INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 14, Issue 01, (2025) E-ISSN: 2226-6348

Evaluating the Impact of MCO-Induced Online Learning on Mathematics Performance of Students at Universiti Teknologi MARA, Campus Segamat

Siti Hasma Hajar Binti Mat Zin[1], Lee Chang Kerk[1*], Kim Fong Choo[2], Basri Badyalina[1]

[1]College of Computing, Informatics and Mathematics, Universiti Teknologi MARA, Johor Branch, Segamat Campus, Malaysia, [2]Academy of Language Studies, Universiti Teknologi MARA, Johor Branch, Segamat Campus, Malaysia

Corresponding Author Email: kerkleechang@uitm.edu.my

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v14-i1/24600 DOI:10.6007/IJARPED/v14-i1/24600

Published Online: 10 February 2025

Abstract

This study evaluates the impact of Movement Control Order (MCO)-induced online learning on the mathematics performance of diploma students at Universiti Teknologi MARA, Segamat Campus. The research focuses on students enrolled in Mathematical Sciences and Computer Sciences programs, analyzing their performance in Pre-calculus (MAT133) and Calculus I (MAT183). A cross-sectional design was employed, with data collected from 157 respondents using an online questionnaire. The instrument comprised sections addressing demographic profiles, general questions about MCO-induced online learning, and perceptions of learning mathematics at secondary school and university. Statistical methods, including descriptive analysis, Pearson correlation, and multiple regression, were used to analyze the data. Results revealed that perceptions of online learning during secondary school had a weak negative correlation with mathematics performance, indicating limited academic benefits from early online learning experiences. Conversely, positive perceptions of online learning at the university level demonstrated a moderate positive correlation with improved mathematics performance. The regression analysis confirmed that students' perceptions significantly influenced their academic outcomes. These findings highlight the dual nature of online learning, presenting both opportunities and challenges. The study underscores the need for improved online teaching strategies and support systems to address learning gaps and enhance student performance in mathematics.

Keywords: Education Challenges, Online Learning, Mathematics Education, Covid-19 Education Impact, Student Perceptions

Introduction

Movement Control Order (MCO) was enforced by the government of Malaysia during the COVID-19 pandemic from 2020 to 2021. This alteration has changed our education system.

All institutions including Universiti Teknologi MARA (UiTM) had to shift learning to online platforms. This action can ensure our students get the continuity of education; however, it also brought some challenges, especially for the subject of Mathematics (Raymundo, 2023). Mathematics plays an important role in our academic curriculum since it exists in all fields such as business, accounting, physics and engineering. Therefore, any interruption in mathematics education can have substantial long-term effects on students' academic and professional futures.

Online teaching and learning for the subject Mathematics is challenging because it requires a lot of interaction, especially when solving problems. Instructors need feedback from students to adjust the teaching pace and methods. However, issues such as Wi-Fi problems or students' lack of self-discipline can disrupt this teaching and learning process.

From the previous studies, the struggles that students faced with online learning have been highlighted, including reduced engagement, limited peer interaction, and insufficient access to resources (Mohd et al. 2021). While there has been substantial research on the immediate impacts of online learning during the pandemic, there is still a notable gap in understanding the long-term effects on university students' performance, particularly in mathematics (Serena et al. 2023).

Therefore, this study aims to fill this gap by focusing on the students of UiTM, Campus Segamat, who had the experience of online learning during the MCO. From the results of this study, the valuable perceptions that can be used for academia in structuring academic curriculum can be obtained.

MCO-Induced Online Learning

Due to the implementation of MCO, the traditional physical classroom has been shifted to an online virtual classroom. This transformation had brought a lot of impacts on our education system (Hamidah et al. 2022). According to Mohd et al., (2021), the arrival of online classes caught both teachers and students off guard, as online platforms were not yet widespread. There are also a lot of obstacles that hinder effective learning outcomes and lead to less effective learning experiences, such as difficulties in mathematical communication, individual learning characteristics and limited interaction with instructors (Cheam et al. 2024; Sonia et al. 2024).

