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Click, Connect, and Achieve: The Influence of Self-Efficacy and Internet Connectivity on Online Learning Performance among MSU Students

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ABSTRACT

The swift transition to digital education has altered the learning experience in higher education; however, numerous institutions continue to face challenges in determining the key factors that most effectively enhance student success in online environments. This research examines the influence of self-efficacy and internet connectivity on student performance in online learning settings among undergraduates at Management and Science University (MSU), Malaysia. A quantitative survey was conducted with 370 respondents using a structured questionnaire, guided by the Technology Acceptance Model (TAM). Data were analysed employing descriptive statistics, correlation, and multiple regression analyses using SPSS. The results indicated that self-efficacy and internet connectivity have a significant positive impact on student achievement. Connectivity quality is identified as a crucial factor for sustained engagement, whereas self-efficacy contributes to increased confidence and persistence in virtual tasks. The findings highlight the significance of both technological readiness and psychological empowerment in attaining success in digital learning. This study provides significant insights for educators and administrators to develop interventions aimed at enhancing digital infrastructure and fostering learner confidence via focused training and technical assistance. Fostering a balanced approach between access and self-belief enhances student performance and contributes to a more inclusive and sustainable online education ecosystem in Malaysian higher learning institutions.

1. Introduction

The transformation of higher education during and after the COVID-19 pandemic has expedited the integration of online learning platforms, presenting both opportunities and challenges for students and educators. Digital tools enhance flexibility and accessibility; however, the effectiveness of online learning is primarily contingent upon students' technological readiness and psychological capability. Numerous institutions, especially in developing contexts like Malaysia, encounter challenges related to inconsistent internet connectivity and differing levels of learner self-efficacy, which directly influence engagement and academic performance.

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Research indicates that dependable technological infrastructure and learner confidence are significant predictors of success in virtual learning environments [11,12]. This study, aligned with the Technology Acceptance Model (TAM), examines two key variables—self-efficacy and internet connectivity—that influence students' performance in online learning environments, emphasising their perceived usefulness and ease of use. This research analyses the perceptions of 370 undergraduate students at Management and Science University (MSU) to identify the collective influence of various factors on academic achievement, providing insights for the improvement of digital education policies and practices in Malaysian higher education.

1.1 Background of the Study

The fast development of information and communication technology has transformed the worldwide educational scene. In Malaysia, colleges are increasingly utilising digital platforms to provide flexible, interactive, and student-centered educational experiences. The transformation became notably significant during and after the COVID-19 pandemic, as higher education institutions like Management and Science University (MSU) completely adopted online delivery. This change ensured continuity in teaching and learning but also revealed ongoing issues concerning internet accessibility, digital literacy, and learners' confidence in adjusting to technology-based education.

Global research demonstrates that the effectiveness of online learning is affected by both the quality of digital infrastructure and learners' psychological preparedness, especially their self-efficacy—the conviction in one's ability to plan and perform the actions necessary for learning tasks (Bandura, 1997). Students exhibiting elevated self-efficacy typically have enhanced motivation, self-regulation, and academic perseverance. Nevertheless, numerous Malaysian students continue to encounter challenges in preserving concentration, upholding discipline, and managing several platforms due to unreliable internet connectivity or insufficient digital proficiency.

Prior research [1,12] has highlighted these dual issues; nonetheless, empirical evidence explicitly correlating internet connectivity and self-efficacy with academic accomplishment in Malaysian higher education is still few. The majority of current research emphasises satisfaction or engagement instead of quantifiable performance outcomes. Consequently, it is essential to investigate the interaction between two crucial factors—technological access and learner confidence—and their impact on student achievement in online learning.

This study examines the correlation between internet connectivity, self-efficacy, and academic accomplishment among MSU undergraduates. This study enhances the Technology Acceptance Model (TAM) paradigm by incorporating psychological and technological characteristics, so offering a more thorough knowledge of the factors influencing academic achievement in virtual learning settings. The findings seek to strengthen data-driven methods to improve infrastructure quality and student empowerment in Malaysian higher education.

1.2 Problem Statement

The transition to online education has transformed higher education globally; nonetheless, its efficacy is significantly influenced by technology accessibility and students' psychological preparedness. The integration of Learning Management Systems (LMS) with virtual platforms like Google Classroom and Zoom in Malaysia has expanded, although not all students receive equal advantage. Numerous individuals persist in encountering unreliable internet connectivity, restricted access to dependable gadgets, and varying degrees of self-efficacy in executing digital learning

activities. These differences lead to variable academic performance, reduced engagement, and digital lack of motivation among students.

