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Generative Artificial Intelligence-Powered Learning: A UTAUT Study among Undergraduate Students from a Public University in Malaysia

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Abstract
The rapid advancement of Generative Artificial Intelligence technologies has transformed various fields, including education, yet research on students' acceptance of Generative Artificial Intelligence tools in Malaysia remains limited. Therefore, this study investigates the adoption of Generative Artificial Intelligence tools among undergraduate students at a public university in Malaysia using the Unified Theory of Acceptance and Use of Technology framework. The findings provide insights for educators, administrators, and policymakers in fostering a technology-enhanced learning environment in Malaysia. A quantitative survey design was employed, and data were collected from 51 undergraduate students through an online questionnaire. Descriptive statistical analysis was conducted using SPSS to examine students' perceptions of Generative Artificial Intelligence tools. The validity and reliability of the instrument were verified. Findings revealed a strong overall acceptance of Generative Artificial Intelligence tools. Performance Expectancy plays a significant role, with students perceiving it as effective for improving productivity, and quality of their work. Effort Expectancy contributes to adoption, as students find it easy to integrate into their studies. While Social Influence had a less decisive impact, peer recommendations encouraged adoption despite limited instructor support. Facilitating Conditions supported the adoption through access to necessary resources, although structured training remained insufficient. High Behavioural Intention and Use Behaviour scores indicate that Generative Artificial Intelligence tools have become an essential component of students' learning processes.
Keywords: Education, generative artificial intelligence, Malaysia, technology acceptance
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Introduction

Industrial Revolution 5.0 focuses on human and machine technology, particularly artificial intelligence working collaboratively to perform personalized tasks. The rapid advancement of Artificial Intelligence (AI) technologies has transformed various fields, including education, where GenAI has been increasingly used to personalize and enhance learning experiences (Julien, 2024; O'Connor, 2023; Shafiee, 2024; Solak, 2024; Yusuf et al., 2024). More recently, Generative Artificial Intelligence (GenAI) tools, such as ChatGPT, Gemini, and Microsoft Copilot, have gained prominence. Distinguished from adaptive learning systems and intelligent tutoring systems that primarily respond to predefined learning pathways based on domain models, student models, and teaching models (Corbett et al., 1997; Woolf, 2008), GenAI enables the generation of dynamic, context-aware content, engaging in natural language interactions, providing instant feedback, and adapting explanations to individual learners (Tan et al., 2022). In the learning context, GenAI-powered tools offer unprecedented opportunities to support learners in developing learning skills (Shah, 2023). Thus, due to the changing landscape of learning due to the integration of GenAI, this study is embarked upon.

Research on GenAI adoption in education has shown that various factors influence users' willingness to engage with these technologies, including perceptions of the tool's utility and the availability of resources to support its use (Majid & Lakshmi, 2022; Kang, 2022). As educational institutions increasingly adopt GenAI-driven platforms for language education, understanding these influencing factors is essential to optimize the positive impact of GenAI on student learning outcomes (Venkatesh et al., 2003). This study would employ the Unified Theory of Acceptance and Use of Technology (UTAUT) framework developed by Venkatesh et al. (2003) to explore how undergraduate students perceive and use GenAI-based learning tools. The UTAUT framework, a well-established model in technology acceptance research, includes key constructs that influence users' intentions to adopt and continue using technology: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioural Intention (BI), and Use Behaviour (UB). Studies have demonstrated that UTAUT provides a robust framework for understanding why students adopt or reject technology in learning environments (Hsu, 2023; Nguyen & Chu, 2021). By focusing on these constructs, this study seeks to understand the factors that drive or hinder GenAI adoption.

While international research has extensively explored GenAI adoption in education, studies focusing on Malaysia remain limited. This gap makes it unclear whether the factors influencing AI adoption in Malaysia align with or differ from global trends. Consequently, there is insufficient evidence to guide universities in developing effective strategies for integrating GenAI-powered learning tools into teaching and learning. Given the rapid expansion of GenAI in education, and the unique position of undergraduate students as primary users of these technologies, this study contributes to the body of knowledge by situating the UTAUT framework within Malaysian learning environments. Specifically, this research aims to examine the factors influencing undergraduate students' adoption of GenAI-powered tools at a public university in Malaysia through the UTAUT framework. This investigation will provide insights for educators, administrators, and policymakers in fostering a technology-enhanced learning environment in Malaysia. Accordingly, this study addresses the following research question:

What are the perceptions of undergraduate students at a public university in Malaysia regarding GenAI-powered learning tools in terms of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Behavioural Intention, and Use Behaviour?

Literature Review

GenAI in Learning Contexts

The application of Generative Artificial Intelligence (GenAI) in learning has introduced transformative changes, enhancing how learners acquire essential learning skills (Alharbi & Khalil, 2023; Yusuf et al., 2024). In learning contexts, GenAI tools offer significant advantages, such as automated feedback, personalized assistance, and real-time support, which can facilitate skill acquisition (Alharbi & Khalil, 2023; Ali, 2023; Julien, 2024). These capabilities have positioned GenAI as a valuable educational technology that may enhance students' learning experiences and academic productivity.

