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
SIG CS@e-LEARNING
Beyond Boundaries : The Multidimensional Horizons of E-Learning
Vol. 9, 24 March 2025

e-ISBN : 978-629-98755-5-0

SIG : e-Learning@CS
https://appspenang.uitm.edu.my/sigcs/
Publication Date : 24 – Mar - 2025

A STUDY ON THE EFFICACY OF ONLINE LEARNING APPROACHES IN UiTMCPP BY GENDER

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ABSTRACT

This study examines the efficacy of online learning approaches at Universiti Teknologi MARA Cawangan Pulau Pinang (UiTMCPP), with a focus on gender-based differences in student perceptions and performance. Using a simple random sampling method, 86 students from Culinary Arts Management, Mechanical Engineering, and Electrical Engineering programs participated in an online survey. This study analyses student engagement and academic efficiency using descriptive and inferential statistical methods, including a one-sample t-test and an independent sample t-test. Findings revealed that while students generally preferred online learning because of the flexibility and accessibility, their perceptions did not meet the highest satisfaction level. The results also indicated that no statistically significant difference between male and female students regarding the perceived efficiency of online learning platforms, suggesting a similar level of adaptability across genders. The study highlights the importance of enhancing interactive features, real-time feedback mechanisms, and adaptive learning resources to optimize online education experiences.

Keywords: Online Learning, Student Perception, Academic Performance, Gender Differences, Higher Education

Background of Study

In recent years, online learning has emerged as a transformative influence in higher education, fundamentally changing the transmission and availability of knowledge. Over the past two decades, technology has facilitated the growing implementation of electronic and online learning systems as a crucial element of global knowledge transmission in numerous universities (Krunal K. Punjani et al., 2021). Many colleges and universities in the United States are transforming traditional face-to-face classes into fully online, blended, or web-facilitated courses (Keengwe J. et al., 2010). The appearance of the novel coronavirus pandemic (COVID-19) as a public health crisis has led to significant changes in education delivery globally. Due to lockdowns, governments have ordered educational institutions in various countries to transition to online learning (Krunal K. Punjani et al., 2021).

Online learning refers to net-based learning, cyber-learning, virtual learning, e-learning, distributed learning, internet-based learning, web-based learning, and cyber-learning while computer-based learning, web-based learning, virtual classrooms, and digital collaborations are just a few of the

many technological applications and educational processes that make up online learning, a subset of distance education (Keengwe J. et al., 2010).

The efficacy of online learning methods has attracted considerable attention, as it directly influences student performance, faculty adaptability, and the future of the educational system. The rising demand for online education, together with a growing number of higher education institutions aiming to offer varied educational opportunities, has led to the expansion of online learning as an effective method for enhancing access for a larger student population (Keengwe J. et al., 2010). Consequently, at a particular stage in their academic careers, university educators may be required to consider teaching their courses either partially or entirely online. Numerous experimental studies show that students engaged in distance learning courses achieve performance levels comparable to those of students who study in traditional classroom environments. These studies indicate that distance learning students show comparable grades, test scores, and attitudes towards the course. Krunal K. Punjani et al. (2021) reported that teachers deemed the virtual learning environment effective and beneficial.

Keys aspects considered in e-learning include its efficacy in student education, its potential to provide an excellent education to anyone with broadband access, its role in professional development, its cost-effectiveness in addressing the rising cost of postsecondary education, and its credit equivalency at the postsecondary level. Increased student engagement with the course material, better perceptions of learning and the online format, a stronger sense of community among students, a decline in withdrawal or failure rates, and improved academic performance as measured by test scores are all examples of positive learning outcomes (Nguyen T. 2015).

This study aims to evaluate the efficacy of online learning approaches in higher education, specifically focused on Universiti Teknologi MARA Cawangan Pulau Pinang (UiTMCPP). It further examines students' and educators' challenges and emphasises strategies to improve the online learning experience, ensuring its feasibility as a sustainable alternative to conventional education.

Methodology

We conducted a study among UiTMCPP students, using a simple random sampling technique to ensure that each respondent had an equal probability of selection. The survey was disseminated through social media channels like Instagram, Telegram, and WhatsApp, enabling swift and effective data collection. The questionnaire contained closed-ended and open-ended questions recommended by SurveyPlanet (2025), allowing collection of qualitative and quantitative data. The questionnaire had been modified to fit the needs of this study. This survey had received responses from 86 students. Due to the extensive accessibility of social media among youth, these platforms have demonstrated efficacy for a swift and effortless data collection.

In this study, we analyse three objectives using three different methods. The first objective is to describe the demographic profile of the respondents. The variables involved were age, gender, field of study, and current GPA. The data analysis was presented in pie charts for gender and field of study and histograms for GPA and age.

