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Online Distance Learning: The Harmful Effects and the Solutions of Undergraduate Students UiTM Pahang During Pandemic

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Abstract

COVID-19 pandemic breeds new norms which include online learning, among other things. As this pandemic might have resulted in stress, the first objective of this study is to identify the harmful effects of Student UiTM Pahang while implementing of Online Distance Learning (ODL) during the pandemic whereas the second is to find the solutions taken among respondents in order to avoid harmful effects to themselves along ODL is applied. The research questionnaires were adapted and adopted from the previous study, were distributed online to 235 respondents via Google form. Stratified sampling was used as a technique for collecting data and analysis was done via Statistical Package for the Social Science software (SPSS) version 21. Cronbach's Alpha'score was 0.873, showing the internal consistency is good. The findings showed that ODL put heavy burdens on students, thus affected their health and routine life. Several actions were taken by them to reduce these harmful effects such as go for recreation, spiritual and time management, self-organization and so on. Therefore, the university should be aware of these consequences and take preventive action in handling this situation. Future research should be expanded to other public and private higher learning institutions to enable deeper probing into this situation, thus provide better insights for changes in the education systems.

Keywords: Online Distance Learning, Harmful Effects, Way Out, Undergraduate Students, Pandemic

Introduction

Online Distance Learning (ODL) has been practiced indirectly in Malaysia. According to Ghosh et al (2012), the concept of open learning and distance education framework centre on open access to education and training to make the learners free from the imperatives of time and put, and advertising adaptable learning openings to people and bunches of learners. ODL is one of the fastest growing areas of teaching, significantly impacted on all instructional delivery frameworks especially during the Covid pandemic outbreak. ODL education stems from the idea that students and instructors are not in the same place but are able to communicate. They are in different situations separated by geography framework adaptable. The Malaysian government had announced a Movement Control Order (MCO) in Mac 2021 to curb the spread of Covid-19 and implement online learning for educational institution. According to Johnson (2020), 71% of survey respondents of high schoolers and college students reported increased stress from this educational disruption n during pandemic COVID-19. The survey further showed that 66% of students in their households were increasingly stressed, while 81% of current adult students reported experienced the same predicament.

Learning using an ODL method has significant differences than using conservative method learning approaches. According to Will (2014), the conservative method, such as face-to-face, maximizes the social contact between lecturers and students in teaching, impacting the students' understanding during and outside class sessions. Private meetings may be arranged between students and lecturers in their free time to discuss difficult and complex topics. Furthermore, in conservative method lecturers are free to teach and do activities with their students without limitation in movements

In contrast, through ODL, discussions, and many materials such as activities, papers, and teachings materials for students can be handed out by the lecturers to improve students' understanding and preparation for the following examinations. However, ODL brings great pressure to students, especially concerning students grouping for group projects and applications of internet-based tools for teaching and learning. Thus, ODL provides more challenges for students to normalize their study environments and methods. Students have a greater need to push themselves to learn from home, which in turn leads to fewer social interactions, resulted in lower academic performance due to Covid-19 (Allam et al., 2020). Therefore, this paper aims to identify the harmful effects and how to overcome them.

Literature Review

Online Distance Learning

Physical separation of students and teachers during instruction and various technologies to facilitate student-teacher and student communication are both the main elements of form education called online learning, distance learning, distance education, or e-learning (Berg & Simonson, 2016). They just teach and learn remotely and were separated from each other, which are students, teachers, and peers (Anglia Ruskin University, 2020). The Covid-19 pandemic has resulted in all education institutions shut across the world. As a result, educational method had changed drastically and significantly, with the unmistakable rise of e-learning, whereby instructing is embraced on advanced stages (Farah & Li, 2020). Online distance learning works by utilizing personal computers, tablets, phones, and the web so that students can learn anywhere and anytime It features flexible arrangement for fitting higher

instruction around work and family commitments (Anynomous, 2019). According to Angdhiri (2020), by distributing gadgets to the students as their preparation for online learning, they have access to learning materials and participate in online classes.

