, P. (2021). The psychological and academic effects of studying from the home and host country during the COVID-19 pandemic. *Front. Psychol.* 12:644096. doi: 10.3389/fpsyg.2021.644096
- Winthrop, R.. (2020). *COVID-19 and school closure: Why can countries from past emergencies*. Brookings. Available at: <https://www.brookings.edu/research/covid-19-and-school-closures-what-can-countries-learn-from-past-emergencies/>.
- Wong, R. (2023). When no one can go to school: does online learning meet students' basic learning needs? *Interact. Learn. Environ.* 31, 434–450. doi: 10.1080/10494820.2020.1789672
- Zainal, A. Z., and Zainuddin, S. Z. (2020). Technology adoption in Malaysian schools: an analysis of national ICT in education policy initiatives. *Digit. Educ. Rev.* 37, 172–194. doi: 10.1344/der.2020.37.172-194
- Zaki, N. N. S. M., Shaharuddin, M. F. S., Ishak, N. A. B. C., Hilmi, Z. S., Azmi, N. A. A. K., and Kurnia, J. C. (2021). Psychological impacts of COVID-19 pandemic towards Malaysia's secondary school students. *J. Manage. Hum.* 4, 31–44.
- Zayapragassaran, Z. (2020). COVID-19: strategies for online engagement of remote learners. *F1000Research* 9:246. doi: 10.7490/f1000research.1117835.1
- Zhang, J., Hong, L., and Ma, G. (2022). Socioeconomic status, peer social capital, and quality of life of high school students during COVID-19: a mediation analysis. *Appl. Res. Qual. Life* 17, 3005–3021. doi: 10.1007/s11482-022-10050-2