The second objective is to observe all student perceptions of online learning in UiTMCPP. Likert scale was used for questions on online learning approaches. The method used is one sample t-test. Lastly, the third objective is to determine whether there is a difference in the mean of student efficiency of online learning platforms between male and female students in UiTMCPP. An independent sample t-test was used to analysed this objective because it compares two population means (gender).

Findings

The initial analysis of the collected data aimed to provide an overview of the participants' demographic characteristics as well as their early responses to survey questions. This research involved 86 UiTMCPP students from various academic disciplines namely Culinary Arts Management, Mechanical Engineering, and Electrical Engineering. The data gathered employed a basic random sampling strategy using social media sites like Instagram, Telegram, and WhatsApp. The demographic study indicated an equitable representation of students across all programs, ensuring that the findings reflect the wider student population accurately. Preliminary responses revealed diverse degrees of engagement and happiness with online learning, paving the way for a comprehensive examination of the factors affecting student participation and success in the following analysis sections.

The pie chart in Figure 1 below displays the gender and field of study, respectively. The first pie chart shows the gender split among the 86 respondents who provided their opinions on the efficacy of online learning approaches in higher education. This chart provides a clear and concise representation of the gender distribution within the dataset, highlighting that there are more females (55.9%) than males (44.1%). The second pie chart showed the students' distribution among the three fields of study, highlighting a nearly equal distribution between Culinary Arts Management and Mechanical Engineering, with Electrical Engineering slightly lower. This combination of a table and pie chart provides a clear and comprehensive view of the student distribution across different fields of study.

The histogram (Figure 2) shows the age distribution among respondents, with the majority were around 21 to 23 years old. The distribution appears to be slightly right-skewed, as there are fewer respondents aged 25 and above. This suggests that most respondents belong to the younger age group, with limited representation from older demographics. The histogram on the right shows that most students have a GPA of 2.0 or 3.0, with the highest frequency at 35.3 % in the range. The distribution skewed towards the lower end, as fewer students fell in the 4.0 GPA category (5.9%). The overall trend suggests that most students perform at a moderate level of academic achievement, with only a small

number of students scored GPA 4.0. In this analysis, 1.00 is the present GPA from 3.50 to 4.00, 2.00 is the present GPA from 3.0 to 3.49, 3.00 is the present GPA from 2.50 to 2.99, and 4.00 is the present GPA from 2.0 to 2.49

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	30	44.1	44.1	44.1
	Female	38	55.9	55.9	100.0
	Total	68	100.0	100.0	

Field of study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Culinary Arts Management	23	33.8	33.8	33.8
	Electrical Engineering	22	32.4	32.4	66.2
	Mechanical Engineering	23	33.8	33.8	100.0
	Total	68	100.0	100.0	

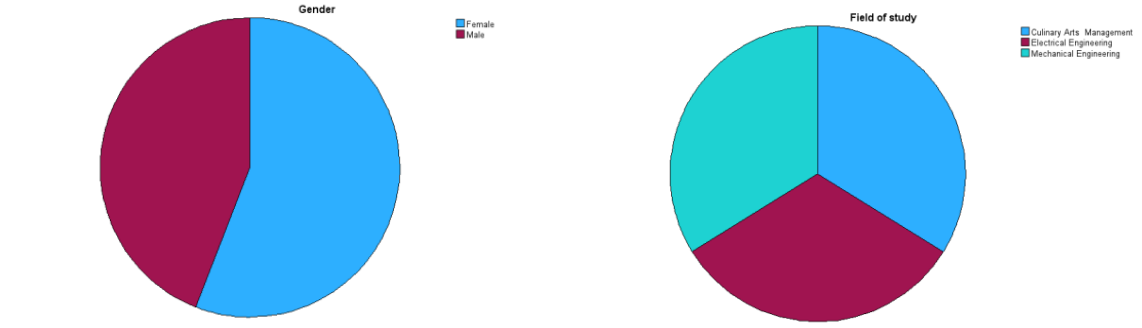

Figure 1: Pie chart of gender and field of study.