There is a lot of research about the perspectives of students towards MCO-induced online learning. According to the studies, students have both positive and negative opinions about their experiences (Ma et al. 2024; Salleh et al. 2021; Mohamed et al. 2021; Sohayla et al. 2022; Chek et al. 2022; Singh and Ranjitkar 2023). For example, among 100 respondents, 76.5% of students found online education flexible, as it can take place at any time and save their time. They preferred online education because study material is available online 24 hours a day (Ma et al. 2024).

However, the studies also found that the majority of the students were dissatisfied with online learning as they missed concepts due to poor network connectivity, experienced distractions and failures in time management during online education, had difficulty staying motivated in online classes, felt isolated from friends, family, teachers, and school, struggled

to organize classwork while simultaneously taking notes during online classes, and felt that continuously attending online classes affected their physical and mental health (Ma et al. 2024; Salleh et al. 2021; Mohamed et al. 2021; Sohayla et al. 2022; Chek et al. 2022; Singh and Ranjitkar 2023)..

The findings clearly indicate that participants believe online learning presents significant challenges. Many respondents express a strong preference for traditional face-to-face classes, highlighting the numerous difficulties they encounter during online learning experiences (Salleh et al. 2021). It is evident that students feel unprepared for the demands of home-based education. Additionally, students have reported an alarming increase in stress levels, citing overwhelming workloads during online classes compared to the more manageable regular semester conditions (Mohamed et al. 2021).

During the period of the Movement Control Order (MCO), students expressed that their learning did not get better in quality or quantity during online classes, blaming this on frequent technical issues and increased distractions faced during virtual sessions; in addition, they mentioned the need to spend more money on internet services, which made it harder for them to stay motivated throughout the online learning experience. As a result, it can be concluded that students' reactions to online education may heavily depend on personal factors, including the need for both technical and financial support to ensure proper access to virtual classes and to create a motivating environment, thus enhancing involvement in the academic curriculum (Sohayla et al. 2022).

Some respondents shared their positive thoughts about online learning because it makes studying more convenient, saves time, is better for the environment, and encourages creativity and originality (Chek et al. 2022). However, fully online learning is actually the least favored option among them. A lot of people still prefer the in-person approach in a hybrid setup since it helps them to “focus better” in a physical classroom (Chek et al. 2022).

According to Singh and Ranjitkar (2023), the research has determined that a majority of students preferred in-person classes over virtual ones, nearly half of the students participated in online classes via smartphones, and more than half encountered internet issues during these sessions. Among the participants, two-thirds expressed a favorable view of online education. Although a small number held a negative perspective and acknowledged that online learning is important, it cannot substitute traditional face-to-face classroom experiences.

Mathematics’ Performance Post-MCO

The research has shown secondary school students' performance was declining during the COVID-19 pandemic period (Kyung et al. 2022). The contributing factors to this decline, including mathematics anxiety, dyscalculia, and low intelligence quotient (Nomsa et al. 2021). Additionally, changes in the classroom environment and the delivery method of teachers, also have impacts on the cognitive level of students and thus affect their mathematics performance (Makofane and Maile, 2019). The availability of learning resources during the online lesson also influences their success in mathematics (Agathi et al. 2024).

Besides that, poor internet connectivity, ineffective teaching methods, and reduced student engagement are also challenges faced by students that affect the development of their math skills (Raymundo, 2023). Research has shown a substantial decrease in secondary school students' math performance during the MCO period, with lower-ranking students experiencing a particularly sharp decline (Kyung et al. 2022). This suggests that MCO-induced online classes had a significant impact on students with a weak math foundation.

Unlike most subjects, mathematics is a subject that requires cumulative and progressive knowledge. Thus, a strong foundation in math is very important when solving higher-level mathematics problems. Students who experienced online learning during the MCO are now university students. Is the impact of MCO-induced online learning still affecting their math performance?

This study will focus on students at Universiti Teknologi MARA, Campus Segamat to investigate whether the effects of MCO-induced online learning persist and continue to impact mathematics achievement at the university level. The main respondents of this study will be diploma students who studied the Programme Diploma in Mathematical Sciences (CDCS143) and Diploma in Computer Sciences (CDCS110), and the study will focus on their performance in Pre-calculus (MAT133) and Calculus 1 (MAT183), which are the courses that will be taken by students in semester 1 and 2 respectively.