Research has shown that GenAI can positively influence learners' academic experiences. For instance, recent Malaysian studies have demonstrated that GenAI may function as a low-pressure learning companion that enhances learners' confidence and self-efficacy when completing academic tasks (Zhang & Saeed, 2026). In addition, features such as intelligent responses, personalization, interactivity, and high-quality feedback can strengthen learners' positive perceptions, encouraging their continued use (Wu et al., 2026). Furthermore, learners have reported that GenAI assists them in problem-solving, idea generation, time management, and improving the quality of academic work within the Malaysian higher education context (Al-kumaim et al., 2025; Borhan et al., 2026; Lee, 2025). Collectively, these findings suggest that learners generally perceive GenAI as a useful educational resource that supports academic activities and enhances learning experiences. Such positive perceptions may encourage learners to adopt and continue using GenAI tools in educational settings.

Despite these benefits, several challenges may hinder the adoption of GenAI in education (Alexander et al., 2023; Alhalangy & AbdAlgane, 2023; Sun, 2023). Concerns have been raised regarding inaccurate outputs, the reliability of AI-generated information, overreliance on AI tools, and the potential reduction of meaningful human interaction during learning (Alexander et al., 2023; Barzanji & Alsofyani, 2026; Hsiao & Chang, 2023). Additionally, disparities in access to technological resources and institutional support may limit students' ability to utilize GenAI tools in their learning effectively (Alexander et al., 2023; Alharbi, 2023; Hsiao & Chang, 2023). These challenges suggest that the successful integration of GenAI depends not only on the technology itself but also on learners' perceptions of its usefulness, ease of use, and the availability of supporting resources.

Although previous studies have demonstrated the potential impacts of GenAI on learning and academic performance, its successful integration into education depends on how students perceive and accept the technology amid both its opportunities and challenges. Despite the growing use of GenAI in education, research on the acceptance of GenAI-powered learning tools among undergraduate students in Malaysian public universities remains limited. Therefore, this study addresses this gap by investigating undergraduate students' perceptions of GenAI-powered learning tools through the UTAUT framework.

UTAUT Framework in Educational Technology Adoption

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a prominent model normally used to analyze technology adoption, particularly within educational settings. Developed by Venkatesh et al. (2003), UTAUT identifies four key constructs—Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC)—that influence Behavioural Intention (BI) and Use Behaviour (UB). The UTAUT model was selected for this study because it synthesizes key constructs from several established technology acceptance theories, including the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Diffusion of Innovation (DOI) theory. As a result, it demonstrates greater explanatory power in predicting technology adoption behaviour than many earlier models (Shuhidan et al., 2019). Studies have also shown that UTAUT effectively explains students' acceptance and use of educational technologies across diverse learning contexts (Hsu, 2023; Nguyen & Chu, 2021). Therefore, the model provides a suitable theoretical framework for examining undergraduate students' adoption of GenAI-powered learning tools.

In the learning context, the UTAUT model has been instrumental in understanding how students perceive GenAI-powered tools. Smolansky et al. (2023) suggested that students perceive GenAI as capable of improving their learning processes and outcomes, contributing to their adoption of GenAI. Similarly, Effort Expectancy, which relates to the perceived ease of use, has been found to impact students' willingness to use GenAI tools significantly. Stakeholders at higher education institutes toward adopting GenAI are significantly influenced by the usage difficulty (Dahri et al., 2024; Helmiatin et al., 2024; Tian et al., 2024; Wang & Reynolds, 2024). Social Influence, particularly from instructors and peers, also plays a critical role in GenAI adoption, a supportive learning environment, fostering a positive attitude towards GenAI and a better understanding of its potential benefits. Nevertheless, findings on its impact are mixed, with some studies suggesting a strong influence and others indicating minimal effects (Alotumi, 2022; Bui et al., 2025; Kumar & Bervell, 2019; Nguyen & Chu, 2021; Tian et al., 2024; Wang & Reynolds, 2024). This inconsistency suggests that cultural and institutional differences could be pivotal in determining the significance of social influences.

Facilitating Conditions, which refer to institutional support and access to resources, have been highlighted as crucial enablers of technology adoption. Availability of internet access, necessary devices, and training materials positively influences GenAI adoption (An et al., 2023; Dahri et al., 2024; Lin et al., 2022; Bui et al., 2025). However, in less technologically equipped countries, a lack of infrastructure could hinder effective GenAI implementation (Helmiatin et al., 2024; Mutia et al., 2024; Nuryadin & Marlina, 2023; Utina et al., 2024).

