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ANALYSIS OF THE USAGE OF ARTIFICIAL INTELLIGENCE (AI) APPLICATIONS AMONG UNIVERSITY STUDENTS IN MALAYSIA

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Abstract
Artificial Intelligence (AI) transforms Education by enhancing personalized learning, automating administrative tasks, and improving student engagement. Despite its growing presence, AI adoption among university students in Malaysia remains limited. This study investigates the level of AI application usage, identifies key factors influencing adoption, and examines the relationship between these factors and actual AI usage. Using the Technology Acceptance Model (TAM), the study focuses on perceived usefulness (PU), perceived ease of use (PEOU), and technological skills as primary determinants of AI adoption. A quantitative research approach was employed, with data collected through a structured survey from 115 undergraduate students at a university in Kedah, Malaysia. After data screening, 105 valid responses were analyzed using descriptive statistics, correlation analysis, and multiple regression analysis. The findings reveal that AI-powered chatbots and academic support tools are the most frequently used applications due to their perceived usefulness and ease of use. However, AI adoption remains moderate, primarily due to limited technological skills and concerns about AI complexity and ethical implications. The study highlights the need for AI literacy programs, improved user-friendly AI designs, and clear ethical policies on AI-assisted learning. Universities should integrate AI training into curricula, and developers should ensure AI accessibility for students with varying technical proficiencies. Future research should explore cultural attitudes, ethical concerns, and trust in AI within educational settings. By addressing these challenges, institutions can enhance AI adoption, ultimately improving student learning outcomes and academic experiences.
Keywords: Artificial Intelligence, Perceived Usefulness, Perceived Ease of Use, Technology Skills, AI Adoption, Higher Education

Introduction

Artificial Intelligence (AI) has emerged as a transformative force in Education, reshaping how students learn, engage, and interact with academic materials. AI applications are increasingly embedded within higher education institutions, enhancing teaching efficiency, student performance, and learning experiences. These AI-driven systems leverage machine learning, natural language processing (NLP), and data analytics to deliver personalized learning

pathways, automate administrative tasks, and improve accessibility for students with diverse learning needs (Cheng, 2023). AI's growing impact on Education aligns with worldwide digital transformation efforts, emphasizing the importance of technology-enhanced learning environments (Holmes, Bialik, & Fadel, 2023).
In Malaysia, adopting AI in Education is a key priority under the Malaysia Education Blueprint (2013-2025). The Ministry of Education (MOE) has acknowledged AI's potential to revolutionize traditional teaching methods, optimize student learning experiences, and create a more data-driven education system. However, despite these potential advantages, research on the actual adoption of AI applications among Malaysian university students remains limited. Understanding how students interact with AI-based educational tools is crucial for designing effective AI literacy programs, user-friendly applications, and policies that ensure ethical AI implementation in higher education institutions.

This study explores AI application usage among Malaysian university students by investigating three critical aspects. First, it examines the extent to which university students use AI applications for academic purposes, assessing their engagement levels and AI-assisted learning preferences. Second, it identifies the factors influencing AI adoption, explicitly focusing on perceived usefulness, perceived ease of use, and technological skills as outlined in the Technology Acceptance Model (TAM). Finally, the study evaluates the relationship between these factors and AI usage, providing insights into the key determinants driving AI adoption.

By applying the TAM framework, this research provides a comprehensive understanding of AI adoption trends, offering valuable recommendations for educators, policymakers, and technology developers. This study ultimately contributes to the broader discourse on AI-driven education, emphasizing the need for a balanced approach that maximizes AI's benefits while addressing its challenges in Malaysian higher Education.

Problem Statement

Adopting Artificial Intelligence (AI) in Education has introduced significant opportunities and challenges. Although AI tools offer potential benefits such as adaptive learning, real-time feedback, and automated grading, their adoption among university students remains moderate (Neo, 2022). Despite Malaysia's commitment to AI-driven education, several obstacles hinder the widespread adoption of AI tools in higher education institutions.

One of the primary challenges is the lack of awareness and understanding of AI functionalities. Many university students remain unfamiliar with AI applications, leading to hesitation in using AI-based tools for academic purposes (Woodruff et al., 2023). Limited technological skills and digital literacy among students further restrict their ability to integrate AI effectively into their learning processes (Almaraz et al., 2023). Students lacking sufficient AI-related technical proficiency may struggle to navigate AI applications, understand AI-generated outputs, and critically evaluate AI-assisted recommendations.

Another pressing concern is the perceived complexity of AI systems and data privacy risks. While AI-powered applications such as ChatGPT, Grammarly, and plagiarism detection software are becoming increasingly popular, some students find these tools difficult to use, unreliable, or ethically questionable (Flores et al., 2020). Issues related to AI bias, plagiarism

detection, and data security create apprehension among students, potentially discouraging them from adopting AI applications for academic tasks.

