Assessing Relationship of Student Learning Experiences and Academic Performances in Higher Education through Online Learning Platforms

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ABSTRACT

In recent years, the entire world experienced the impact of the Coronavirus disease (COVID-19), leading to significant disruptions across various economic sectors, including the field of education. Since then, online learning has made a significant impact in addressing educational needs. This study's primary objective is to assess the relationship between higher education student learning experiences and their academic performances through online learning platforms. This study adopts a quantitative approach with a descriptive, comparative, and correlational research design. Surveys through Google Forms were used as instruments to gather data from 119 mathematical students from the Faculty of Education, UiTM Puncak Alam. The survey encompasses 24 questions covering students' personalization, learning authenticity, and collaboration in online learning settings. Results of this study indicate that students exhibited positive educational experiences, particularly in terms of personalization, authenticity, and collaboration. Lastly, the research also reveals a strong positive correlation between students' experiences and academic performance, specifically in the factors of personalization, authenticity, and collaboration. These findings contribute valuable insights into the effectiveness of online learning for higher education students and highlight the importance of personalized and authentic online educational experiences in fostering academic success.

Keywords: Online learning, student learning experience, academic performance, higher education, digital learning

INTRODUCTION

The COVID-19 pandemic brought drastic changes to all economic sectors and human daily lives. One of the major changes is in the education sector. During the pandemic, online classes have been introduced and implemented on a large scale since face-to-face learning is not possible to be conducted [14] and it has been applied in some higher institutions until now. While many students have demonstrated increased satisfaction and improved academic performance in online classes compared to traditional face-to-face settings [10], some students continue to face challenges adapting to this new environment. Therefore, this quantitative research aims to evaluate the experiences of higher education students with digital learning and assess their academic performance in online classes. The study seeks to determine whether these students can achieve better results and show improvement in an online learning environment compared to traditional face-to-face instruction, or vice versa. To thoroughly assess students' experiences with online learning, several factors can be considered, such as digital device ownership, computer literacy, and attitudes toward online learning [22]. Additionally, factors like gender, prior learning experience, and time spent on digital learning [18] can also be relevant. This

research, however, focuses on specific characteristics that influence students' online learning experiences as highlighted and discussed by previous researchers including personalization, learning authenticity, and learner collaboration [31].

LITERATURE REVIEW

A. Experience with Online Learning

Online learning can address the limitations associated with traditional face-to-face classroom teaching, such as flexibility in resource use, spatial constraints, time scheduling, and authenticity [28]. Nearly 90% of students found online learning effective, as it allowed them to take control of their learning pace and navigate materials independently [28]. These findings align with more recent research by [9], which shows that over 80% of respondents felt that online learning materials significantly enhanced their understanding of the subject. Many students even expressed a desire for the continued use of online learning due to its conveniences, such as reduced costs from not needing to print assignments, and its motivational benefits.

Students' positive experiences with online learning are often linked to the availability and quality of learning materials [9]. These materials are crucial for improving learning outcomes and supporting the educational process. Additionally, more than 30% of students reported improved experiences with online learning when educational programs were broadcast on TV [24]. This group suggested that such innovative learning methods should be continued and considered as alternative approaches alongside traditional face-to-face instruction. Despite the bright side of online learning, students often face challenges adapting to this new system. The shift from traditional to online learning presents difficulties, particularly in collaborative activities and communication, especially in technical subjects like mathematics education [6]. Students may struggle with interaction due to shared home spaces and limited opportunities for peer support, as highlighted by [9],[28]. Additionally, students can feel overwhelmed by the abundance of online information, leading to difficulties in identifying key points and potential misinformation.