Methodology

Study Design and Sampling

This is a cross-sectional study where the data will be collected within a month. The population in this study is all students from Parts 3, 4, and 5 who are studying a diploma in mathematical sciences and a diploma in computer sciences. The 157 respondents are conveniently participating in this study. In this study, we used convenience sampling to select the respondents because it is easy to implement and inexpensive. The method used for data collection was an online questionnaire, which was distributed using Google Forms. This method was chosen because of its ease of use.

Research Instrument

This study's instrument was modified from Shaid et al. (2021) and Omar et al. (2021). The instrument is divided into four sections. Section A focuses primarily on the respondents' demographic profiles, which include gender, semester, program, age, grade of pre-calculus and calculus subjects, CGPA score, and SPM results for mathematics and additional mathematics. Meanwhile, Section B focusses on general questions related to MCO-induced online learning. Then, Section C is about perceptions regarding the experience of learning mathematics (and/or additional mathematics) through online learning in secondary school. It consists of 28 items. Finally, Section D comprises nine items that explore perceptions about the learning experience of Pre-Calculus and Calculus I at UiTM Segamat. For Section C and Section D, we use a five-item interval scale that goes from strongly disagree to strongly agree.

Data Analysis

In this study, several statistical methods have been used to analyse the data, such as descriptive statistics, the Pearson correlation coefficient, and multiple regression analysis. Frequency tables, mean, and standard deviation are examples of descriptive statistics. It is

used to determine the demographic profiles of the respondents and the level of students' perceptions towards the experience of learning mathematics through online learning and the experience of learning Pre-Calculus and Calculus I in UiTM Segamat.

Then, the Pearson correlation coefficient is used to measure the strength of the relationship between the two variables. The formula for Pearson's correlation coefficient, *r,* is

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]\left[\sum y^2 - \frac{(\sum y)^2}{n}\right]}}$$

Where,
X = Independent variables
Y = Dependent variable
n = number of observations

Based on Kya et al. (2022), if the correlation value is close to -1.0, it indicates that the two variables have a strong negative relationship. Meanwhile, the correlation value is close to +1.0, indicating a strong positive relationship. A correlation value approaching or equal to zero, on the other hand, suggests that the two variables do not have a linear relationship.

Then, a multiple regression analysis is applied. When there are several independent variables in the model, multiple regression analysis is applied. The regression equation can be written as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

Where
y = Mathematics performance,
x_1 = Students' perceptions of learning Mathematics through online learning in secondary school,
x_2 = Students' perceptions of learning Pre-Calculus and Calculus I in UiTM Segamat,
β_0 = constant term,
$\beta's$ = regression coefficients
ε = error term.

Conceptual Framework
In this study, two hypotheses have been made:

H1: There is a relationship between students' perceptions of learning mathematics through online learning in secondary school and mathematics performance among university students.

H2: There is a relationship between students' perceptions of learning pre-calculus (and calculus I) at UiTM Segamat and mathematics performance among university students.

As a result, the research framework is shown in Figure 1. In this study, students' mathematics performance (average of grade value) is a dependent variable, while the two independent

variables are students' perceptions of learning mathematics through online learning in secondary school and students' perceptions of learning pre-calculus and calculus I in UiTM Segamat.