Harmful Effect During ODL

The harmful effects of ODL include stress, anxiety, depression, and the physical effects. For example, stress has a different meaning for different people under different conditions. Shiel (2018) defines stress as a physical, mental, or emotional component that creates significant or mental pressure in a medical or biological environment. Stress-causes can be classified as from external (from the environment, mental, or social circumstances) or internal (ailment or restorative strategy). Signs and indications of stress can be divided into two, emotional and physical indications. Emotional indications can include being effectively agitated, feeling disappointed, feeling overpowered, mood changes, losing control, having difficulty unwinding and calming the mind, feeling terrible about self (low self-esteem), depression, sadness, and low energy. Stress's physical side effects can include migraines, upset stomach, diarrhoea, constipation, nausea, aches, pains, tense muscles, chest pain, and quick heartbeat. Furthermore, it also leads to sleeping disorder, frequent colds and infections, loss of sexual craving and ability, anxiety and shaking, and clenched jaw and grinding teeth (Anonymous, 2019). Online Distance Learning (ODL) can cause various stresses, significantly mentally affecting student performance.

On the other hand, according to Zalaznick Matt (2020), it said that due to online distance learning, 75% of college students reported feeling stress and anxiety, and this is further supported by Son et al (2020) 's study that conducted an interview at BestCollege, United State, the results show that out of 195 students, 138 (71%) were suffering from stress during ODL. Different factors are associated with stress perceived by students, such as lack of feedback and lecturer interaction (Harmsen et al., 2018). Students may have inconvenience in learning and self-evaluation. The student must get prompt inputs during learning period in any organization setting, nevertheless, the nature of ODL prevents the F2F contact with the lecturers and other students. It is particularly discriminating? for those students who stay in rural areas where network system and accessibility might be the additional deciding factors for a satisfactory ODL instructive involvement (Essel & Owusu, 2017). They may not have access to reliable broadcast communications, computers, and technology. The frustration resulting from the problem leads to stress among students during ODL. Some students struggle over ODL mode due to the many assignments and tasks needed to be completed during a particular period. According to Ida (2020), some lecturers did not conduct online classes but only provided notes and assignments to students. Also, some lecturers provided a lot of classes activities and assignments that needed to be submitted early where some students will not be able to complete it on time. The students get burdened with many tasks and assignments, and this will cause a lack of sleep and will affect student health (Anita Schlarb et al., 2017). According to Hashim et al (2020), the internet coverage problem is also one factor that leads to stress during ODL. It is supported by Ida (2020) that states the situation of lagging internet speed has obstructed the learning process because it would cause students to miss out on certain parts of classes through live video sessions. The affected students will require extra efforts to hunt for additional material or to refer to their friends, some who may reluctant to help. Thus, the anticipated long-term impact is that the affected students will most likely to experience stress issues and develop discouragement (Simpson, 2018).

Solution of Harmful Effect

Since the emergence of COVID-19, a few of research has been conducted on online distance learning. Although there are several challenges associated with online education, the benefits of this mode of learning in these challenging circumstances cannot be overlooked. It would be possible to resolve technical challenges by prerecording video lectures, testing the material, and always having a Plan B on hand so that the teaching-learning process is not impeded (Dhawan, 2020). Secondary students may benefitted from online, indoor, and desk-based learning, which will allow them to study more efficiently and continuously while the COVID-19 pandemic lockdown occurs (Van Haeften et al., 2020). During the COVID-19 pandemic, online learning via the Community of Inquiry framework (Col) can significantly boost students' involvement in learning, as well as their learning accomplishment and team teaching (Tan et al., 2020). The usage of online distance learning in education has grown dramatically in recent years, with several advantages being realized due to this increase (Allen & Seaman, 2017). As the number of students taking their classes online increases, educators are being forced to create online courses that enhance student learning and increase instructional effectiveness (Evans, 2014). Students might benefit from the discussion forum by collaborating to solve complicated challenges and enhance their learning. Mobile technology, such as mobile applications, tablet PC, and laptops, boosts the effectiveness of mobile learning efforts by making it easier to access an online learning platform (Panigrahi et al., 2018).

Online courses should be made lively, entertaining, and interactive to engage students' attention. Students should be reminded of time limitations and reminders by their teachers to remain aware and attentive. For students to successfully transition into this new learning environment, they need to get individual attention. Communication with students may be accomplished via social media and numerous group forums. When it becomes tough to reach out to students through texts, different messaging apps, video chats, and other means, communication is essential to maintaining a positive attitude. Both the teaching approach and the material should be designed so that students may practice and refine their abilities while in class. The quality of the courses should be consistently increased, and lecturers or educators should strive to provide their best effort.