B. Students' Academic Performance during Online Learning

Academic performance is a complex phenomenon influenced by various factors, including personalization in online learning, authenticity, collaboration, prior knowledge, and learning styles [22]. The impact of online learning on academic performance remains unclear, agreeing with Coldwell-Neilson that numerous factors need to be considered to fully understand the relationship between students' online learning experiences and their performance [26]. Some students are enthusiastic about continuing online learning in the future, as they have had positive experiences that helped them develop new skills and competencies not typically acquired in traditional classrooms [9]. This is due to the additional resources and approaches available through digital devices. However, it is found that some students prefer traditional learning environments and report lower grades when learning online especially in technical subjects like mathematics [5]. Nearly half of her respondents noted diminished performance in online mathematics classes, and 40% were uncertain about their final grades. This uncertainty has led many students to feel anxious and lacking in self-esteem regarding their ability.

C. Students' Personalization during Online Learning

Online learning experiences can be evaluated through three key elements: personalized learning, learning authenticity, and collaboration [15]. Personalized learning involves customizing pedagogy, curriculum, and learning environments to meet the diverse needs and styles of individual learners. Fred Keller's Personalized System of Instruction, introduced in 1968, highlighted self-pacing, mastery learning, and group collaboration [16],[17].

In addition, personalized or self-regulated learning can enhance students' ability to adapt and improve their learning strategies, yet this approach is most effective for students with strong self-regulation skills [14].

D. Learning Authenticity with Online Learning

Authentic learning, also known as active or real-life learning, connects classroom knowledge with real-world

issues and encourages meaningful student engagement [8]. This approach helps students understand the relevance of their learning to everyday life and enhances engagement and educational outcomes. Authentic learning contradicts traditional education, which often focuses on test scores [27]. Instead, authentic learning is student-centered, involving hands-on activities and real-world applications. Modern authentic learning integrates technology and multimedia [18]. There are also researcher reported improvements in performance with authentic learning environments. Authentic learning supports career preparation and benefits students at all performance levels, particularly those with lower academic achievements [19]. Overall, research indicates that authentic learning is effective in online settings, positively impacting students' academic and emotional development.

E. Collaboration during Online Learning

Research has explored whether online collaboration is as effective as traditional classroom collaboration. Many students appreciate online group work for its time and cost savings, such as reducing living expenses, tuition fees, and commuting time [25]. Online collaboration allows students to avoid physical meetings, instead using the internet and technology to quickly access information and communicate. This convenience means group members don't need to coordinate schedules for in-person meetings but can instead use online platforms for immediate discussions. Usefulness and benefits of virtual collaborative learning [25]. Additionally, there are also several pedagogical advantages of online collaborative learning, including increased satisfaction, enhanced higher-order thinking, and improved content understanding and retention [4].

F. Online Learning Platform

Educational institutions face challenges selecting the most suitable online platforms for students and lecturers due to the wide range of available options supporting online learning and Open Distance Learning (ODL) [2]. Various platforms are chosen based on their ability to facilitate online sessions, provide learning materials, monitor student participation, and track progress [20]. There are two primary categories of online learning platforms used in higher learning institutions which are Learning Management Systems (LMS) and video conferencing tools [11]. LMS platforms, such as Google Classroom, offer a comprehensive environment with features for content management, discussions, online activities, and collaborative group work. In contrast, video conferencing platforms like Google Meet and Zoom create interactive settings that impersonator face-to-face sessions. There are studies highlighted the need for video conferencing features within LMS to enhance real-time interactions between students and lecturers [21],[32]. This combination is believed to be able to enhance the functionality of LMS in general. As years passed by, the widespread use of commercial communication platforms like WhatsApp and Telegram also improve the online learning process. These communication platforms are used to delegate information and learning materials among students and lecturers. In Universiti Teknologi Mara (UiTM) , there are no restrictions on platform choices for online learning sessions, allowing lecturers to use any platform that meets course outcomes and ensures accessibility for all students. In 2020, UiTM developed uFuture which is an advanced online learning platform to support its students' academic needs [1],[3],[21]. Functioning as a comprehensive LMS, uFuture allows students to access course materials, engage in online discussions, submit assignments, and track their academic progress. It also enhances communication between students and lecturers, facilitating a more interactive and flexible learning environment.