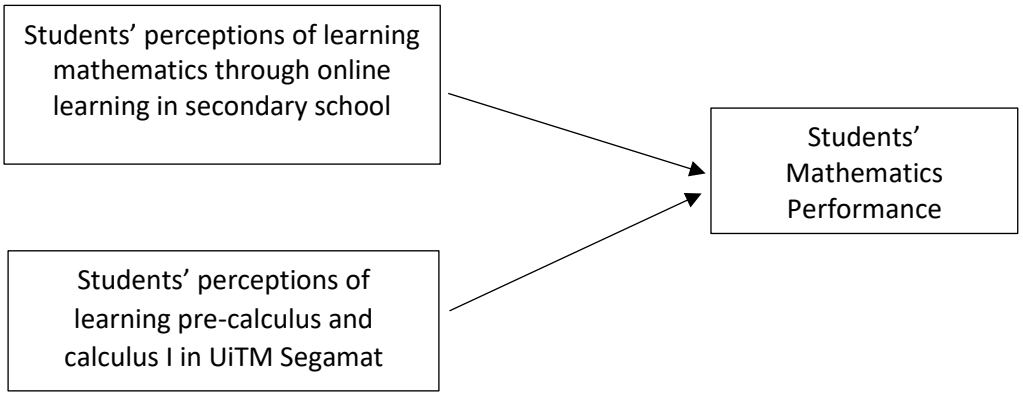

Figure 1: Research Framework

Result and Discussion

Demographic Profile

Table 1 presents the demographic profile for 157 respondents. The results show that 60.5% of respondents are from the female group and the other 39.5% are from the male group. Part 3 students make up most of the respondents, followed by Part 3 students at 22.9%, and Part 6 students at 6.4%. Additionally, 51% of the respondents were studying for the Diploma in Mathematical Sciences (CDCS143), and 49% of the respondents were studying for the Diploma in Computer Sciences (CDCS110).

Table 1
Demographic profile of the respondents

Variables	Frequency	Percentage (%)
Gender		
Male	62	39.5
Female	95	60.5
Semester		
Part 3	111	70.7
Part 4	36	22.9
Part 5	10	6.4
Courses		
Diploma in Computer Sciences (CDCS110)	77	49
Diploma in Mathematical Sciences (CDCS143)	80	51
Grade for Pre-Calculus		
A+	19	12.1
A	56	35.7
A-	23	14.6
B+	23	14.6
B	11	7.0
B-	6	3.8
C+	13	8.3
C	5	3.2
D	1	0.6

Grade for Calculus I		
A+	22	14
A	34	21.7
A-	17	10.8
B+	16	10.2
B	8	5.1
B-	14	8.9
C+	18	11.5
C	22	14
C-	0	0
D+	0	0
D	0	0
E	1	0.6
N/A	N/A	N/A

Based on Table 1, most of the respondents scored grade B for Pre-Calculus, which is 35.7%, followed by grade A- and B+, which are both, respectively, 14.6%. Meanwhile, for the Calculus I subject, 21.7% of the respondents scored grade A, followed by grade A+ and C, which are both 14%.

General Questions Related to MCO-Induced Online Learning

Table 2 shows general questions related to MCO-induced online learning. All respondents (100%) have participated in MCO-induced online learning. In addition, 51% of the respondents have been involved in online learning since form 3, followed by 40.1% in form 4, and the remaining 8.9% in form 5.

Table 2
Online learning during MCO-induced

Variables	Frequency	Percentage (%)
Have you ever faced online learning during MCO?		
Yes	100	100
No	0	0
What grade were you in when you took online classes in secondary school?		
Form 3	80	51
Form 4	63	40.1
Form 5	14	8.9

Referring to Figure 1, 84% of the respondents were using Google Meet as their e-learning platform during secondary school. Zoom applications had the lowest usage rate, accounting for only 1% of the respondents.