Creative, dynamic, relevant, student-centered, and group-based online programs should be the goal of each online program (Partlow & Gibbs, 2003). Teachers must devote a significant amount of effort to developing successful ways for delivering their online lessons. The most successful online distance learning encourages students to provide comments and feedback, to ask questions, and broaden their horizons in terms of course content (Keeton, 2004). Schools should prioritize pedagogical concerns and encourage collaborative learning, case-study-based teaching methods, and project-based learning techniques via online instructions (Kim & Bonk, 2006).

A few scholars have made positive proposals for improving online learning experiences. Some recommendations were made to enhance online learning for undergraduate students during COVID-19, such as establishing an upper-level, project-based class (Zewail-Foote, 2020). Distance learning, convenience, and accessibility were some of the advantages of online learning, but its drawbacks included inefficiency and problems in monitoring students (Mukhtar et al., 2020). When performing online learning, educators should make every effort to monitor their students' progress and boost their classroom output while delivering lessons through the internet. Teachers can keep track of their student's progress more easily in online classes because of the prevalence of numerous significant aspects in the platform.

Materials and Methods

The research design used in this research is descriptive. A stratified sampling technique is used for this study based on BA232 undergraduate students of Bachelor Office Systems Management (Hons) at University Technology MARA (UiTM) Pahang Branch, Jengka Campus. This research was selected the respondents who are applying the ODL during the semester. There are 235 students from semester 1 to semester 6 who participated in this study. Researchers applied adapted questionnaires from several authors (Naziya & Khan, 2020; Aafreen et al., 2018). Likert Scale 1-5 will be used to obtain the findings. The items in this questionnaire will cover the demographic profile as in sections A; the harmful effects while doing the ODL will be covered in Section B and Section C consists of the outcomes to reduce the harmful effects. Statistical Package for the Social Science software (SPSS) version 26 is used for data analysis to obtain the exact outcome of the results. Following Krijieic and Morgan (1970), the sampling for 281 population is 235.

Findings and Discussion

The sampling of 235 respondents have taken which shows that female respondents are 194, and the rest are male.