RESEARCH METHODOLOGY

This research hypothesis aims to identify any significant relationship between students' experiences and their academic performance during online learning. In the process of achieving the objective, quantitative approach is selected due to three main factors which are (1) quantitative research is useful and appropriate for researchers to quantify the experience, beliefs, points of view, attitudes, and behavior of the target population as well as identify what position the population is in about a certain issue [23],[29] which fit with the purpose of this research, (2) quantitative research is practical and applicable for novice researchers to use in their research to describe some phenomena. Since this research is new to this area of research, then this method is very suitable to be applied and (3) quantitative research suitable for hypothesis testing [29].

This research used questionnaire as instruments in collecting data. The questionnaire consists of five sections. Section A is focused on the demographic background of the respondents which includes age, gender, and some

educational background questions. Section B questions are used to measure students' personalization in online learning and Section C analyzes students' learning authenticity while learning online. Then, Section D investigates the final factor assessed by this research in this research which is the collaboration between peers and teachers. The last section, Section E is used to compare and analyze students' performance academically before and after experiencing online classes.

Fig. 1 shows the data collection and analysis process involved in the research.
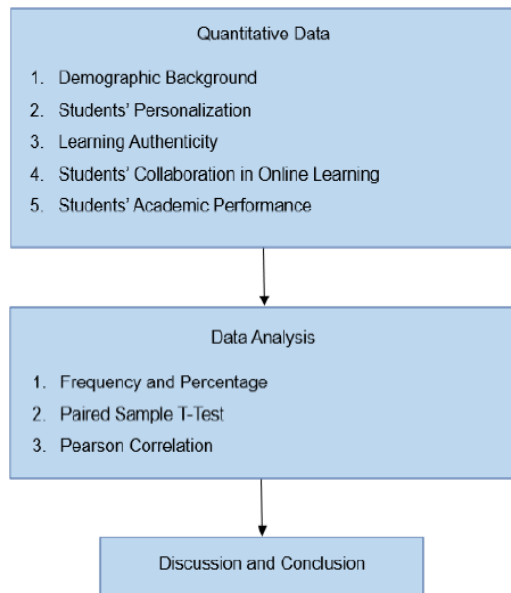

Fig. 1 Data collection and analysis for the research

The statistical analysis chosen for this research is mainly selected based on the type of data which is the essential determinant of the alternative in analyzing the responses from the respondents. Table 1 shows proposed analyses based on each of the research questions.

Table I. Proposed Analysis Based on Each of The Research Questions

Purpose of Analysis	Research Question	Null Hypothesis	Type of Data	Statistical Analysis
Descriptive	What are students' experiences in using online learning?	-	Nominal, Ordinal	Frequency & Percentage
Comparative	Is there any difference in Academic performance (CGPA) of students between the before and the after online classes?	There is no difference in Academic performance (CGPA) of students between the before and the after online classes.	Interval, Ratio	Paired-Sample T-test
Relationship	Is there any significant Relationship between students' experiences and their academic performance?	There is no significant relationship between students' experiences and their academic performance.	Interval, Ratio	Pearson Correlation

This research involved third-year and fourth-year Mathematics students from the Faculty of Education in Universiti Teknologi Mara (UiTM) Selangor as the research sample. A total of 167 students will be the

population size of this research. Therefore, according to [7], in determining the sample size for a 167-population size, this research needs to have at least 113 respondents or samples so that the findings have a minimum margin of error. These students are the most ideal respondents for this study as they have experienced a sudden change in the educational system where online distance learning has replaced traditional classrooms as a result of the pandemic. Besides, as every learner has different experiences towards online learning as well as different academic performances, this research believes that this sample can represent the whole population and can generalize the final findings.

