PREFACE

The SIG CS@e-Learning committee sincerely appreciates the dedication and contributions of the educators from Jabatan Sains Komputer & Matematik (JSKM), UiTM Penang Branch, in bringing the 9th edition to fruition. This edition received 30 scholarly articles, all of which met the required criteria and were accepted. Authors are encouraged to further refine their research with additional insights and discussions for potential publication in high-impact journals indexed by SCOPUS, WOS, or ERA.

The theme for the ninth volume, "Beyond Boundaries: The Multidimensional Horizons of E-Learning," reflects the continuous evolution of digital learning. Over the past few decades, e-learning has proven to be a transformative force in education, demonstrating exceptional adaptability and effectiveness. The widespread use of mobile technology has expanded its reach, making e-learning an essential component not only in higher education and vocational training but also in primary and secondary education. Emerging trends such as artificial intelligence (AI), micro-credentials, big data, virtual and augmented reality, blended learning, cloud-based platforms, gamification, mobile learning, the Internet of Things (IoT), and online video are reshaping the digital learning landscape.

SIG CS@e-Learning remains dedicated to fostering academic excellence through impactful publications. With continuous commitment and innovation, we aspire for JSKM to attain recognition in esteemed academic journals, further advancing the frontiers of e-learning.

Ts. Jamal Othman
Chief Editor
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THE EFFECT OF ONLINE LEARNING ON STUDENT INVOLVEMENT AND ACHIEVEMENT IN PERMATANG PAUH CAMPUS, UiTM CAWANGAN PULAU PINANG (UiTMCPP)

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ABSTRACT

This study investigates the effects of online learning on student engagement and academic achievement at the Permatang Pauh Campus of Universiti Teknologi MARA Cawangan Pulau Pinang (UiTMCPP). As the institution transitioned from traditional face-to-face learning to online education during the COVID-19 pandemic, students faced both opportunities and challenges. The study employed a questionnaire-based survey targeting 82 students from Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs. A sample of 34 students was selected using simple random sampling, and data were analyzed using descriptive and inferential statistics, including ANOVA and chi-square tests. The findings revealed that while online learning provided flexibility and accessibility, it also led to varying levels of student engagement and academic performance. Some students reported increased participation, while others struggled with motivation and concentration. The ANOVA results indicated significant differences in GPA among the three academic programs, suggesting that the effectiveness of online learning varied by field of study. The study highlights the need for enhanced online learning strategies, including interactive course designs and real-time feedback mechanisms, to improve student engagement and academic outcomes. Future research should explore long-term trends in online education to further refine instructional practices.

Keywords: Online Learning, Student Engagement, Academic Achievement, Higher Education

Background of Study

The COVID-19 pandemic created an unforeseen period of limited opportunities, forcing an extended disruption of face-to-face education. Its worldwide impact affected over 850 million students, leading to the suspension of in-person learning (Ulum, 2022). Permatang Pauh Campus of Universiti Teknologi MARA Cawangan Pulau Pinang (UiTMCPP) is also moving from face-to-face classes or traditional classroom learning to online learning during the COVID-19 pandemic. This change brought both opportunities and challenges. Online learning offers flexibility and convenience but concerns about its impact on student engagement and academic performance exist (Akpen et.al, 2024). The study focuses on understanding on how online learning has influenced student involvement and achievement at UiTMCPP. By comparing students' experiences and performance in

online learning versus traditional classroom learning, this research will provide insights to help students improve their future teaching strategies at the university.

The study will target students at the Permatang Pauh Campus of UiTMCPP and aim to understand their level of engagement in online classes and how it affects their academic performance. The findings will help to identify strategies to enhance the online learning experience at the university. The sampling frame, which consists of 82 students, was chosen as respondents in this study. They are students from the Culinary Arts Management, Mechanical Engineering and Electrical Engineering programs. The data for this study will be collected through an online survey. The survey will include multiple-choice and open-ended questions to capture quantitative and qualitative data from the students. The questions will cover how often students participate in online classes, their engagement during lessons, and their perceived academic performance.

Methodology

This study uses a questionnaire approach to analyse the engagement and academic performance of the Permatang Pauh Campus of UiTMCPP students in online and traditional learning environments. The data was gathered using an online questionnaire survey, which was shared via online group chats with 82 students from the Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs. This simple random sampling method was selected to ensure an equal selection of respondents. The survey contained closed-ended and open-ended questions suggested by Survey Planet (2025), allowing qualitative and quantitative data. The questionnaire has been modified to be suitable for this study. Descriptive and inferential statistical methods, including ANOVA and chi-square tests, were applied to analyse the data and ensure it complies with the study's objectives.

Data Exploration

The study focused on a population of 82 students from the Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs in the Permatang Pauh Campus of UiTMCPP. A sample of 34 students was selected using simple random sampling, ensuring a representative mix from the three programs. Data was collected via a questionnaire survey distributed through Google Forms, with the survey link shared on online platforms such as Telegram and WhatsApp to facilitate easy access for the participants.

Steps of Simple Random Sampling

Below are the steps of applying simple random sampling to choose the sample in this study.

1) Define the population for this study, consisting of 82 students from the Culinary Arts, Electrical Engineering, and Mechanical Engineering programs.

2) Determine the required sample size using an online sample size calculator.
3) Create a sampling frame by preparing a complete list of all 82 students in the population.
4) Assign a unique number for each individual in the sampling frame, starting from one.
5) Then, select 34 numbers randomly from the sampling frame using a random number generator to ensure fairness.
6) Cross-check the selected number with the sampling frame to identify the individual by their names.
7) Lastly, data from the selected sample will be collected and recorded by distributing the survey online.