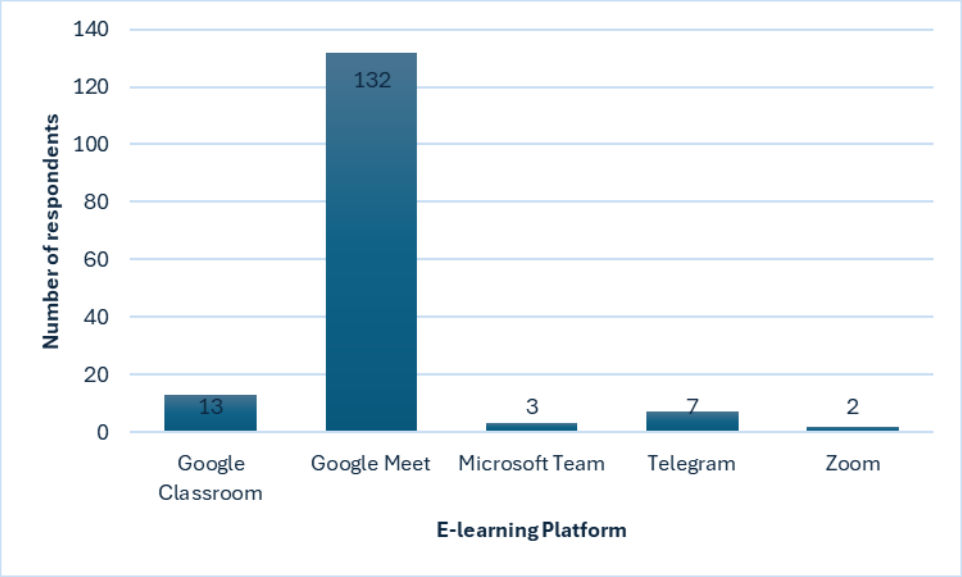

Figure 1: E-learning platforms were adopted for online learning during secondary school

The Relationship Between Students' Perceptions of Online Learning in Mathematics Subjects at Secondary School and at UiTM Towards Mathematics Performance

Table 3 shows the correlations between the independent variables and the dependent variable. The relationship between students' perceptions of online learning in mathematics at secondary school and students' mathematics performance is -0.175, which shows that there is a weak negative correlation between these two variables. This indicates that students' perceptions of online learning in mathematics at secondary school have a minimal impact on their academic performance. Meanwhile, a moderate positive relationship (r = 0.312) has been observed between students' perceptions of online learning in mathematics (pre-calculus and Calculus I) at UiTM Segamat and their performance in mathematics. It indicates that the students with a positive perception towards online learning in mathematics at the university level tend to have moderate mathematics performance.

Table 3
Correlations between Independent Variables and Dependent Variable

Variables	Students' Mathematics Performance	Students' Perceptions of Online Learning in Mathematics at Secondary School	Students' Perceptions of Online Learning in Mathematics at UiTM
Students' Mathematics Performance	1	-0.175**	0.312**
Students' Perceptions of Online Learning in Mathematics at Secondary School		1	0.255**
Students' Perceptions of Online Learning in Mathematics at UiTM			1

*** Correlation is significant at the 0.01 level*

The Influence Between Students' Perceptions of Online Learning in Mathematics Subjects at Secondary School and at UiTM Towards Mathematics Performance

Table 4
Coefficient of Regression for The Association of Independent and Dependent Variable

	B	t	Sig. (p-value)
Constant	2.537	4.545	0.000
Students' Perceptions of Online Learning in Mathematics at Secondary School	-0.330	-2.117	0.036
Students' Perceptions of Online Learning in Mathematics at UiTM	0.558	4.534	**0.000**
R	0.350	**R^2**	0.123
F	10.733	**Sig.**	0.000

Dependent variable: Students' Mathematics Performance

Based on Table 4, the results demonstrate the significance of the model, with an F-test value of 10.733 and a p-value of 0.000, which is less than the significance level of 0.05. This suggests that at least one of the independent variables significantly influences the mathematics performance of the students. The findings also revealed that the value of R is 0.350, which indicates that there is a moderately positive relationship between students' perceptions of online learning in mathematics subjects at secondary school and at UiTM and their mathematics performance. The R-squared is 0.123. It can be concluded that 12.3% of the total variation of the students' mathematics performance can be explained by the students' perceptions of online learning in mathematics subjects at secondary school and at UiTM. Other variables not investigated in this study may explain the remaining 87.7% of the variation. From the findings of coefficient of regression analysis, the regression model can be written as:

$$\hat{y} = 2.537 - 0.33x_1 + 0.558x_2$$

Where,
Y represents students' mathematics performance
X_1 represents students' perceptions of online learning in mathematics at secondary school
X_2 represents students' perceptions of online learning in mathematics at UiTM

When the mean score of students' perceptions of online learning in mathematics at secondary school increased, the students' mathematics performance decreased by 0.33. Meanwhile, when the mean score of students' perceptions of online learning in mathematics at UiTM increased, the students' mathematics performance increased by 0.558.