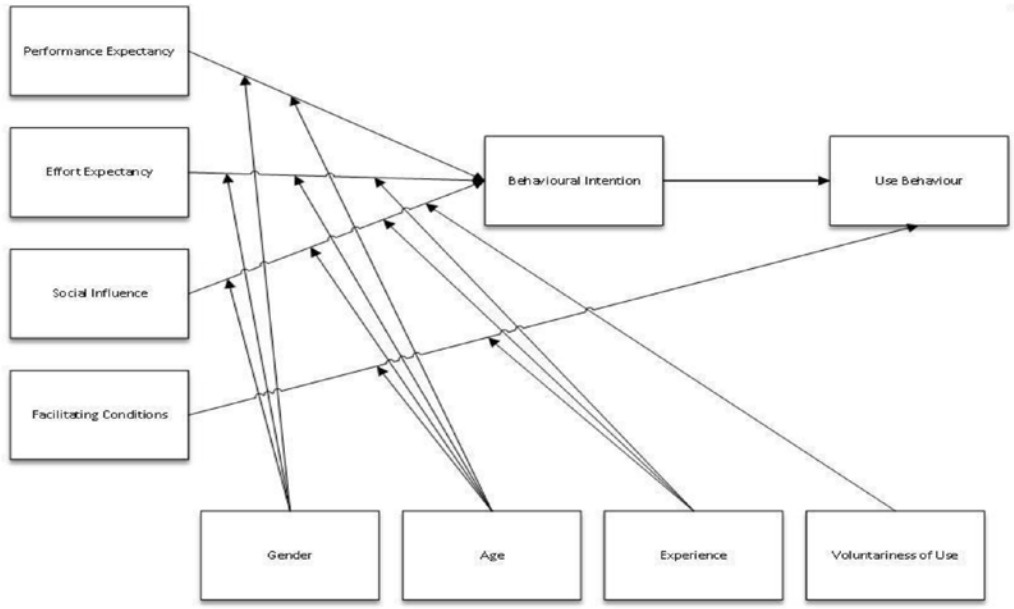


Figure 1. UTAUT Framework (Venkatesh et al., 2003)

Method

Research Design

This study employed a quantitative descriptive survey design to explore the adoption of GenAI tools among undergraduate students at a public university in Malaysia.

Participants

The respondents for this study were 51 undergraduate students from a public university in Malaysia. Convenience sampling was employed, whereby participants were recruited through direct approaches. This technique was selected due to its practicality and accessibility (Golzar et al., 2022), allowing the researcher to efficiently collect data from undergraduate students who were available and familiar with GenAI tools. The sample consists of students from the Faculty of Law, Faculty of Engineering and Built Environment, Faculty of Social Sciences and Humanities, and Faculty of Economics and Management, ensuring diverse representation across academic disciplines.

Research Instruments

The questionnaire was designed based on the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. It consists of 24 items, with four items under each construct: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioural Intention (BI), and Use Behaviour (UB). The survey was conducted in English and employs a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) to assess respondents' attitudes, perceptions, and intentions related to GenAI adoption in learning. This scale was chosen for its ability to capture nuanced differences in respondents' attitudes more accurately than binary choices by incorporating semantic differentials (Joshi et al., 2015; Monteiro, 2021). The structured design ensures consistency while minimizing bias from extreme response tendencies. Table 1 below shows the sample questionnaire items.

Table 1. *Sample questionnaire items*

Construct	Sample Item
Performance Expectancy (PE)	Using ChatGPT, Gemini, Copilot, and other GenAI tools helps me complete my academic tasks more effectively.
Effort Expectancy (EE)	Learning to use ChatGPT, Gemini, Copilot, and other GenAI tools is easy for me.
Social Influence (SI)	My peers encourage me to use ChatGPT, Gemini, Copilot, and other GenAI tools for academic purposes.
Facilitating Conditions (FC)	My university provides sufficient support for me to use ChatGPT, Gemini, Copilot, and other GenAI tools.
Behavioural Intention (BI)	I intend to continue using ChatGPT, Gemini, Copilot, and other GenAI tools in my future studies.
Use Behaviour (UB)	I regularly use ChatGPT, Gemini, Copilot, and other GenAI tools as part of my learning activities.

Research Procedures

The data is collected through an online structured questionnaire administered via Google Forms. To ensure broad participation and students' convenience, the survey was distributed through both face-to-face and online channels. Respondents are undergraduate students from a public university in Malaysia, and participation is voluntary. Participants are invited through university communication channels, including email, student groups, and direct approaches. The data collection process spans approximately 53 days to ensure an adequate response rate and a representative sample size.

Data Analysis

Quantitative data will be analyzed using SPSS software, a widely used tool for statistical analysis. Descriptive statistics will be employed to summarize the demographic data and provide an overview of participants' responses to the survey items. Specifically, the Mean and Standard Deviation (SD) will be calculated to assess the central tendency and variability of participants' responses. The Mean will offer insights into the average level of agreement or perception among participants regarding GenAI-powered learning tools, while the Standard Deviation (SD) indicates the degree of variation or consistency in their responses. This analysis provides a clear understanding of the overall trends and helps identify key factors influencing GenAI adoption among the participants.

Validity and Reliability

In order to ensure the validity and reliability of the study, several measures were taken. The questionnaire was adapted from UTAUT instruments and validated by a senior lecturer from the faculty of education at a public university in Malaysia. In addition, one (1) instructor and two (2) students were selected to check the clarity of the items in the questionnaire. Based on this feedback, a few items were removed and improved to add clarity. Lastly, the questionnaire would be pilot-tested with 18 undergraduate students to ensure its clarity and relevance. Table 2 below shows Cronbach's Alpha values for each construct in the UTAUT framework.