Despite these challenges, previous studies have demonstrated that perceived usefulness and ease of use significantly influence students' AI adoption behaviours (Li, 2023). However, the relationship between technological skills and AI adoption remains underexplored in Malaysian universities. By examining how perceived usefulness, perceived ease of use, and technological skills interact, this study seeks to address existing research gaps and provide actionable insights for optimizing AI adoption in Malaysian higher education institutions.

To enhance our understanding of how Artificial Intelligence (AI) is integrated into higher Education, we must assess the level of AI application usage among university students. This involves identifying the frequency with which students engage with AI-powered tools, the specific types of AI applications they use, and the academic tasks for which these tools are employed. AI applications such as chatbots, plagiarism detection software, grammar-checking tools, virtual assistants, and adaptive learning platforms have become increasingly accessible to students.

However, the extent to which these tools are utilized for academic purposes, including research, assignment writing, and test preparation, varies significantly among students. Some students may actively incorporate AI-powered applications into their learning processes, while others may be hesitant due to a lack of awareness or confidence in using such technology. By evaluating AI usage patterns, it becomes possible to determine whether students effectively leverage AI's capabilities to enhance their academic performance.

Identifying key factors influencing AI adoption among university students is crucial, focusing on perceived usefulness, perceived ease of use, and technological skills. The Technology Acceptance Model (TAM) provides a theoretical framework for understanding how students' perceptions impact their willingness to use AI applications. Perceived usefulness (PU) refers to the degree to which students believe AI applications can improve their academic efficiency and learning outcomes. If students perceive AI as beneficial in completing tasks such as proofreading essays, summarising texts, or providing instant feedback on assignments, they are more likely to adopt it.

Perceived ease of use (PEOU) examines how simple or intuitive students find AI applications to operate. If students encounter difficulties understanding how AI tools function or if the learning curve is steep, they may be discouraged from integrating these tools into their daily academic routine. Technological skills also play a significant role, as students who possess higher digital literacy and technical proficiency are more likely to explore and adopt AI-powered applications. Students with limited exposure to technology may find AI applications overwhelming, leading to reduced adoption rates. Identifying these factors enables educators, institutions, and AI developers to address barriers to adoption and improve AI accessibility for all students.

It is necessary to examine the relationship between these factors and the actual usage of AI in academic settings. Understanding how perceived usefulness, perceived ease of use, and technological skills correlate with students' engagement with AI applications provides valuable

insights into AI adoption behaviour. For instance, if students perceive AI as highly useful and easy to use but still exhibit low adoption rates, there may be underlying barriers such as concerns about data privacy, lack of institutional support, or misconceptions about AI's role in learning.

Suppose students with strong technological skills are significantly more likely to use AI tools. In that case, this highlights the need for digital literacy programs to bridge the gap for students with lower levels of technical proficiency. By conducting statistical analyses, such as correlation and multiple regression analyses, researchers can quantify the strength of these relationships and determine which factors have the most significant impact on AI adoption. The findings from this analysis can inform the development of targeted AI training programs, user-friendly AI interfaces, and institutional policies that encourage responsible AI use in higher Education.

Integrating AI in higher Education has introduced innovative approaches to personalized learning, intelligent tutoring systems, and automated assessment tools. AI-driven applications can analyze students' learning behaviours, tailor academic content to individual needs, and provide real-time feedback on performance (Hinojo et al., 2019). Studies show that AI-powered tools enhance student engagement, improve academic performance, and streamline university administrative processes worldwide (Crompton & Burke, 2023).

Recent studies indicate that university students increasingly use AI applications for research assistance, academic writing, and coursework automation. Ibrahim et al. (2023) found that AI-powered chatbots, plagiarism checkers, and writing assistants are among the most widely used AI tools. However, ethical concerns related to AI-driven plagiarism detection and automated grading systems have raised questions about AI's fairness and accuracy in academic settings (Dergunova et al., 2022).

The Technology Acceptance Model (TAM) is a widely used theoretical framework that explains how individuals adopt and use technology. TAM posits that perceived usefulness and ease of use significantly influence an individual's decision to accept a new technology (Davis, 1989). This model has been widely applied in technology adoption research to assess user behaviour towards e-learning systems, AI applications, and digital platforms.

Several studies (Raman, 2014; Daud et al, 2015; Raman et. al, 2015; Rathakrishnan et al., 2015) have confirmed that students who perceive AI applications as valuable and easy to navigate are likelier to adopt them for academic purposes (Sumakul, Hamied, & Sukyadi, 2022). However, the role of technological skills as a moderating factor remains relatively unexplored, particularly in the context of Malaysian higher Education.