Furthermore, based on the findings, the p-value for both independent variables which are students' perceptions of online learning in mathematics at secondary school and at UiTM, is less than 0.05. As a result, the null hypothesis for each of these variables was rejected. Therefore, we can conclude that both students' perceptions of MCO-induced online learning in mathematics at secondary school and at UiTM significantly influence their mathematics academic performance. This result was consistent with Huda et al. (2021). Their findings also demonstrate that a positive correlation between students' perceptions and their academic performance. In online learning, students who have positive opinions about mathematics

courses also perform well academically. Widayani (2011) also claimed that students' perceptions of mathematics and their achievement in the subject were positively and significantly correlated.

Conclusion

The study aimed to evaluate the impact of MCO-induced online learning on the mathematics performance of students at Universiti Teknologi MARA (UiTM), Campus Segamat. The findings revealed that while online learning during the Movement Control Order (MCO) presented significant challenges, it also had varying effects on students' academic performance in mathematics. The research highlighted that students' perceptions of online learning in mathematics at the secondary school level had a weak negative correlation with their mathematics performance, suggesting that negative experiences during secondary school online learning may have a minimal adverse impact on their university performance. Conversely, a moderate positive relationship was found between students' perceptions of online learning in mathematics at the university level and their mathematics performance, indicating that positive perceptions of online learning at UiTM Segamat were associated with better academic outcomes. The study also identified several factors that influenced students' performance, including technical issues, lack of motivation, and the need for financial and technical support. These findings align with previous research, which has shown that online learning environments can be challenging due to limited interaction, distractions, and the need for self-discipline. However, the study also found that students who adapted well to online learning at the university level were able to achieve better results, suggesting that the transition to online learning can be successful with the right support and resources. This study contributes to the field of online education by providing a detailed analysis of how MCO-induced online learning has influenced mathematics performance among university students at UiTM Segamat. It highlights the varying effects of online learning experiences at different educational stages, showing that while secondary school online learning had a weak negative impact, university-level online learning fostered a moderate positive relationship with academic performance. The findings emphasize the critical role of technical and financial support in ensuring equitable access to online education, particularly for students from diverse backgrounds. Additionally, the study underscores the importance of effective teaching strategies, such as interactive and engaging online platforms, to maintain student motivation and participation. By identifying the challenges and opportunities of online learning, this research offers practical recommendations for educators to adopt hybrid learning models that combine the flexibility of online education with the interaction of traditional classroom settings. Furthermore, the study provides policymakers with evidence-based insights to develop more inclusive and adaptive educational policies that address the unique needs of students in a post-pandemic world. Overall, this research enriches the discourse on online education and serves as a foundation for future studies aimed at optimizing digital learning environments for better academic outcomes.

References

Raymundo, F. P. (2023). The effect of COVID-19 on the academic performance in mathematics of the students at Tugatog National High School in the city division of Malabon. *AIDE International Research Journal, 2*(1). https://doi.org/10.56648/aide-irj.v2i1.34

Mohd, S. N., Mohd, D. H., Mohd, R. R., & Abd, R. R. (2021). Student readiness towards online learning during Movement Control Order (MCO) in Malaysia: A descriptive analysis (Kesediaan pelajar ke arah pembelajaran dalam talian semasa Perintah Kawalan Pergerakan (PKP) di Malaysia: Analisis deskriptif). *Akademika.*

Serena, R., Iro, X. D., & Krzysztof, C. (2023). Emotions and mathematics: Anxiety profiles and their influence on arithmetic performance in university students. *Royal Society Open Science.* https://doi.org/10.1098/rsos.230861

Hamidah, J., Abdul, K. N., Mariam, F. M. N., Aida, I. N., Zur, R. S. D. M. A., & Naemah, N. N. D. (2022). Psychological stress of parents during the Movement Control Order (MCO) and the effectiveness of teaching and learning at home (PdPR). *International Journal of Academic Research in Business & Social Sciences.* https://doi.org/10.6007/ijarbss/v12-i12/15839

Mohd, S. N., Mohd, D. H., Mohd, R. R., & Abd, R. R. (2021). Student readiness towards online learning during Movement Control Order (MCO) in Malaysia: A descriptive analysis (Kesediaan pelajar ke arah pembelajaran dalam talian semasa Perintah Kawalan Pergerakan (PKP) di Malaysia: Analisis deskriptif). *Akademika.*