Method Analysis

Table 1 below are the details of the research objectives, variable (s) involved, and the analysis method used in this study.

Table 1. Research objectives, variable (s) involved, and analysis method

Objective	Variable (s)	Analysis Method
1. To describe students' learning engagement in online classes and traditional classroom settings in the Permatang Pauh Campus of UiTMCPP.	Student engagement	Bar-chart
2. To determine whether there is a significant difference in academic performance between different programs.	Current GPA Field of Study	One-way ANOVA

Finding

The main goal of this study was to find out how online learning at the Permatang Pauh Campus of UiTMCPP affected student participation and performance. Many new ideas were found by gathering information from 34 students in the Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs. For this study, the questionnaire was sent out through Google Forms, and students who filled it out were chosen randomly. The results examine how online learning platforms have affected student engagement and academic success, pointing out both the good things that have happened and the problems that students have had to deal with during this change.

The information from 34 students who answered the questionnaire how online learning affects student participation and success on their studies at the Permatang Pauh Campus, UiTMCPP. The results from Figure 1 shows that most of the students in the Culinary Arts Management, Mechanical

Engineering, and Electrical Engineering programs have significant changes in how involved they were in their studies and how well they performed.

The bar chart shows how often students rated their engagement in online learning versus standard classroom learning. Many students said they were "More Engaged" in their online study, while others said they were "Neutral." The fewest occurrences were "Much Less Engaged" and "Much More Engaged." This shows that while online learning platforms increased accessibility and flexibility in education, they also made it more difficult to maintain students' interest and involvement. The questionnaire's findings indicate that students' success varied. While some students found it difficult to adjust to the new learning style, others performed well when learning online.

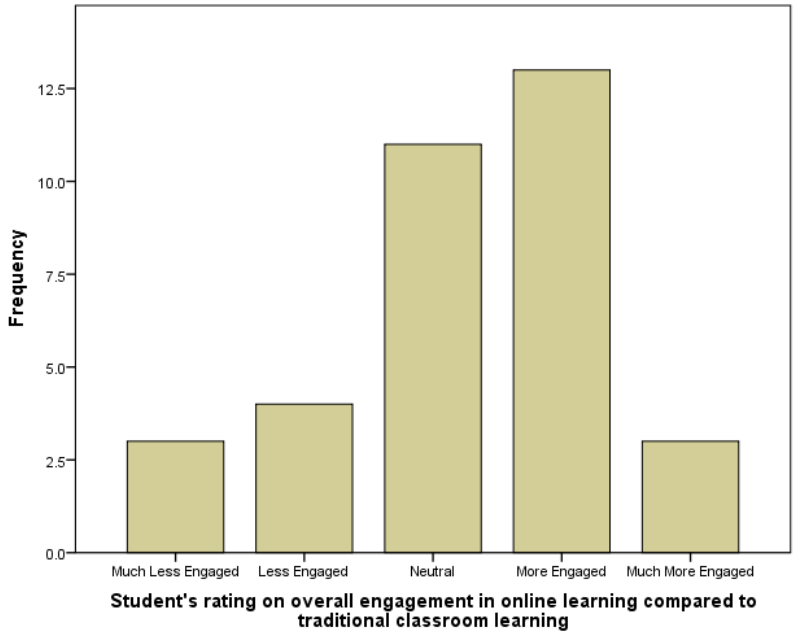

Figure 1: Bar chart of student's engagement in online learning

Table 2 below shows the impact of online learning on students' academic progress by applying an Analysis of Variance (ANOVA) test. This statistical test was implemented to determine whether there were any notable variations in students' present GPAs among the Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs. The ANOVA results indicated statistically significant differences in GPA among the groups ($F = 21.940$, $p < .001$). The between-groups sum of squares was 2.809 with 2 degrees of freedom, whereas the within-groups sum of squares was 1.985 with 31 degrees of freedom. The cumulative sum of squares was 4.794 with 33 degrees of freedom. The results indicate that the learning modality may have variably influenced students' academic achievement across the various programs.

Table 2: Result of One-Way ANOVA

Current GPA	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.809	2	1.405	21.940	.000
Within Groups	1.985	31	.064		
Total	4.794	33			

Conclusion and Recommendations

Online learning affects student engagement and academic performance at Permatang Pauh Campus of UiTMCPP. Many lectures are conducted online to save time for both lecturers and students. This became more common after the COVID-19 pandemic, as online platforms made teaching and learning easier. Online classes can also be an alternative when classrooms are unavailable, such as during maintenance. If traditional classes are not possible, online learning becomes a main option. However, it can also negatively impact academic performance due to a lack of resources, poor internet connection, or an unsuitable learning environment (Bharwani, 2023).

From the results, there are important findings about how online learning affects student engagement and performance at Permatang Pauh Campus of UiTMCPP. The bar chart shows that students had different levels of engagement in online learning. While many students reported increased or steady involvement, a large number struggled to stay motivated and participate.

The ANOVA test showed significant differences in GPA among students from Culinary Arts Management, Mechanical Engineering, and Electrical Engineering. This suggests that online learning affected students' academic performance differently in each program. Some programs adapted well to online learning, while others faced more challenges.

Overall, online learning has different effects on student participation and achievement. Online platforms make education more flexible and accessible, but they also create challenges in maintaining engagement and academic success. These results highlight the need for special support in different programs to maximize the benefits of online learning while reducing its drawbacks.

The results suggest that Permatang Pauh Campus of UiTMCPP should improve online learning platforms to increase student engagement. This includes adding interactive features like live discussions and real-time feedback to create a classroom-like experience. Engaging course content and clear expectations can also help encourage regular attendance. Future research could study the long-term effects of online learning on student performance and engagement through extended studies.

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