While many studies have investigated overall satisfaction or platform usability in online education [2], fewer have analysed the interaction between technological and psychological factors in influencing student achievement, especially in Malaysian higher education settings. Current research predominantly concentrates on Western populations or prioritises institutional preparedness over student-level experiences. The absence of localised evidence restricts universities' capacity to develop data-driven interventions that enhance both technical infrastructure and learner confidence.

This study examines a significant gap by exploring the impact of internet connectivity and self-efficacy on student achievement in online learning among undergraduates at Management and Science University (MSU). Comprehending these relationships is crucial for creating inclusive, efficient, and powerful digital learning environments that foster academic achievement in Malaysia's dynamic higher education environment.

1.3 Research Objectives

This study focusses to examine the most important factors influencing performance in online learning platforms for undergraduate students at Management and Science University (MSU), Malaysia. The specific objectives are: (1) To examine the influence of internet connectivity on student achievement in online learning and (2) To assess the role of self-efficacy in enhancing student achievement among online learners.

1.4 Significance of the Study

1.4.1 Theoretical significance

This study enhances the current literature on online learning by expanding the Technology Acceptance Model (TAM) to incorporate both psychological and technological factors—namely, self-efficacy and internet connectivity—as determinants of student accomplishment. This study illustrates that, in addition to perceived utility and simplicity of use, students' confidence and access quality are critical factors in achieving success in digital learning. The findings provide new empirical evidence from the Malaysian higher education setting, delivering localised insights that support and extend the application of the Technology Acceptance Model beyond Western-centric research. The study enhances theoretical comprehension of the relationship between digital preparedness and learner belief systems, demonstrating how technology adoption correlates with quantifiable academic success.

1.4.2 Practical Significance

This research offers practical suggestions for educators, instructional designers, and university administrators aiming to enhance the efficacy of online learning environments. The findings highlight the necessity of investing in stable internet infrastructure, especially for students in limited resources regions, and the imperative to bolster learner confidence via digital literacy education, mentorship, and motivational assistance. Institutions like MSU might use these insights to develop tailored interventions—such as technical help, adaptive learning platforms, and confidence-enhancement programs—that foster both access and participation. The study's conclusions advocate for the

establishment of a more inclusive, equitable, and resilient online education environment that can sustain student accomplishment in Malaysia's digital age.

1.5 Literature Review

1.5.1 Self-Efficacy and Online Learning

Self-efficacy, as defined by Bandura [4], describes to a person's belief in their ability to successfully perform particular tasks. In the field of online learning, individuals who possess elevated self-efficacy often demonstrate enhanced motivation, persistence, and adaptability when engaging with digital platforms [3]. Individuals in this context tend to demonstrate a greater propensity for self-regulated learning, effectively utilise feedback, and sustain concentration throughout virtual instruction. Previous investigations [8,17] consistently indicate that individuals who view themselves as proficient in utilising online tools attain superior academic results. This suggests that nurturing confidence and independence is equally important as supplying technological resources.

1.5.2 Internet Connectivity and Student Achievement

The availability of internet connectivity is a fundamental factor influencing the effectiveness of online learning. Reliable and fast internet connectivity allows students to engage fully in real-time classes, access online resources, and work together efficiently [1]. On the other hand, unreliable connections hinder engagement, diminish participation, and lead to learning fatigue. A study conducted by the OECD [13] indicates that students who maintain consistent connectivity exhibit higher attendance rates and improved academic performance. In Malaysia, where differences in broadband infrastructure remain, it is essential to guarantee fair internet access to foster inclusive education and close the digital divide.

1.5.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model [7] offers a theoretical framework for comprehending the adoption of technology within educational settings. The assertion is that the perception of usefulness and ease of use affects a person's intention to interact with technology. When learners perceive digital learning platforms as accessible and advantageous, their engagement and outcomes enhance. This study expands the Technology Acceptance Model by integrating self-efficacy, a psychological factor, and internet connectivity, a technical factor, as additional determinants of student achievement. Collectively, these factors illustrate the necessary human and technological preparedness essential for successful online learning.

2.Methodology

2.1 Research Design

The study utilised a quantitative, correlational research design to explore the impact of internet connectivity and self-efficacy on student achievement in online learning. The design was guided by the Technology Acceptance Model (TAM), which clarifies technology adoption based on user perceptions of its usefulness and ease of use. This study expands on existing models by integrating both technological elements, such as internet connectivity, and psychological aspects, like self-efficacy, as key predictors of success in online learning. This method facilitates the discovery of

statistically significant connections among variables and underpins data-driven suggestions for improving digital education results.