Table 2. *Cronbach' s Alpha Values*

Construct	Cronbach's Alpha	No. of Items
Performance Expectancy (PE)	0.768	4
Effort Expectancy (EE)	0.788	4
Social Influence (SI)	0.586	4
Facilitating Conditions (FC)	0.586	4
Behavioural Intention (BI)	0.806	4
Use Behaviour (UB)	0.806	4

Taber (2018) claimed that a Cronbach's Alpha coefficient of 0.70 or above signifies the consistency of items on a scale. Table 2 shows that values of Performance Expectancy (PE), Effort Expectancy (EE), Behavioural Intention (BI) and Use Behaviour (UB) are above 0.70, indicating the internal consistency and reliability. However, Cronbach's Alpha values for Social Influence (SI) and Facilitating Conditions (FC) were below the recommended threshold of 0.70, with both constructs obtaining a value of 0.586. The items are maintained since Cortina (1993) emphasized that even though a value of 0.70 or above is always considered acceptable, it depends on the context. In early stages, a value between 0.50 and 0.60 can be tolerated, as the goal of the research is not only to measure internal consistency but also to explore and understand the construct. The low Alpha could indicate that further refinement and validation are needed, which is expected in initial phases of scale development. While universities are proactively integrating GenAI, there is a strong need for comprehensive policy frameworks to assess its impact and establish effective communication strategies among stakeholders (Jin et al., 2025). As a result, Social Influence (SI) and Facilitating Conditions (FC) can be regarded as the early stage of the research process to explore and understand the construct, allowing the Cronbach's Alpha coefficient to be lower than 0.60.

Results

Demographic Data of the Participants

Appendix A presents the demographic data of the participants, comprising 4 faculties at a public university in Malaysia. The demographic analysis provided an overview of the characteristics of the participants. The sample consisted of 51 students. The demographics included factors such as gender, year of study, and expertise in using GenAI tools.

Factors Influencing the Adoption of GenAI Tools

The research objective is to examine the factors influencing undergraduate students' adoption of GenAI-powered learning tools at a public university in Malaysia through the UTAUT framework constructs: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioural Intention (BI), and Use Behaviour (UB). The findings revealed the influencing factors of Malaysian undergraduate students' adoption of GenAI-powered learning tools across all UTAUT constructs.

To interpret the data, Table 3 from (Sözen & Guven, 2024) was used as a guide to determine the mean position of each questionnaire.

Table 3. *5-Point Likert Scale Mean Range by Five Levels*

Mean Range	Interpretation
1.00 - 1.75	Very Low
1.76 - 2.50	Low
2.51 - 3.25	Moderate
3.26 - 4.00	High
4.01 - 5.00	Very High

Appendix B presents the mean scores for each UTAUT construct for undergraduate students, along with the Standard Deviation (SD) to offer insights into the average level of perception among participants regarding GenAI-powered learning tools and the degree of variation or consistency in their responses.

The findings indicate that all UTAUT constructs received consistently high ratings, reflecting a strong overall acceptance of GenAI-powered learning tools among the participants. Performance Expectancy (PE) recorded the highest mean score (4.72), indicating that respondents perceive GenAI tools as highly effective in enhancing learning outcomes. Effort Expectancy (EE) followed closely with a mean of 4.63, suggesting that users find these tools easy to use and integrate into their learning processes.

Social Influence (SI) received a strong mean score of 4.06, indicating that external encouragement plays a notable role in GenAI adoption among students. However, item 2 responses reveal that instructor encouragement for GenAI-powered learning tools scored relatively lower, with a mean of 3.70. This suggests that while peers and social settings may promote GenAI adoption, direct encouragement from instructors remains limited. Similarly, while Facilitating Conditions (FC) yielded a high overall mean of 4.31, indicating that students generally perceive sufficient institutional and infrastructural support, item 3 reveals that provision of GenAI training from the institution scored lower at 3.94. This suggests that despite access to GenAI-powered tools, students may not receive adequate formal training from the institution to optimize their use.

In terms of adoption behavior, both Behavioural Intention (BI) and Use Behaviour (UB) scored 4.60, demonstrating a strong inclination to continue using GenAI-powered tools. These findings suggest that participants not only recognize the usefulness and ease of GenAI tools but also benefit from a supportive learning environment, ultimately leading to higher engagement and adoption.

Discussion

The findings of this study indicate a strong acceptance of GenAI-powered learning tools among undergraduate students in a public university in Malaysia, as reflected in the consistently high ratings across all UTAUT constructs. This section discusses the implications of these results in relation to the research question of examining the factors influencing the participants in the adoption of GenAI-powered learning tools through the UTAUT framework constructs: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioural Intention (BI), and Use Behaviour (UB).

Performance Expectancy (PE)

The findings suggest that the participants perceive GenAI-powered learning tools as highly effective in improving their academic outcomes. Students reported that they believe these tools enhance their academic productivity, and improve the quality of their work. Students perceive that GenAI-powered learning tools help them achieve their academic goals more efficiently by streamlining their study processes and providing valuable support. Specifically, many students believe that these tools assist them in completing their English assignments, making academic tasks more manageable and effective, which contributes to their adoption of GenAI to their learning.

This finding aligns with Smolansky et al. (2023), who found that many students had a positive opinion regarding GenAI tools, recognizing its potential for individualized learning support, and its research capabilities considerably influenced the adoption of GenAI tools in higher education. Additionally, it is supported by Tian et al. (2024) that Performance Expectancy (PE) is shaping the behavioral intention towards technology adoption, a pattern evident across diverse educational realms. It highlights the influential role of user experience in driving students' intention to utilize GenAI tools as educational resources, suggesting that students' perceptions of better-quality work, improved efficiency, and successful assignment completion contribute to GenAI adoption in learning.