RESULT AND DISCUSSION

A. Demographic Background

Analysis shows that out of 119 respondents, 24 of them are 22 years old ($n = 24$), 27 of them are 23 years old ($n = 27$), 63 of them are 24 years old ($n =63$) and 5 of the respondents are 25 years old ($n = 5$). As for gender, 80% of the respondents are female ($n = 86$) while the remaining are male respondents ($n = 33$). Since this research only involved students who have experienced at least 3 semesters of online learning, this means that only third-year and fourth-year students are involved in this research. Therefore, only 4- semester students directly participated in answering this survey. Out of 119 respondents, one's semester five ($n = 1$) has answered the Google Form. While there are 32 students from sixth semester has voluntarily answered the survey ($n = 32$). As for the final year students which are seventh and eighth semester, there are 30 students ($n = 30$) and 56 students ($n = 56$) has cooperate to get the findings of this research respectively. All 119 respondents have their own experience of online learning ($n = 119$).

B. Students' Experiences in Using Online Learning

In assessing students' experiences in using online learning, this research decided to investigate three factors that influence students' experiences in online learning including students' personalization with online learning, students' authenticity with online learning as well as their collaboration activities through online learning with both students and teachers. Table 2 shows the analysis result of students' experiences in the aspect of personalization with online learning.

Table 2. Students' Personalization with Online Learning

	N		Mean	Std. Deviation
	Valid	Missing		
I plan and organize my studies better during online learning.	119	0	3.51	1.199
Online Learning offers more flexibility.	119	0	4.15	1.005
My ability to self-monitor of my understanding and reflect the knowledge about learning in an online setting is better than in the classroom.	119	0	3.26	1.175
I was encouraged to take responsibility for my own learning.	119	0	3.97	1.025
I was able to work through the subject material at my own pace comfortably.	119	0	3.99	.897
I have great control over my own learning.	119	0	3.58	1.190

Table 2 shows that students view online learning positively in terms of personalization. They rate items like "I plan and organize my studies better online" ($M = 3.51$) and "Online Learning offers more flexibility" ($M = 4.15$) highly, indicating improved self-management and scheduling flexibility. They also appreciate the ability to self-monitor ($M = 3.26$) and work at their own pace ($M = 3.99$), suggesting online learning enhances their control and responsibility over their studies. Despite initial challenges, many students feel online learning offers

significant benefits with proper support and training. Table 3.0 shows a total of 4 item distribution of students' authenticity with online learning.

Table 3. Students' Authenticity with Online Learning

	N		Mean	Std. Deviation
	Valid	Missing		
I self-direct my learning better during online learning than in class learning.	119	0	3.34	1.114
I gain more and deep knowledge about topics learned as I can use the technology to improve my understanding.	119	0	4.03	.901
My resources of knowledge and information is wider (other than textbook) when I am learning online.	119	0	4.16	1.008
I am able to apply what I have learned in a new environment better compared to classroom learning.	119	0	3.32	1.248

Item 1, "I self-direct my learning better online than in-class," reflects high authenticity in online learning (M = 3.34). Online resources enable self-directed learning anytime, anywhere. Item 2 shows that students gain deeper knowledge through technology (M = 4.03). Item 3 highlights broader access to resources (M = 4.16), and Item 4 indicates students can better apply their learning in new environments (M = 3.32). Overall, students value the flexibility and resource accessibility of online learning. Table 4 is a table that discusses the responses from 119 respondents regarding online collaboration between students and students as well as students and teachers.

Table 4. Collaboration Between Students and Teachers Through Online Learning

	N		Mean	Std. Deviation
	Valid	Missing		
I find collaboration with peers through online learning is helpful.	119	0	3.60	1.036
Online learning provides teamwork skill opportunities better than in classroom learning.	119	0	3.49	1.141
Adequate opportunity to study with other classmates while learning online.	119	0	3.43	1.086
Online learning provides adequate opportunity to discuss with teachers about teaching and learning process.	119	0	3.45	1.079
Online learning establishes peer support and collaboration activities better than in classroom setting.	119	0	3.38	1.066

Item 1, "I find collaboration with peers through online learning is helpful," shows a moderate positive rating (M = 3.60), indicating that online group activities enhance learning by facilitating idea-sharing and deeper understanding. Item 2, at (M = 3.49), suggests online learning better supports teamwork. Item 3 (M = 3.43) indicates ample opportunities for collaborative study, while Item 4 (M = 3.45) reflects sufficient chances to discuss lessons with teachers. Finally, Item 5 (M = 3.38) highlights that online peer support and collaboration are perceived as more effective than in-class activities.