This study employs a quantitative survey research design to investigate the usage of artificial intelligence (AI) applications among university students in Malaysia. A cross-sectional data collection approach was used to gather data simultaneously to assess students' AI adoption behaviour. A structured questionnaire was developed as the primary data collection tool to systematically measure students' AI usage patterns, their perceptions of AI's usefulness and ease of use, and their level of technological proficiency. This approach ensures that the research

effectively captures a snapshot of students' engagement with AI applications, allowing for a comprehensive analysis of the factors influencing their adoption of AI tools.

The quantitative method was chosen because it allows for objective measurements and statistical analysis of variables, ensuring reliability and accuracy in interpreting results (Creswell, 2021). This approach facilitates the identification of patterns, trends, and relationships between key factors, making it particularly suitable for assessing the role of perceived usefulness (PU), perceived ease of use (PEOU), and technological skills in influencing AI adoption. Quantitative research also allows for the generalization of findings to a broader student population, which is essential for drawing conclusions that can inform policy recommendations, AI tool development, and university support strategies.

A structured questionnaire was selected for this study because it provides a standardized way of collecting data, reducing variability and ensuring that all respondents answer the same set of questions (Bryman, 2021). The questionnaire was designed based on the Technology Acceptance Model (TAM) framework, ensuring it effectively captures students' perceptions and behaviours of AI adoption. The survey instrument was organized into three sections. The first section gathered demographic information, including basic details about the respondents, such as age, gender, academic year, and field of study. These factors were included to determine whether certain demographic groups had different AI adoption patterns. AI Usage Patterns examined how frequently students engage with AI applications, the types of AI tools they use (e.g., AI-powered chatbots, virtual assistants, plagiarism checkers, grammar correction software), and their primary purposes for using AI in academic tasks. Factors Influencing AI Adoption measured perceived usefulness (PU), perceived ease of use (PEOU), and technological skills. These constructs were assessed using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to capture students' attitudes toward AI applications.

The cross-sectional survey design ensures that data is collected efficiently within a limited timeframe, making it feasible for research examining current trends in AI adoption among university students. While a cross-sectional approach provides a detailed snapshot of AI usage at a given time, one limitation is that it does not allow tracking behaviour changes over time. Future studies could build on this research by conducting longitudinal studies to assess how AI adoption evolves as students become more familiar with these technologies.

The study utilized a convenience sampling technique, a non-probability sampling method where participants are selected based on their availability and willingness to participate (Etikan et al., 2019). A total of 115 undergraduate students from a university in Malaysia were invited to participate in the survey. After data screening, 105 valid responses were included in the final analysis. The response rate was 91.3%, which is considered high for online surveys.

Convenience sampling was selected due to its practicality, efficiency, and cost-effectiveness. Given the constraints of time and resources, this method allowed for the rapid collection of data from a diverse student population. However, it is important to acknowledge that convenience sampling has limitations, including selection bias and the potential lack of generalizability of findings beyond the sampled university. Future research could incorporate random sampling methods to improve the study's external validity.

Data Collection Procedure

To ensure broad Participation, we conducted the survey using Google Forms, a widely utilized online survey platform that facilitates efficient data collection and management. The survey link was disseminated through social media platforms such as WhatsApp and Instagram, enabling easy access for students. These platforms were chosen because they are commonly used by university students and provide an effective way to reach many potential respondents within a short timeframe.

Participants received clear instructions on how to complete the survey and were assured that their responses would remain confidential and anonymous. Ethical considerations were prioritized throughout the process. Informed consent was obtained from all participants before they began the survey. Students were provided with an explanation of the study's purpose, their rights as participants, and how their data would be used. It was emphasized that participation was voluntary, allowing students the option to withdraw from the study at any time without facing any consequences. Data confidentiality was ensured by keeping all responses anonymous and securely storing the data, which was accessible only to the researchers.

Data collection was conducted over a two-week period, during which reminders were sent periodically to encourage Participation. By using an online survey format, the study minimized potential biases associated with in-person data collection, such as social desirability bias or interviewer influence. However, one potential drawback of online surveys is self-selection bias, as students who are more comfortable with AI and technology may have been more likely to participate.

Despite these limitations, the data collection process was effective in gathering a diverse sample of university students from different academic disciplines, allowing for a comprehensive analysis of AI adoption patterns.