Effort Expectancy

Participants perceive GenAI-powered tools as user-friendly and easy to integrate into their study routines. The simplicity and clarity of these tools play a crucial role in their adoption, as students appreciate how straightforward it is to learn and navigate GenAI-powered learning platforms. Many students find that their interaction with GenAI-powered learning is clear and understandable, particularly beneficial for English learning. Students perceive that the reduced learning curve and accessibility fostered their adoption of GenAI tools. It is aligned with the research from Helmiatin et al. (2024) that stakeholders at higher education institutes toward adopting GenAI are significantly influenced by the Effort Expectancy (EE). Tian et al. (2024) also found that the adoption of GenAI in higher education necessitates minimal effort without significantly influencing users' intention to utilize it.

The ease of use directly influences students' willingness to engage with new technologies, reinforcing GenAI's role as an effective and convenient learning aid in various academic disciplines, including English language acquisition.

Social Influence

The findings suggest that Social Influence (SI) plays a role in students' perceptions and adoption of GenAI tools, as students were influenced by their classmates, instructors, and the overall popularity of GenAI-powered learning tools. While some students are encouraged by their peers to use GenAI-powered tools, the support from instructors for such tools is relatively limited. Although classmates may actively recommend GenAI tools or discuss their benefits, the encouragement from instructors is not as strong.

This echoes the previous research that the impacts of Social Influence (SI) are mixed, with some studies suggesting a strong influence and others indicating minimal effects (Nguyen

& Chu, 2021; Wang & Reynolds, 2024). This inconsistency suggests that cognitive differences could be pivotal in determining the significance of social influences.

As a result, compared to other factors, social influence appears to be a less decisive factor in adoption. It can be proven by Tian et al. (2024) that Social Influence (SI) does not exert a decisive impact on the behavior and intention in terms of the adoption of GenAI, as well as Kumar and Bervell (2019) and Alotumi (2022)'s research that comparatively less impact of SI on users' sustained usage compared to other factors.

Researchers believe that the less encouragement from instructors and the educational environment on the adoption of GenAI by students can be ascribed to the relatively limited usage and uptake of GenAI technology among the target population in the public university in Malaysia, which has not gained widespread acceptance and recognition in the social settings. Additionally, there is a lack of comprehensive policy frameworks to assess their impact and establish effective communication strategies among stakeholders (Jin et al., 2025).

Facilitating Conditions

Facilitating Conditions (FC) highlight the importance of infrastructure and institutional support. Participants perceived that the availability of internet access, necessary devices, and training materials positively influenced their adoption of GenAI tools, aligning with Bui et al. (2025), who found that Facilitating Conditions (FC) contribute to a supportive learning environment that enhances students' skills and knowledge in using GenAI. It fosters a positive attitude towards GenAI and a better understanding of its potential benefits. It is possibly due to greater exposure to technology and better infrastructural support in Malaysia. This aligns with a study conducted by Dahri et al. (2024), which found that Malaysian higher education institutions provide support through better facilities to enhance GenAI adoption among the students.

However, while students generally have access to these resources, the training for using GenAI-powered tools provided by their institutions appears to be limited. The findings suggest that structured guidance on effectively integrating GenAI tools into academic work is insufficient. This limitation may affect students' perceptions of their ability to optimize GenAI's potential for learning and research, potentially influencing their confidence and adoption of GenAI-driven solutions to some degree, but not impacting students' overall intention to adopt GenAI, since they have many other complementary accessible sources to support the adoption of GenAI.

Behavioral Intention and Use Behaviour

The participants show a strong inclination to continue using GenAI-powered learning tools, as evidenced by high BI scores, which indicate a strong willingness to recommend these tools to peers and integrate them into future academic activities. Correspondingly, UB scores suggest that participants reported frequent use of GenAI tools, suggesting that these tools are becoming an important component of their learning processes, reinforcing the idea that GenAI adoption is not merely a passing trend but a fundamental shift in their study practices. It is supported by Au (2023), a Malaysian researcher from Universiti Tunku Abdul Rahman, who found that students in higher education institutions in Malaysia are familiar and preferably to continue using GenAI for academic-related tasks. This trend reflects the growing normalization of GenAI tools in education, suggesting that students are not just experimenting with these tools

but actively incorporating them into their study habits because they perceive these tools as helpful for enhancing efficiency, streamlining research, and supporting their academic work. The findings of the study suggest that students have moved beyond initial experimentation and are actively incorporating AI-powered learning tools into their regular learning activities.

Pedagogical Implications

Given that students perceive GenAI tools as highly effective, one key implication is that universities may consider integrating these tools into curriculum and instructional practices (Baltezarević & Baltezarević, 2024). The high Performance Expectancy (PE) scores suggest that students view tools as useful in supporting their learning activities. Therefore, providing students with opportunities to engage with these tools in academic settings may further enhance their learning experiences.

Despite the ease of use of GenAI tools, the findings revealed that institutional training on the use of these tools remains limited. This highlights the need for structured support to help students use these technologies effectively and responsibly. Kamoun et al. (2024) recommend introducing specialized training on formulating and refining prompts when interacting with GenAI tools while adhering to ethical and responsible use practices. Additionally, as suggested by Dahri et al. (2024), educators should be provided with professional development opportunities to strengthen their understanding of GenAI tools and their potential applications in education.

The findings also show that instructor encouragement played a less significant role than peer influence in supporting GenAI adoption. Universities may therefore encourage greater faculty involvement in guiding students on the appropriate use of these tools. Promoting discussions on responsible GenAI use and providing guidance on its academic applications may help foster a more supportive learning environment. Such support may encourage students to use GenAI tools more confidently and responsibly in their studies.