2.2 Population and Sampling

The research population consisted of undergraduate students at Management and Science University (MSU) in Malaysia, all of whom had engaged in online learning via platforms like Google Classroom, Moodle, and Zoom. Utilising the sample size table established by Krejcie and Morgan (1970), a total of 370 students were chosen through stratified random sampling to guarantee adequate representation from various faculties and academic levels. This sampling technique was selected to gather a variety of viewpoints on connectivity and confidence levels among active online learners.

2.3 Research Instrument

Data collection was conducted using a structured questionnaire that was adapted from established instruments utilised in previous research. Items concerning internet connectivity were sourced from Basuony *et al*., [5], whereas self-efficacy items were modified from Ejdys [9] and Lee and Mendlinger [11]. Student achievement was assessed through indicators of engagement, satisfaction, and perceived academic performance. Each item utilised a five-point Likert scale, with responses ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). A pilot test validated the content and demonstrated reliability, as indicated by Cronbach's alpha coefficients surpassing the acceptable threshold of 0.60 for all constructs.

2.4 Data Collection and Analysis

The survey was distributed online through Google Forms to enhance accessibility and reduce physical interaction. The analysis of the collected data was conducted utilising version 26 of the Statistical Package for the Social Sciences (SPSS). The analysis included descriptive statistics to summarise the demographics of respondents and the distributions of variables. Additionally, correlation and multiple regression analyses were employed to examine the hypothesised relationships among internet connectivity, self-efficacy, and student achievement. The model accounted for 83.6% of the variance in student achievement ($R^2 = .836$, $p < .001$), demonstrating a robust predictive capability. Significant positive effects on student achievement were observed for both self-efficacy ($\beta = .248$) and internet connectivity ($\beta = .265$), thereby supporting all proposed hypotheses.

3. Result

The descriptive analysis revealed that students typically viewed their internet connectivity and self-efficacy levels as moderately high, with mean scores exceeding 19 on a 5-point Likert scale (converted to a sum scale). The reliability assessment conducted through Cronbach's alpha indicated that both constructs demonstrated acceptable internal consistency: internet connectivity ($\alpha = .640$) and self-efficacy ($\alpha = .540$), thereby affirming their appropriateness for analysis.

Table 1
Correlation analysis

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.914[a]	.836	.834	1.24757	1.709

a. Predictors: Online Platform usability, interface quality, Internet Connectivity and self-efficacy
b. Dependent Variable: Student Achievement

Correlation analysis indicated notable positive associations between the independent variables and student achievement: internet connectivity ($r = .811$, $p < .01$) and self-efficacy ($r = .788$, $p < .01$). The regression model exhibited significant explanatory strength ($R^2 = .836$, Adjusted $R^2 = .834$, $p < .001$), indicating that 83.6% of the variation in student achievement can be accounted for by the interplay of these two predictors. Internet connectivity ($\beta = .265$, $p < .001$) and self-efficacy ($\beta = .248$, $p < .001$) demonstrated significant positive effects, thereby validating the study hypotheses.

3.1 Discussion

The results indicate that technological readiness and psychological empowerment are essential elements for effective online learning. Students who have reliable internet connections tend to participate regularly in virtual classes, access course materials, and communicate effectively with instructors and peers, which ultimately leads to improved academic performance. This aligns with earlier findings by Adedoyin and Soykan [1] and the OECD [13], which highlighted connectivity reliability as a crucial factor influencing student participation and the continuity of learning.

In a comparable way, the positive effect of self-efficacy corresponds with Bandura's [4] theory and the research conducted by Artino [3] and Zimmerman and Schunk [17], highlighting that confidence in utilising online tools significantly affects motivation, persistence, and task performance. Students who have confidence in their capacity to tackle technological challenges generally adjust more effectively to virtual settings and sustain elevated levels of achievement. This relationship underscores the significance of self-regulated learning behaviours within the realm of digital education.

Analysing these results through the lens of the Technology Acceptance Model (TAM) underscores the significance of the extended model within the context of higher education. The findings indicate that, in addition to perceived usefulness and ease of use, internal belief (self-efficacy) and external access (internet connectivity) collaboratively influence students' perceived capability to thrive in online learning. Therefore, the effectiveness of digital learning is influenced by both the quality of the system and the learner's confidence and digital resilience.

The findings of this study are in strong agreement with recent research highlighting the essential importance of psychological and technological preparedness in online learning. In line with the existing findings, Ejdys [9] and Lee and Mendlinger [11] demonstrated that self-efficacy plays a crucial role in boosting students' motivation and persistence within virtual environments. The findings indicate that individuals who possess greater confidence in utilising digital tools are more likely to attain superior academic results. This study bolsters these conclusions by offering additional empirical evidence from a Malaysian context, demonstrating that self-efficacy ($\beta = .248$, $p < .001$) serves as a positive predictor of student achievement in online learning environments.