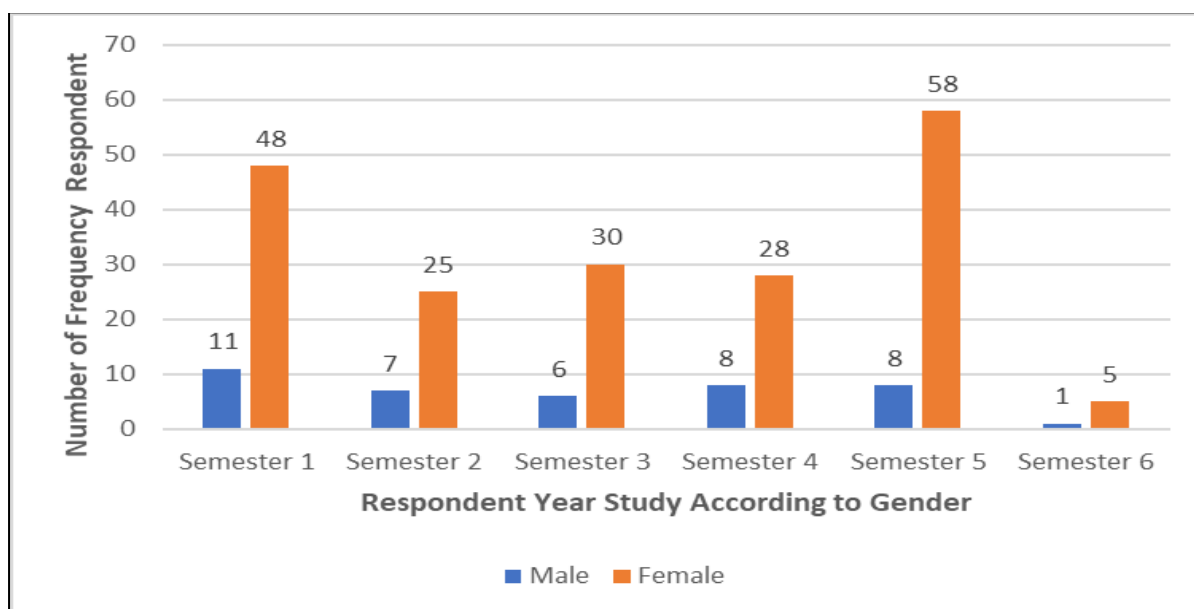


Figure 1: Gender of Students

Table 1

Harmful Effect on Students During ODL

ITEM	Mean	Std. Deviation	N
I find that it is hard for me to control my worried	3.89	.953	235
I often have a headache along the implementation of online distance learning	3.76	1.044	235
I find that I have eye sights problem due to spending hours in front of screen or digital (increasing power, increasing blurred vision)	3.98	1.031	235
I always do not get enough sleep	3.93	.917	235
I am gaining weight due to stress during online distance learning	3.44	1.247	235
I am losing weight due to stress during online distance learning	2.82	1.285	235
I found that my academic performance was declining	3.44	1.062	235

The data show the harmful effects to students during ODL. The highest mean showed the increase of blurry eye sights vision due to spending hours in front of the screen ($m=3.93$). While the lowest mean is losing weight, $m=2.82$ indicates that most of them are gaining weight and spending more on food and less physical movement during pandemic ($m=3.44$). This study can be identified that most respondents strongly agree that the eye sights problem significantly affects their condition compared to before the pandemic. While the rest factors also show the high mean scores on affecting their health condition, such as anxiety, headache, not enough sleep, and declining academic performance.