Furthermore, although students generally reported having access to GenAI-related resources, the findings indicate a need for stronger institutional guidance regarding their use. Universities may therefore enhance existing support systems by providing additional resources, training programmes, and guidance to help students maximize the educational benefits of GenAI technologies.

Finally, the high Behavioral Intention (BI) and Use Behaviour (UB) scores indicate that students have already incorporated GenAI-powered learning tools into their learning practices and intend to continue using them. Given this strong acceptance, universities may consider establishing clear policies, guidelines, and support mechanisms to promote the effective and responsible use of GenAI-powered learning tools in academic contexts.

Conclusion

This study examined the factors influencing undergraduate students' adoption of GenAI-powered learning tools at a public university in Malaysia using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. The findings revealed a strong overall acceptance of GenAI tools among the participants. Performance Expectancy (PE) and Effort Expectancy (EE) emerged as the strongest factors, indicating that students perceive GenAI tools as useful for enhancing academic performance and easy to integrate into their learning activities. Facilitating Conditions (FC) also positively supported GenAI adoption

through adequate resources and support. Although Social Influence (SI) showed a positive effect, encouragement from instructors appeared less prominent than the influence of peers. High levels of Behavioural Intention (BI) and Use Behaviour (UB) further suggest that GenAI tools have become an important component of students' learning process. Overall, the findings indicate that undergraduate students have positive perceptions of GenAI-powered learning tools and are willing to continue using them in their learning practices.

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References

Alexander, K. et al. (2023). Who wrote this essay? Detecting AI-generated writing in second language education in higher education. *Teaching English with Technology*, *23*(2), 25-43. https://doi.org/10.56297/BUKA4060/XHLD5365

Alhalangy, A., & AbdAlgane, M. (2023). Exploring the impact of AI on the EFL context: A case study of Saudi universities.

Alhalangy, A., & AbdAlgane, M. (2023). Exploring the Impact of AI on the EFL Context: A Case Study of Saudi Universities. *Journal of Intercultural Communication*, *23*(2), 41-49. https://doi.org/10.36923/jicc.v23i2.125

Alharbi, K., & Khalil, L. (2023). Artificial intelligence (AI) in ESL vocabulary learning: An exploratory study on students' and teachers' perspectives. *Migration Letters*, *20*(S12),

1030-1045.

Ali, A. M. (2023). An Intervention Study on the Use of Artificial Intelligence in the ESL Classroom: English teacher perspectives on the Effectiveness of ChatGPT for Personalized Language Learning. *Master of Arts in Upper Secondary Education*, *300*.

Al-kumaim, N. H. et al. (2025). Navigating GenAI in Malaysian universities: Use, problems, and challenges. In *2025 5th International Conference on Emerging Smart Technologies and Applications (eSmarTA)* (pp. 1–7). IEEE. https://doi.org/10.1109/eSmarTA66764.2025.11132252

Alotumi, M. (2022). Factors influencing graduate students' behavioral intention to use Google Classroom: Case study-mixed methods research. *Education and Information Technologies*, *27*, 10035–10063. htpps://doi.org/10.1007/s10639-022-11051-2

An, X. et al. (2023). Modeling English teachers' behavioral intention to use artificial intelligence in middle schools. *Education and Information Technologies*, *28*(5), 5187-5208. https://doi.org/10.1007/s10639-022-11286-z

Au, W. C. (2023). *Examining the adoption of ChatGPT technology among academics in higher education institutions in Malaysia* (Unpublished Master's thesis). Universiti Tunku Abdul Rahman, Malaysia. http://eprints.utar.edu.my/6221/

Barzanji, A. M., & Alsofyani, A. H. (2026). Exploring Saudi EFL learners' motivation and perceptions of ChatGPT and instructor feedback in paragraph writing. *Arab World English Journal, Special Issue on Artificial Intelligence*, (3), 5–25. https://dx.doi.org/10.24093/awej/AI3.1

Baltezarević, R., & Baltezarević, I. (2024). Students' attitudes on the role of artificial intelligence (AI) in personalized learning. *International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE)*, *12*(2), 387–397. https://doi.org/10.23947/2334-8496-2024-12-2-387-397

Borhan, N. R. et al. (2026). Utilization of Generative AI Tools in Assignment Completion Among DCS and DCV Students. *Tropical Scientific Journal*, *5*(1), 79-91.

Bui, H. Q. et al. (2025). AI adoption: A new perspective from accounting students in Vietnam. *Journal of Asian Business and Economic Studies*, *32*(1), 40–51. https://doi.org/10.1108/JABES-06-2024-0300

Corbett, A. T. et al. (1997). Intelligent tutoring systems. In M. G. Helander, T. K. Landauer, & P. V. Prabhu (Eds.), *Handbook of human-computer interaction* (2nd ed., pp. 849–870). Elsevier.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78(1)*, 98-104. https://doi.org/10.1037/0021-9010.78.1.98

Dahri, N. A. et al. (2024). Extended TAM based acceptance of AI-Powered ChatGPT for supporting metacognitive self-regulated learning in education: A mixed-methods study. *Heliyon*, *10*(8), e29317. https://doi.org/10.1016/j.heliyon.2024.e29317