The findings regarding technological readiness align with the work of Adedoyin and Soykan [1] as well as the OECD [13] report, both of which highlight internet connectivity as a crucial factor influencing engagement and the continuity of learning. Students who have dependable connections

engage more effectively in online discussions and assessments, resulting in improved academic outcomes. In alignment with these worldwide trends, the present study identified internet connectivity ($\beta = .265$, $p < .001$) as the most significant predictor of student achievement, reinforcing the notion that digital infrastructure is essential for successful e-learning.

The current findings align with those of Basuony *et al*., [5], who investigated e-learning quality and determined that system accessibility and connection stability had a significant impact on satisfaction and learning outcomes. Similarly, Al-Fraihat *et al*., [2] and Artino [3] emphasised that usability and learner confidence together influence students' engagement and satisfaction with online systems. This study advances the conversation by integrating technical access (connectivity) and psychological readiness (self-efficacy) into a unified model that accounts for 83.6% of the variance ($R^2 = .836$) in student achievement—exceeding the explanatory strength noted in similar research (e.g., $R^2 = .602$ in Basuony *et al*.,[5]; $R^2 = .665$ in Artino, [3]). The enhanced predictive power indicates that combining technological and personal aspects offers a more comprehensive insight into the factors contributing to online learning success.

Furthermore, recent investigations like Nurturing Success: E-Learning Readiness and Self-Efficacy among Nursing Students [15] and Predictors of Electronic Learning Self-Efficacy [9] support the notion that e-learning readiness and learner belief systems serve as universal predictors of achievement. Nevertheless, although previous studies primarily concentrate on self-efficacy in isolation, the current research reveals that integrating it with connectivity significantly enhances predictive accuracy. This finding underscores the relationship between infrastructure support and learner confidence, both of which are crucial for attaining equitable and sustainable outcomes in digital education.

The analysis of previous studies reveals that the current investigation offers fresh contextual insights by affirming widely recognised international findings within the Malaysian higher education landscape. This indicates that internet connectivity and self-efficacy are interrelated elements that should be developed together to enhance academic success in online learning environments.

The findings suggest that enhancing online education necessitates a two-pronged approach: prioritising investment in dependable technological infrastructure while simultaneously fostering students' self-efficacy through targeted training, constructive feedback, and mentorship. The equilibrium between connectivity and confidence is crucial for maintaining engagement and academic success in the dynamic higher education environment of Malaysia.

4. Conclusion

This investigation explored the impact of internet connectivity and self-efficacy on student performance in online learning among undergraduate students at Management and Science University (MSU), Malaysia. Based on the Technology Acceptance Model (TAM), the study revealed that both technological and psychological factors are crucial in influencing academic success in virtual environments. The results indicated that internet connectivity ($\beta = .265$) and self-efficacy ($\beta = .248$) have a significant and positive impact on student achievement, together accounting for 83.6% of the variance ($R^2 = .836$) in performance outcomes.

The findings indicate that successful online learning relies not just on the usability of platforms and the availability of digital tools, but also on the learner's confidence in utilising those tools effectively. Students with strong self-belief and consistent connections tend to stay engaged, motivated, and achieve academic success. This study therefore enhances the existing framework by incorporating both infrastructure quality and learner belief systems, providing a deeper insight into the effectiveness of learning in digital higher education environments.

The study highlights the importance of achieving a harmonious balance between access to technology and the empowerment of learners. Institutions of higher education must improve their digital infrastructure — Guarantee reliable, high-speed internet access throughout the campus and offer data support for remote learners to mitigate disparities related to connectivity. Universities ought to enhance self-efficacy by implementing digital literacy programs that include regular workshops and mentoring sessions. These initiatives should focus on building students' confidence in navigating online platforms, troubleshooting technical issues, and fostering independent learning. In addition, universities ought to implement e-learning designs that prioritise the needs and experiences of students. Integrate interactive elements, adaptable interfaces, and intuitive designs to maintain user engagement and reduce cognitive strain. Additionally, establish continuous monitoring and feedback mechanisms by utilise analytics and surveys to monitor student satisfaction, identify access challenges, and assess learning confidence, thereby informing ongoing enhancements in online education.

In future studies, it would be beneficial for scholars to investigate mediating or moderating factors like self-regulation, learning engagement, or instructor support to gain deeper insights into the interplay between connectivity and self-efficacy in influencing long-term academic performance. It is advisable to conduct comparative studies across various universities and cultural contexts to generalise these findings and enhance strategies for effective and equitable online education throughout Southeast Asia.

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