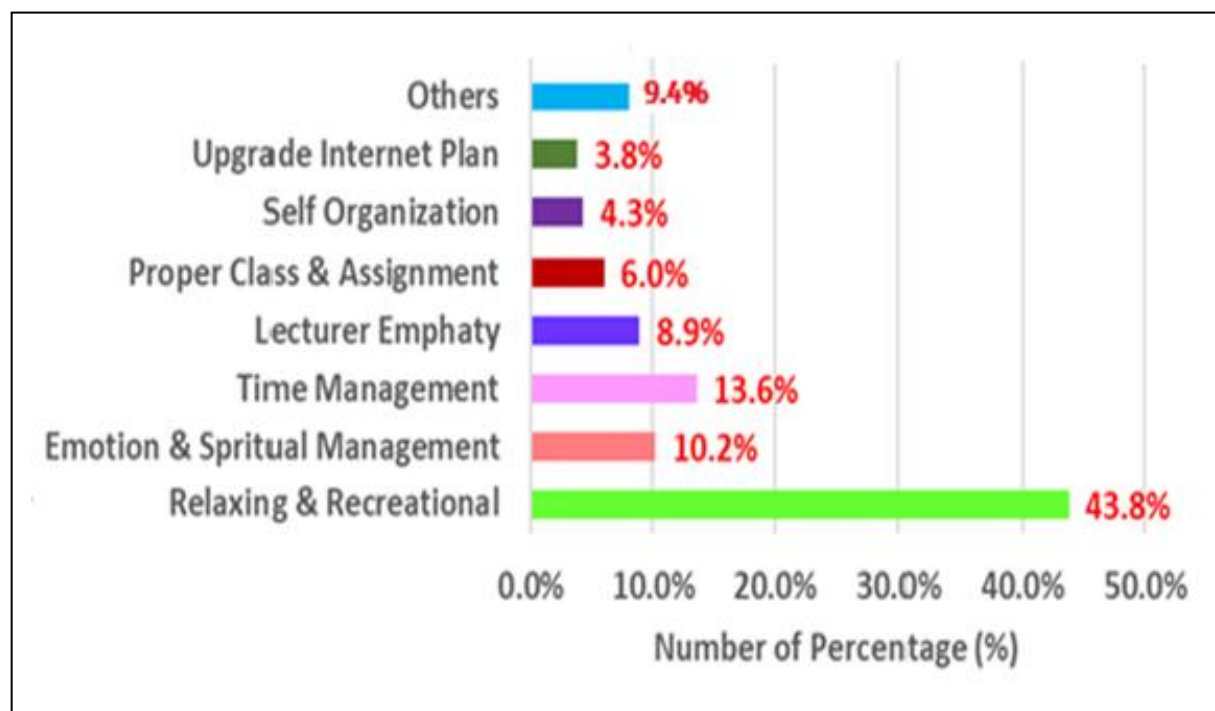


Figure 2: Way Out of Harmful Effect

Figure 2 showed 235 students had proclaimed ways to lessen harmful effects during the implementation of ODL. The opinions from respondents have been separated and clustered accordingly. As shown in the Figure 2, relaxing & recreational are popular among the students as it has scored 43.8%. Next, students are also concerned about time management as important during ODL, which is 13.6%. The following is 10.2% due to emotional and spiritual management from them. While 8.9% of them insist on lecturer empathy about the problem they confronted during pandemics, the rest give priorities to other reasons, 9.4%. Sixth percent of them also stated they need proper classes with appropriate assignments with ODL conditions. The percentage then shows that 6% of students agree that self-organization can reduce harmful effects. Lastly, 4.3% of them also believe the internet plays an essential role during ODL in making their class and personal business matters smooth and efficient.

Result and Discussion

The data showed the harmful effects of students' health, such as increasing the power of eye sights vision, making them have headaches due to not enough sleep, and being too worried (anxiety). These problems are related because they need to focus on lectures and finish the assignments on the datelines even though they are too tired. They are being forced to search for information online and finished up the tasks. The unconducive environments such as the internet problem, anxiety, and worry about adapting to new norms worsen their conditions, which accordance to previous studies such as by (Simpson, 2018; Schlarb et al., 2017). Furthermore, the ODL also contributes to weight gain due to overstress. The reason is the lack of movements unlike the physical class on the campus, and further unhealthier eating habits at home. ($m=3.44$).

As participants felt the ODL condition during the pandemic worsen, they took several solutions to make things better and reduce the anxiety. Most of them preferred to take a break with relaxing & recreational activities. As they believe too much time spent on-screen can damage the eyes. The recreational and relaxing could soothe the tired eyes and lose some weight. It was shown that the relationship of physical exercise and perceived stress had a statistically significant influence on student happiness with their lives (Olefir et al., 2019). Next, students are also concerned about time management as critical during ODL because the academic cohort and implementation are also changing due to pandemics. Therefore, they need to adapt to the new norm of control. This can lead to the confusion and anxiety among students where it can affect their studies. Burnout has become a significant psychological issue among undergraduate students, implying that burnout might have an impact on academic performance (Zhu et al., 2021). Next is emotional and spiritual management from students themselves, which due to tiredness, stress, and the burden of online assignments and activities during learning. Besides that, they also asked for lecturers' empathy and advice about the problems they confronted during pandemics to lessen their anxiety about the declining academic performance.

Last but not least, self-organization is encouraged among students since they have to adapt to self-study at home. However, lecturers must continue to monitor their students' progress in order to guarantee that they grasp the topics covered. In comparison to older individuals, youngsters (primarily students) had more difficulty in managing their learning activities in remote mode (Zinchenko et al., 2020). The internet plan must be sufficient for effective online learning/. Therefore, the participants hope for the government or agencies to provide free internet data or better plans for telecommunication services for students to reduce these kinds of obstacles.

Conclusion

As a conclusion, the harmful effects of ODL may influence students' mental health and their academic performance. This study is conducted in UiTM Cawangan Pahang and found that students are heavily burdened with the implementation of online distance learning (ODL). Students could not pay attention during online classes because they could not understand due to new methods of teaching and were easily distracted when studying at home. Consequently, they faced many harmful effects which lead to detrimental health impacts, anxiety, and stress. This pandemic has taught us to be more efficient and learn to be more proper in time and self-management to stay healthy. In a nutshell, the university should find the best way to overcome this problem because it could affect its visions and mission achievement. The pandemic has given a lot of challenges to students and lecturers. The lecturers should recognise and assist the students' efforts in interacting with the new learning approach. Both parties must negotiate a win-win outcome in unexpected situations. Universities, for example, can improve the process of online teaching and learning by increasing teachers' technical skills and providing training programmes to assist them in remodelling and adapting their teaching style and interactions with students to the online environment. Meanwhile, students should not take it for granted that they can skip courses; instead, they must open their minds to the new learning method and work to assist lecturers in making it more manageable. When students have technical problems, lecturers should devise solutions so that students can access the information offered during classes by recording and posting the course on the platform offering supplementary materials, etc.