Dahri, N. A. et al. (2024). Investigating AI-based academic support acceptance and its impact on students' performance in Malaysian and Pakistani higher education institutions. *Education and Information Technologies*, 1-50. https://doi.org/10.1007/s10639-024-12599-x

Han, J. et al. (2024). Continue using or gathering dust? A mixed method research on the factors influencing the continuous use intention for an AI-powered adaptive learning

system for rural middle school students. *Heliyon, 10*(12), e33251. https://doi.org/10.1016/j.heliyon.2024.e33251

Helmiatin, H. A., & Kahar, M. R. (2024). Investigating the adoption of AI in higher education: a study of public universities in Indonesia. *Cogent Education, 11*(1), 2380175. https://doi.org/10.1080/2331186X.2024.2380175

Hsiao, J. C., & Chang, J. S. (2023). Enhancing EFL reading and writing through AI-powered tools: design, implementation, and evaluation of an online course. *Interactive Learning Environments*, 1-16. https://doi.org/10.1080/10494820.2023.2207187

Hsu, L. (2023). EFL learners' self-determination and acceptance of LMOOCs: The UTAUT model. *Computer Assisted Language Learning*, *36*(7), 1177-1205. https://doi.org/10.1080/09588221.2021.1976210

Jin, Y. et al. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence, 8*, 100348. https://doi.org/10.1016/j.caeai.2024.100348

Joshi, A. et al. (2015). Likert scale. *British Journal of Applied Science & Technology*, *7*, 396. https://doi.org/10.9734/BJAST/2015/14975

Julien, G. (2024). How Artificial Intelligence (AI) Impacts Inclusive Education. *Educational Research and Reviews*, *19*(6), 95-103. https://doi.org/10.5897/ERR2024.4404

Kamoun, F. et al. (2024). Exploring students' and faculty's knowledge, attitudes, and perceptions towards ChatGPT: A cross-sectional empirical study. *Journal of Information Technology Education: Research, 23*, 1–22. . https://doi.org/10.28945/5239

Kang, H. (2022). Effects of Artificial Intelligence (AI) and Native Speaker Interlocutors on ESL Learners' Speaking Ability and Affective Aspects. *Multimedia-Assisted Language Learning*, *25*(2). https://doi.org/10.15702/MALL.2022.25.2.09

Kumar, J. A., & Bervell, B. (2019). Google Classroom for mobile learning in higher education: Modelling the initial perceptions of students. *Education and Information Technologies*, *24*, 1793–1817. https://doi.org/10.1007/s10639-018-09858-z

Lee, A. H. C. (2025). Use of Generative Artificial Intelligence among Selected Pre-University Business Students at a Private University in Malaysia. *Asia-Pacific Journal of Futures in Education and Society*, *4*(1), 1–20. https://doi.org/10.58946/apjfes-4.1.P1

Lin, H. C. et al. (2022). Understanding adoption of artificial intelligence-enabled language e-learning system: An empirical study of the UTAUT model. *International Journal of Mobile Learning and Organisation*, *16*(1), 74-94. https://doi.org/10.1504/IJMLO.2022.119966

Majid, I., & Yanduri, V. L. (2022). Artificial Intelligence in Education. *The Indian Journal of Technical Education*, *45*(3), 11-16. https://ssrn.com/abstract=4463555

Malik, N., & Dahiya, M. (2024). Interacting with ChatGPT: Impact on students and teaching-learning. *Sigma Journal of Engineering and Natural Sciences, 42*(6), 1736-1748. https://doi.org/10.14744/sigma.2023.00147

Monteiro, F. F. (2021). Análise de uma experiência híbrida no ensino de Física 1. *Revista Brasileira de Ensino de Física*, *43*, 1–10. https://doi.org/10.1590/1806-9126-RBEF-2020-0315

Mutia, F. et al. (2024). A comparative analysis of librarians' views on AI support for learning

experiences, lifelong learning, and digital literacy in Malaysia and Indonesia. *Preprints.* https://doi.org/10.20944/preprints202405.1380.v1

Nguyen, H. T., & Chu, Q. P. (2021). Estimating university students' acceptance of technological tools for studying English through the UTAUT model. *International Journal of TESOL & Education*, *1*(3), 209-234. https://doi.org/10.11250/ijte.01.03.012

Nuryadin, R., & Marlina, M. (2023). The Use of AI (Artificial Intelligence) in Education-(Literature Review). *Indonesian Journal of Primary Education*, *7*(2), 143-158. https://doi.org/10.17509/ijpe.v7i2.64290

O'Connor, K. W. (2023). *Higher education on cruise control: Is artificial intelligence helping or hurting the classroom?* (Order No. 30694645), (Unpublished Doctoral dissertation). University of South Alabama, United States. https://www.proquest.com/dissertations-theses/higher-education-on-cruise-control-is-artificial/docview/2887907734/se-2

Shah, P. (2023). *AI and the Future of Education: Teaching in the Age of Artificial Intelligence*. John Wiley & Sons. https://doi.org/10.1002/9781394344000

Shafiee Rad, H. (2024). Revolutionizing L2 speaking proficiency, willingness to communicate, and perceptions through artificial intelligence: a case of Speeko application. *Innovation in Language Learning and Teaching*, 1-16. https://doi.org/10.1080/17501229.2024.2309539