C. Students' Experiences in Using Online Learning

The paired sample t-test compares the means of two variables for a single group which in this case is the academic performance (CGPA) of students between the before and the after of online class. Table 5 shows the result of the differences of the academic performances when students are in physical classroom and the academic

performance while students learn online.

Table 5. Students' Comparison in academic performance (CGPA) of students between the before and after online classes

| | | Paired Differences | | | | | | |
| | | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	CGPA BEFORE attending online class - CGPA AFTER attending online class	-.07269	.19103	.01751	-.10737	-.03801	-4.151	118	<.001

The paired sample t-test compares students' CGPA before and after online classes. Table 5 reveals that the 95% Confidence Interval for the mean difference ranges from -0.10737 to -0.03801. The t-test result ($t(119) = -4.151$, $p = 0.001$) shows a statistically significant difference. Since the p-value is less than 0.05, we reject the null hypothesis and accept the alternative, indicating that online classes led to a significant improvement in students' CGPA. Specifically, the number of students scoring below 3.00 decreased from 4 to 1 after online classes.

D. Relationship Between Students' Experience and Their Academic Performance

For this analysis, correlation of coefficients to measure the strength of the linear relationship between two variables which in this case there are 3 variables that are being measured with students' academic performance including students' personalization, students' authenticity and students' online collaboration. Through this method of analysis, we can conclude about the existence of a relationship between two variables and their correlation measures. Table 6 shows the measure of the relationship between students' personalization with online learning and their academic performance.

Table 6. The Relationship Between Students' Personalization with Online Learning and their Academic Performance

| | Mean_StudentsPersonalization | | | Mean_AcademicPerformance | | |
	Pearson Correlation	Sig. (2-tailed)	N	Pearson Correlation	Sig. (2-tailed)	N
Mean_StudentsPersonalization	1		119	.663**	.000	119
Mean_AcademicPerformance	.663**	.000	119	1		119

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6 shows a significant relationship between students' personalization in online learning and their academic performance. With a p-value of 0.000, which is less than 0.05, the null hypothesis is rejected, and the alternative hypothesis is accepted. The Pearson correlation coefficient of $r = 0.663$ confirms a strong positive correlation, indicating that improvements in students' personalization with online learning are associated with better academic performance. Table 7 displays the measure of the relationship between students' authenticity with online learning and their academic performance.

Table 7. The Relationship Between Students' Personalization with Online Learning and their Academic Performance

| | Mean_StudentsAuthenticity | | | Mean_AcademicPerformance | | |
	Pearson Correlation	Sig. (2-tailed)	N	Pearson Correlation	Sig. (2-tailed)	N
Mean_StudentsAuthenticity	1		119	.677**	.000	119
Mean_AcademicPerformance	.677**	.000	119	1		119

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7 shows a significant relationship between students' authenticity in online learning and their academic performance, with a p-value of 0.000, which is less than 0.05, leading to the rejection of the null hypothesis. The

Pearson correlation coefficient of $r = 0.667$ indicates a strong positive correlation, suggesting that improvements in students' authenticity with online learning are associated with better academic performance. Table 8 displays the measure of the relationship between students' collaboration with other students and teachers and their academic performance.

Table 8. The Relationship Between Students' Collaboration with Other Students and teachers and their Academic Performance

	Mean_StudentsCollaboration			Mean_AcademicPerformance		
	Pearson Correlation	Sig. (2-tailed)	N	Pearson Correlation	Sig. (2-tailed)	N
Mean_StudentsCollaboration	1		119	.660**	.000	119
Mean_AcademicPerformance	.660**	.000	119	1		119

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8 shows a significant relationship between students' collaboration with peers and teachers and their academic performance, with a p-value of 0.000, which is below 0.05, leading to the rejection of the null hypothesis. The Pearson correlation coefficient of $r = 0.660$ indicates a strong positive correlation, meaning that increased collaboration is associated with improved academic performance.