Cheam, C. L., & Luqman, A. (2024). Determinants of online teaching and learning effectiveness for statistical concepts and calculations subjects during the COVID-19 Movement Control Order (MCO). *SAGE Open.* https://doi.org/10.1177/21582440241239115

Sonia, M., Yus, M. C., & Zukhrufurrohmah. (2024). Online learning think talk write: Developing communication mathematics skills students. https://doi.org/10.1201/9781003376125-25

Ma, N. H., & Abdul, R. A. (2024). Perception of higher secondary school students towards online education. *International Journal for Multidisciplinary Research.* https://doi.org/10.36948/ijfmr.2024.v06i02.15599

Salleh, N. M., Amir, A. L., Shukri, A. H. S. A., & Zulkifli, N. (2021). Students' perspective towards online learning during COVID-19 pandemic: A case study in MiCoST. *Journal of Advanced Computing Technology and Application (JACTA), 3*(2), 51-56.

Mohamed, S. R., Samsudin, S. S., Ismail, N., Alam, N. M. F. H. N., & Adnan, N. I. M. (2021). Challenges of home learning during Movement Control Order among UiTM Pahang students. *Journal of Physics: Conference Series, 1988*(1), 012052. IOP Publishing.

Attalla, S. M., Bazla, B. W., Hassan, O. A., Nihal, A. H., Mahfuza, A. K., & Kumar, K. A. (2022). Students' academic performance in the online learning sessions during the Movement Control Order for COVID-19 pandemic: Students' perspective. *Open Access Research Journal of Multidisciplinary Studies.* https://doi.org/10.53022/oarjms.2022.4.1.0080

Chek, K. L., Yoke, L. L., & Chiow, T. S. (2022). Students' perceptions on online learning. *International Journal of Education, Psychology and Counseling.* https://doi.org/10.35631/ijepc.745019

Singh, A., & Ranjitkar, U. D. (2023). Perception towards online education among the secondary level students during COVID-19 pandemic. *DMC Research Journal, 5*(1), 8-16.

Kyung, K. K., Jaehwee, S., & Lim, H. (2022). Changes in math achievement among high school students in the wake of COVID-19: The current state and influencing factors. https://doi.org/10.29221/jce.2022.25.4.63

Nomsa, M., Namayammu, M. P., & Serole, R. (2021). Factors contributing to poor learner performance in mathematics: A case of selected schools in Mpumalanga Province, South Africa. https://doi.org/10.33225/PEC/21.79.451

Makofane, P., & Maile, S. (2019). Factors influencing poor performance in Grade 12 mathematics: A case study of Bohlabela Cluster of Limpopo. https://doi.org/10.22158/WJER.V6N1P37

Stathopoulou, A., & Mastrotheodorou, M. (2024). Low mathematics performance and the role of digital technologies. *World Journal of Biology, Pharmacy and Health Sciences.* https://doi.org/10.30574/wjbphs.2024.18.1.0147

Shaid, N. N., Kamruzaman, F. M., & Sulaiman, N. A. (2021). Online learning during ongoing COVID-19 pandemic: A survey of students' satisfaction. *International Journal of Academic Research in Business and Social Sciences, 11*(7), 924-937.

Omar, N. H., Thomas, B., Jusoh, M. Z., & Jalil, S. Z. (2021). Students' perception and preference for online learning in Sabah during COVID-19 pandemic. *International Journal of Academic Research in Business and Social Sciences, 11*(11), 270-292.

Kya, L. T., Ngor, P. Y., & Awang, Z. (2022). *Statistics for UiTM* (6th ed.). SJ Learning.

Huda, N., Wahyuni, T. S., & Fauziyah, F. D. (2021, April). Students' perceptions of online mathematics learning and its relationship towards their achievement. In *International Conference on Engineering, Technology and Social Science (ICONETOS 2020)* (pp. 522-529). Atlantis Press.

Widayani. (2011). *Hubungan antara persepsi peserta didik pada mata pelajaran matematika dengan hasil belajar matematika kelas X MA NU Nurul Huda Mangkang Semarang.* IAIN Walisongo Semarang Fakultas Ilmu Tarbiyah dan Keguruan: Program Studi Tadris Matematika, Semarang.