References

- Allam, S. N. S., Hassan, M. S., Mohideen, R. S., Ramlan, A. F., & Kamal, R. M. (2020). Online Distance Learning Readiness During Covid-19 Outbreak Among Undergraduate Students. *International Journal of Academic Research in Business and Social Sciences*, 10(5). <https://doi.org/10.6007/ijarbss/v10-i5/7236>
- Allen, I. E., & Seaman, J. (2017). Digital Compass Learning: Distance Education Enrollment Report 2017. *Babson survey research group*.
- Angdhiri, R. P. (2020). Challenges of home learning during a pandemic through the eyes of a student - Lifestyle - The Jakarta Post. In *The Jakarta Post.com*.
- Schlarb, A., Friedrich, A., & Claßen, M. (2017). Neuropsychiatric Disease and Treatment Dovepress sleep problems in university students-an intervention. *Neuropsychiatric Disease and Treatment*, 1989–2001.
- Anglia Ruskin Universiti. (2019). *How Does Distance Learning Work Anglia Ruskin Distance Learning*. <https://distancelearning.anglia.ac.uk/blog/how-does-distance-learning-work/> (27 September 2021)
- Generations College. (2020). Advantages Of Video Conferencing In Education. Mac Cormac College. <https://www.maccormac.edu/blog/advantages-video-conferencing-education> (27 September 2021)
- Berg, G. A., & Simonson, M. (2016). Distance learning education. Britannica. In *Encyclopedia Britannica*. <https://www.britannica.com/topic/distance-learning> (28 September 2021)
- Cennimo, D. J. (2020). *What is COVID-19?* Pediatric Dermatology. <https://doi.org/10.1111/pde.14218>
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of educational technology systems*, 49(1), 5-22.
- Evans, H. K. (2014). An experimental investigation of videotaped lectures in online

- courses. *TechTrends*, 58(3), 63-70.
- Farah & Li. (2020). The rise of online learning during the COVID-19 pandemic | World Economic Forum. In *World Economic Forum Covid Action Platform* (pp. 1–8). <https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/>
- Essel, G., & Owusu, P. (2017). *Causes of students' stress, its effects on their academic success, and stress management by students*. Faculty: School of Business and Culture. Seinajoki University of Applied Science.
- Ghosh, S., Nath, J., Agarwal, S., & Nath, A. (2012). Open and Distance Learning (ODL) Education System : Past , Present and Future – a Systematic Study of an Alternative Education System. *Journal of Global Research in Computer Science*, 3(4), 53–57.
- Harmsen, R., Helms-Lorenz, M., Maulana, R., & van Veen, K. (2018). The relationship between beginning teachers' stress causes, stress responses, teaching behaviour and attrition. *Teachers and Teaching: Theory and Practice*, 24(6), 626–643. <https://doi.org/10.1080/13540602.2018.1465404>
- Hashim, H., Abd. Kadir, N. A., Mansor, F., & Azudin, M. Z. M. (2020). Open and Distance Learning (ODL) During Movement Control Order (MCO): Conceptualizing the Relationships between Self-Efficacy, Learning Motivation and Performance of Higher Learning Education Students. *International Journal of Academic Research in Business and Social Sciences*, 10(8), 258–269. <https://doi.org/10.6007/ijarbss/v10-i8/7530>
- Ida, L. (2020). Reality for Malaysia's university students: Online learning challenges, stress, workload; possible solutions for fully digital future until Dec. In *Malay Mail* (pp. 1–7). <https://www.malaymail.com/news/malaysia/2020/05/30/reality-for-malaysias-university-students-online-learning-challenges-stress/1870717>
- Johnson, R. (2020). *Students Stressed Out Due to Coronavirus*. *BestColleges*. <https://www.bestcolleges.com/blog/coronavirus-survey/> (28 September 2021)
- Keeton, M. T. (2004). Best online instructional practices: Report of phase I of an ongoing study. *Journal of asynchronous learning networks*, 8(2), 75-100.
- Kim, K. J., & Bonk, C. J. (2006). The future of online teaching and learning in higher education. *Educause quarterly*, 29(4), 22-30.
- Krejcie & Morgan. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, no.30, pp. 607-610.
- Aafreen, M., Priya, V. V., & Gayathri, R. (2018). Effect of stress on academic performance of students in different streams. *Drug Invention Today*, 10(9), 1176–1780
- Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan journal of medical sciences*, 36(COVID19-S4), S27.
- Naziya, H., & Khan, N. H. (2020). *Online Teaching-Learning During Covid-19 Pandemic :Students ' . 8(4)*, 202–213.
- Palansamy, Y. (2020). Higher Education Ministry: All University Lectures to be Online-Only Until end 2020, with a Few Exceptions, *Malay Mail*, <https://www.malaymail.com/news/malaysia/2020/05/27/higher-educationministry-all-university-lectures-to-be-online-only-until-e/1869975> (26 September 2020)
- Panigrahi, R., Srivastava, P. R., & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome—A review of literature. *International Journal of Information Management*, 43, 1-14.
- Partlow, K. M., & Gibbs, W. J. (2003). Indicators of constructivist principles in Internet-based