CONCLUSIONS

The research conducted with the aim to assess the relationship between higher education student learning experiences and their academic performances through online learning platforms. Findings indicate a strong positive relationship between Mathematical students' online learning experiences and their academic performance. This suggests that improvements in online learning experiences such as personalization, authenticity, and collaboration positively affect academic performance. Positive and meaningful learning experiences significantly contribute to academic success. When students engage in a supportive and stimulating online learning environment, they become more motivated, engaged, and confident. These positive experiences boost their self-confidence and encourage them to tackle challenges with optimism. Therefore, it is crucial to ensure that students enjoy their learning experiences, as this impacts their academic performance. It is recommended that those involved with online learners, including parents and teachers, focus on students' well-being, ensuring they are comfortable and well-prepared for online tasks, which can enhance the overall effectiveness of their learning.

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REFERENCES

1. Abdullah, Z. (2020). U Future: UiTM's Digital Learning Platform. UiTM Press.
2. Abd Aziz, M. N., Noradzan, H., Zakariah, Z., Ismail, J., & Abdul Rahman, R. (2022). Open and distance learning: investigation on quality of experience among final year computer science students in UiTM Cawangan Pahang. International Journal of e-Learning and Higher Education (IJELHE), 17(2), 59-76.
3. Bakar, N. A., & Yusof, S. (2021). The Role of u Future in Facilitating Remote Learning at UiTM. Malaysian Journal of Educational Technology.
4. Brandon, D. P., & Hollingshead, A. B. (1999). Collaborative learning and computer-supported groups. Communication education, 48(2), 109-126.
5. Bringula, R., Reguyal, J. J., Tan, D. D., & Ulfa, S. (2021). Mathematics self-concept and challenges of learners in an online learning environment during COVID-19 pandemic. Smart Learning Environments,

8(1), 22.

6. Calder, N., Jafri, M., & Guo, L. (2021). Mathematics education students' experiences during lockdown: Managing collaboration in elearning. Education Sciences, 11(4), 191.

7. Chuan, C. L., & Penyelidikan, J. (2006). Sample size estimation using Krejcie and Morgan and Cohen statistical power analysis: A comparison. Jurnal Penyelidikan IPBL, 7(1), 78-86.

8. Coldwell-Neilson, J., & Craig, A. (2012, November). Preparing for WIL: online career development for IT students. In 2012 Australian Collaborative Education Network National Conference (p. 37).

9. Famularsih, S. (2020, August 31). Students' Experiences in Using Online Learning Applications Due to COVID-19 in English Classroom. ResearchGate; unknown. https://www.researchgate.net/publication/346284553 Students' Experiences in Using Online Learning Applications Due to COVID-19 in English Classroom

10. Gopal, R., Singh, V., & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19. Education and Information Technologies, 26(6), 6923–6947. https://doi.org/10.1007/s10639-021-10523-1

11. Hapompwe, C. , Kukano, C. (2021). Challenges and Prospects for Quality Education via E-Learning Platforms in Private Universities: A Case Research of Acacia University Zambia. International Journal of Scientific and Research Publications, 387-395. http://dx.doi.org/10.29322/ IJSRP.11.04.2021.p11252

12. Herrington, J., Oliver, R., & Herrington, A. (2007). Authentic learning on the web: Guidelines for course design. In Flexible learning in an information society (pp. 26-35). IGI Global.

13. Ingkavara, T., Panjaburee, P., Srisawasdi, N., & Sajjapanroj, S. (2022). The use of a personalized learning approach to implementing self-regulated online learning. Computers and Education: Artificial Intelligence, 3, 100086.

14. Kamaludin, K., & Sheela Sundarasen. (2023). COVID-19 and online distance learning in Malaysia: A blessing or a curse? 8. https://doi.org/10.3389/feduc.2023.1062219

15. Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. Alt-J-Research In Learning Technology, 20(1).