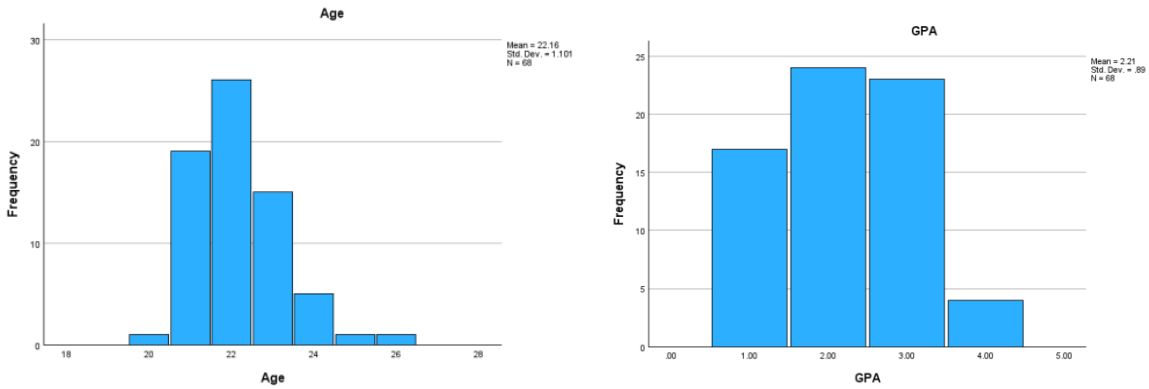

Figure 2: Histogram of age and GPA

Inferential statistics was used to analyse the second objective. Figure 3 shows the output of a one-sample t-test. The results indicate that the average student perception of online learning at UiTMCPP (3.7075) is significantly lower than the test value of 5. The negative t-value and the statistically significant p-values support the conclusion that suggests the students' perceptions of online learning are not as high as the benchmark value of 5, and there is strong evidence to reject the null hypothesis that the mean perception score is equal to 5. In this study, 5 was chosen as the test value representing the positive response in the following Likert scale.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Section_2	68	3.7075	.54969	.06666

One-Sample Test

Test Value = 5

	t	df	Significance One-Sided p	Significance Two-Sided p	Mean Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
Section_2	-19.389	67	<.001	<.001	-1.29248	-1.4255	-1.1594

Figure 3: Result of One-Sample t-test.

Figure 4 shows the result of the independent sample t-test corresponding to the third objective. Levene's Test for Equality of Variances was used to determine the variability assumption. The test's result indicates that the p-value is 0.446 which is more than 0.05 while the variances of the two populations are equal. Therefore, there is a need to refer to the row' Equal Variances Assumed' to obtain the point and interval estimates of the difference and p-value for the T-Test for Equality of Means. The T-Test for Equality of Means was used to see if there is a statistically significant difference between the two groups. The H_0 is accepted since the p-value is 0.054 which is more than 0.05. There is no significant difference in the mean of student efficiency of online learning platforms between male and female students in UiTMCPP. The results suggest that male and female students perceive the efficiency of online learning platforms similarly. This indicates that the current online learning platforms at UiTMCPP are equally effective for both genders.

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Section_2	Male	30	3.8519	.55696	.10169
	Female	38	3.5936	.52325	.08488

Independent Samples Test

		Levene's Test for Equality of Variances: F	Levene's Test for Equality of Variances: Sig.	t-test for Equality of Means: t	df	Significance One-Sided p	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
Section_2	Equal variances assumed	.588	.446	1.965	66	.027	.054	.25828	.13148	-.00421	.52078
	Equal variances not assumed			1.950	60.479	.028	.056	.25828	.13246	-.00663	.52320

Figure 3: Result of Independent Sample t-test.

Conclusion

Understanding student demographics, such as gender distribution, age groupings, faculty affiliations, and residential colleges has helped demonstrate online learning methodologies' effectiveness in higher

education. Understanding these demographic factors is essential in order to design more successful teaching strategies for specific student populations. Furthermore, every respondent's experiences with online learning platforms emphasises its importance to the UiTMCPP learners. This emphasises how online learning strategies may affect academic achievement.

Other than that, online learning has shown itself to be a successful educational instrument when used carefully and supported by the appropriate resources and techniques. It is essential to promote contact and participation to increase its effectiveness. Group projects, live sessions for right-away conversations, and interactive tools like polls, discussion boards, and quizzes can help achieve this. The platform used must be easy to use to provide accessibility, navigation, and multimedia resources. Adaptive technology and self-paced modules are examples of personalising the learning process to meet each individual's demands and learning speeds. Engaging, succinct, and well-structured content is important and multimedia components like infographics and videos should be used to enhance it. Frequent evaluations and feedback are required to track development, spot learning gaps, and offer helpful advice.

In conclusion, the survey indicates that UiTMCPP students prefer online learning over face-to-face learning. This preference is attributed to a more conducive environment, cost savings, and other advantages online learning has to offer. Overall, online learning has a positive impact, enabling students to engage in their studies more efficiently. Furthermore, the study reveals that female students tend to be more dominant and proficient in using online learning platforms. This suggests that female students are more adaptable to digital learning technologies, effectively leveraging the opportunities provided by this mode of education.

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e-ISBN : 978-629-98755-5-0

Design of the cover powered by FPPT.com