- courses. *Journal of Computing in Higher Education*, 14(2), 68-97.
- Practice Guidelines. <https://doi.org/10.1891/9780826153425.0016b>
- Shiel, W. C. (2018). Definition of Stress. In *Eating Disorders in Women and Children*. <https://doi.org/10.1201/9781420039405.pt2> (28 September 2021)
- Simpson, Stacy. (2018). "Stress Triggers, the Effects Stress Has on Social, Mental and Physical Behavior in College Students, and the Coping Mechanisms Used". *Integrated Studies*. 215. <https://digitalcommons.murraystate.edu/bis437/215> (26 September 2020)
- Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research*, 22(9). <https://doi.org/10.2196/21279>
- Tan, H. R., Chng, W. H., Chonardo, C., Ng, M. T. T., & Fung, F. M. (2020). How chemists achieve active learning online during the COVID-19 pandemic: using the Community of Inquiry (Col) framework to support remote teaching. *Journal of Chemical Education*, 97(9), 2512-2518.
- Umair, S., Waqas, U., & Faheem, M. (2020). COVID-19 pandemic: Stringent measures of Malaysia and implications for other countries. *Postgraduate Medical Journal*, 2–4. <https://doi.org/10.1136/postgradmedj-2020-138079>
- Van Haefen, S., Milic, A., Addison-Smith, B., Butcher, C., & Davies, J. M. (2021). Grass Gazers: Using citizen science as a tool to facilitate practical and online science learning for secondary school students during the COVID-19 lockdown. *Ecology and Evolution*, 11(8), 3488-3500.
- Will. (2014). *Key differences between classroom and online learning*. EF Publication. Accessed at <https://www.ef.com/wwen/blog/general/key-differences-classroom-online-learning/> (26 September 2021).
- Zalaznick Matt., 2020. *Another survey shows college students' mental health struggles*. *Universiti Business*. <https://universitybusiness.com/college-students-mental-health-anxiety-stress-depression-online-learning-coronavirus/#:~:text=In%20a%20survey%20of%20%2C500,a%20student%20housing%20development%20company.> (26 September 2021)
- Zewail-Foote, M. (2020). Pivoting an upper-level, project-based biochemistry laboratory class to online learning during COVID-19: enhancing research skills and using community outreach to engage undergraduate students. *Journal of Chemical Education*, 97(9), 2727-2732.
- Zhu, X., Chu, T., Yu, Q., Li, J., Zhang, X., Zhang, Y., & Zou, L. (2021). Effectiveness of Mind-Body Exercise on Burnout and Stress in Female Undergraduate Students. *INTERNATIONAL JOURNAL OF MENTAL HEALTH PROMOTION*, 23(3), 353-360.
- Zinchenko, Y. P., Morosanova, V. I., Kondratyuk, N. G., & Fomina, T. G. (2020). Conscious self-regulation and self-organization of life during the COVID-19 pandemic. *Psychology in Russia: State of the Art*, 13(4), 168-182.