16. Keefe, J. W., & Jenkins, J. M. (2008). Personalized instruction: The key to student achievement. Rowman & Littlefield Education.

17. Keller, F. S. (1968). Good-bye, teacher... Journal of applied behavior analysis, 1(1), 79.

18. Kim, G., & Bae, J. (2020). A Study In to Students' Use of Digital English Learning Strategies in Tertiary Education. Teaching English with Technology, 20(1), 21–42. https://Files.Eric.Ed.Gov/Fulltext/Ej1242644.Pdf

19. Lai, P. K., Portolese, A., & Jacobson, M. J. (2016). Does sequence matter? Productive failure and designing online authentic learning for process engineering. British Journal of Educational Technology, 48(6), 1217–1227. https://doi.org/10.1111/bjet.12492

20. Maqableh, M., Alia, M. (2021). Evaluation online learning of undergraduate students under lockdown amidst COVID-19 Pandemic: The online learning experience and students' satisfaction. Children and Youth Services Review 128. https://doi.org/10.1016/j.childyouth.2021.106160

21. Mahmud, R., & Ismail, N. (2021). Student Perceptions of u Future: A Case Research at UiTM. International Journal of Education and Development Using ICT.

22. Mehmet Demirezen, Oz, H., & Jafar Pourfeiz. (2015). Digital Device Ownership, Computer Literacy, and Attitudes Toward Foreign and Computer-Assisted Language Learning. Procedia - Social and Behavioral Sciences, 186, 359–366. https://www.academia.edu/12727627/Digital Device Ownership Computer Literacy and Attitudes Toward Foreign And Computer Assisted Language Learning

23. Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. Journal of Economic Development, Environment and People, 9(4), 50–79. https://doi.org/10.26458/jedep.v9i4.679

24. Mukuka, A., Overson Shumba, & Mulenga, H. M. (2021). Students' experiences with remote learning during the COVID-19 school closure: implications for mathematics education. Heliyon, 7(7), e07523–e07523. https://doi.org/10.1016/j.heliyon.2021.e07523

25. Pham, T. T. T., Le, H. A., & Do, D. T. (2021). The Factors Affecting Students' Online Learning Outcomes during the COVID-19 Pandemic: A Bayesian Exploratory Factor Analysis. Education Research International, 2021, 1–13. https://doi.org/10.1155/2021/2669098

26. Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in

an online course. Journal of Asynchronous learning networks, 6(1), 21-40.

27. Shaw, A. (2019, March 26). Authentic Assessment in the Online Classroom - Center for Teaching and Learning | Wiley Education Services. Center for Teaching and Learning | Wiley Education Services. https://ctl.wiley.com/authentic-assessment-in-the-onlineclassroom/

28. Sit, J. W. H., Joanne W.Y. Chung, Meyrick C.M. Chow, & Thomas K.S. Wong. (2005). Experiences of online learning: students' perspective. Nurse Education Today, 25(2), 140–147. https://doi.org/10.1016/j.nedt.2004.11.004

29. Sukamolson, S. (2007). Fundamentals of quantitative research. Language Institute Chulalongkorn University, 1(3), 1-20.

30. Uzunboylu, H., Tezer, M., & Yildiz, E. P. (2020). The effects of the authentic learning approach with a course management system (moodle) on students mathematics success and online authentic learning self-efficacy. Educational Research and Reviews, 15(11), 679–689. https://doi.org/10.5897/ERR2020.4087

31. Yates, A., Starkey, A., Egerton, B., & Flueggen, F. (2020). High school students' experience of online learning during Covid-19: the influence of technology and pedagogy. https://doi.org/10.26686/wgtn.13315877.v1

32. Yuan, Y. P., Tan, G. W. H., Ooi, K. B., & Lim, W. L. (2021). Can COVID-19 pandemic influence experience response in mobile learning?. Telematics and Informatics, 64, 101676.