Shuhidan, S. M. et al. (2019). Extending technology acceptance model to EPV application. *International Journal of Financial Research, 10*(5), 398–410. https://doi.org/10.5430/ijfr.v10n5p398

Smolansky, A. et al. (2023). Educator and student perspectives on the impact of generative AI on assessments in higher education. *Educational Studies in Perspective*, *27*, 149–157. https://doi.org/10.1145/3573051.3596191

Solak, E. (2024). Revolutionizing Language Learning: How ChatGPT and AI Are Changing the Way We Learn Languages. *International Journal of Technology in Education*, *7*(2), 353-372. https://doi.org/10.46328/ijte.732

Sözen, E., & Guven, U. (2024). The effect of online assessments on students' attitudes towards undergraduate-level geography courses. *International Education Studies*, *12*(10), 1-1. https://doi.org/10.5539/ies.v12n10p1

Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the P value is not enough. *Journal of graduate medical education*, *4*(3), 279-282.

Sun, T. (2023). The Potential Use of Artificial Intelligence in ESL Writing Assessment: A Case Study of IELTS Writing Tasks. *Irish Journal of Technology Enhanced Learning*, *7*(2), 42-51. https://doi.org/10.22554/ijtel.v7i2.137

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Tan, S. C. et al. (2022). A systematic review of artificial intelligence techniques for collaborative learning over the past two decades. *Computers and Education: Artificial Intelligence*, *3*, 100097. https://doi.org/10.1016/j.caeai.2022.100097

Tian, W. et al. (2024). AI chatbots in Chinese higher education: Adoption, perception, and influence among graduate students—An integrated analysis utilizing UTAUT and ECM models. *Frontiers in Psychology*, *15*.

https://doi.org/10.3389/fpsyg.2024.1268549

Utina, S. S. et al. (2024). A comparative study of artificial intelligence in education psychology: the cases of Indonesia and Thailand. *Bulletin of Social Informatics Theory and Application*, *8*(1), 70-85.

Venkatesh, V. et al. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478. https://doi.org/10.2307/30036540

Wang, X., & Reynolds, B. L. (2024). Beyond the Books: Exploring Factors Shaping Chinese English Learners' Engagement with Large Language Models for Vocabulary Learning. *Education Sciences*, *14*(5), 496. https://doi.org/10.3390/educsci14050496

Woolf, B. P. (2008). *Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning*. Elsevier.

Wu, J. et al. (2026). Modeling the Impact of AI Features on Writing Performance: A TAM–SRL Integrated Framework. *Arab World English Journal*, *Special Issue on Artificial Intelligence,* (3):102-117. https://dx.doi.org/10.24093/awej/AI3.7

Yusuf, A. et al. (2024). Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives. *International Journal of Educational Technology in Higher Education*, *21*(1), 21. https://doi.org/10.1186/s41239-024-00453-6

Zhang, K., & Saeed, M. A. (2026). Chinese EFL learners' engagement with ChatGPT feedback on academic writing: A case study in Malaysia. *Computers and Composition*, *79*, 102976. https://doi.org/10.1016/j.compcom.2025.102976

Appendices

Appendix A

Demographic Data of the Participants

Institution Features		A Public University in Malaysia
Gender	Male	25
	Female	26
Year of Study	Year 1	11
	Year 2	16
	Year 3	12
	Year 4	12
Faculty	Faculty of Law	12
	Faculty of Engineering and Built Environment	16
	Faculty of Social Sciences and Humanities	14
	Faculty of Economics and Management	9
Expertise in using AI tools	Beginner	4
	Intermediate	35
	Advanced	12
Total		51

Appendix B
Mean Scores and Standard Deviation for UTAUT Constructs of the Participants

UTAUT construct	Mean (SD)	Level	Item	Mean (SD)	Level
Performance Expectancy (PE)	4.72 (0.94)	Very High	Item 1	4.93 (0.25)	Very High
			Item 2	4.82 (0.39)	Very High
			Item 3	4.86 (0.34)	Very High
			Item 4	4.75 (0.48)	Very High
Effort Expectancy (EE)	4.63 (1.05)	Very High	Item 1	4.83 (0.38)	Very High
			Item 2	4.80 (0.40)	Very High
			Item 3	4.80 (0.40)	Very High
			Item 4	4.88 (0.33)	Very High
Social Influence (SI)	3.91 (0.87)	High	Item 1	4.83 (0.38)	Very High
			Item 2	3.70 (0.90)	High
			Item 3	4.96 (0.20)	Very High
			Item 4	4.87 (0.34)	Very High
Facilitating Conditions (FC)	4.31 (1.34)	Very High	Item 1	4.88 (0.33)	Very High
			Item 2	4.88 (0.33)	Very High
			Item 3	3.94 (1.22)	High
			Item 4	4.75 (0.43)	Very High
Behavioural Intention (BI)	4.60 (1.10)	Very High	Item 1	4.83 (0.38)	Very High
			Item 2	4.78 (0.56)	Very High
			Item 3	4.85 (0.35)	Very High
			Item 4	4.80 (0.40)	Very High
Use Behaviour (UB)	4.60 (1.08)	Very High	Item 1	4.81 (0.39)	Very High
			Item 2	4.88 (0.32)	Very High
			Item 3	4.74 (0.49)	Very High
			Item 4	4.86 (0.35)	Very High