Analysis

Once data collection was completed, responses were cleaned, coded, and analyzed using Statistical Package for the Social Sciences (SPSS) version 28, a powerful software tool commonly used for quantitative data analysis in social science research. The analysis was conducted in three main stages. Descriptive statistics were used to summarise the demographic characteristics of the respondents and their AI usage behaviors. Frequencies and percentages for categorical variables such as gender, age group, and academic year. Mean and standard deviation for continuous variables such as AI usage frequency and Likert scale responses. Descriptive statistics provided an overview of AI adoption trends, enabling the identification of patterns in AI engagement across different student groups.

A Pearson correlation analysis was conducted to examine the relationships between perceived usefulness (PU), perceived ease of use (PEOU), technological skills, and AI adoption. Correlation analysis helps determine the strength and direction of associations between variables. A strong positive correlation between PU and AI adoption suggests that students who perceive AI as useful are likelier to use it. A negative or weak correlation between PEOU and AI adoption might indicate that students find AI applications difficult to use, which discourages

them from adopting AI tools. Analyzing these correlations, the study provides insights into how students' perceptions influence their AI adoption behaviour.

A multiple regression analysis was performed to examine the combined effects of perceived usefulness (PU), perceived ease of use (PEOU), and technological skills on actual usage of AI. This analysis aimed to identify which of these three factors—PU, PEOU, or technological skills—significantly influence AI adoption. It also investigated whether technological skills serve as a moderator in the relationship between perceived usefulness/ease of use and AI adoption.he regression model helped identify the predictors of AI adoption, providing empirical evidence to support the study's hypotheses. Table 1 presents the regression analysis results.

Table 1
Model Summary for Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.792[a]	0.627	0.616	0.42145

A significant p-value (< 0.05) for a variable indicates that it has a statistically significant impact on AI adoption. The beta coefficients (β) help determine the relative contribution of each factor to AI usage.

Findings and Analysis

This section presents the findings derived from the data collected through the structured questionnaire. The analysis is divided into three key areas: the demographic profile of respondents, AI application usage patterns, and regression analysis results. These findings provide insights into the extent of AI adoption among university students, the factors influencing their engagement with AI tools, and the statistical relationships between these factors and actual AI usage.

The demographic characteristics of the respondents provide important contextual information regarding the backgrounds of students participating in the study. Understanding demographic distributions, such as age, gender, and academic discipline, helps identify potential differences in AI adoption based on these factors (Ismail et al., 2019).

Table 2 presents the demographic distribution of the study participants. Most respondents were between 18 and 25 years old, reflecting the typical age range of undergraduate students. The sample consisted of a higher percentage of female respondents than male respondents, which is consistent with gender distribution trends in many academic institutions. Additionally, students from various disciplines participated in the study, including those from science, technology, engineering, and mathematics (STEM) fields, social sciences, and business studies.

By analyzing demographic factors, it becomes possible to determine whether certain groups, such as STEM students who may have greater exposure to AI technologies, demonstrate higher adoption rates compared to students in non-technical fields. The findings from this analysis set the foundation for interpreting the subsequent results on AI usage patterns and influencing factors.

Table 2
Summary of Collected Responses

Item	Category	N	Percentage (%)
Gender	Male	41	35.7
	Female	74	64.3
	Total	115	100
Age	Under 18	0	0
	18-21	53	46.1
	22-25	29	25.2
	26-30	30	26.1
	Over 30	3	2.6
	Total	115	100
Academic Level	Diploma	54	47
	Degree	61	53
	Total	115	100

The study further examined how frequently students engage with AI-powered applications and the specific types of AI tools they utilize in their academic activities. AI applications such as chatbots, virtual learning assistants, plagiarism detection software, and automated writing tools have gained popularity among students for their ability to enhance efficiency and streamline academic tasks.

Figure 1 illustrates the types of AI applications most commonly used by university students. The findings indicate that plagiarism detection tools and grammar-checking applications, such as Turnitin and Grammarly, are among the most widely used AI tools. These applications assist students in ensuring the originality of their work and improving writing accuracy, making them indispensable for assignments and research papers.

A significant percentage of students reported using AI-powered chatbots and virtual learning assistants, such as ChatGPT, Google Assistant, and AI-driven note-taking applications. These tools provide students with instant access to academic resources, quick explanations of complex concepts, and personalized learning recommendations. However, despite the widespread use of AI for writing and research, the findings suggest that more advanced AI applications, such as AI-driven tutoring systems and predictive learning analytics, remain underutilized among university students.

The reasons for this variation in usage patterns could be attributed to students' familiarity with AI, accessibility to AI-powered applications, and perceived ease of use of these technologies. Furthermore, students from STEM disciplines showed a higher tendency to explore and utilize

AI applications beyond basic functions, such as AI-assisted programming tools and data analysis applications.

Understanding AI usage patterns helps universities and policymakers develop targeted AI literacy programs that align with students' needs and encourage the responsible integration of AI tools in Education.

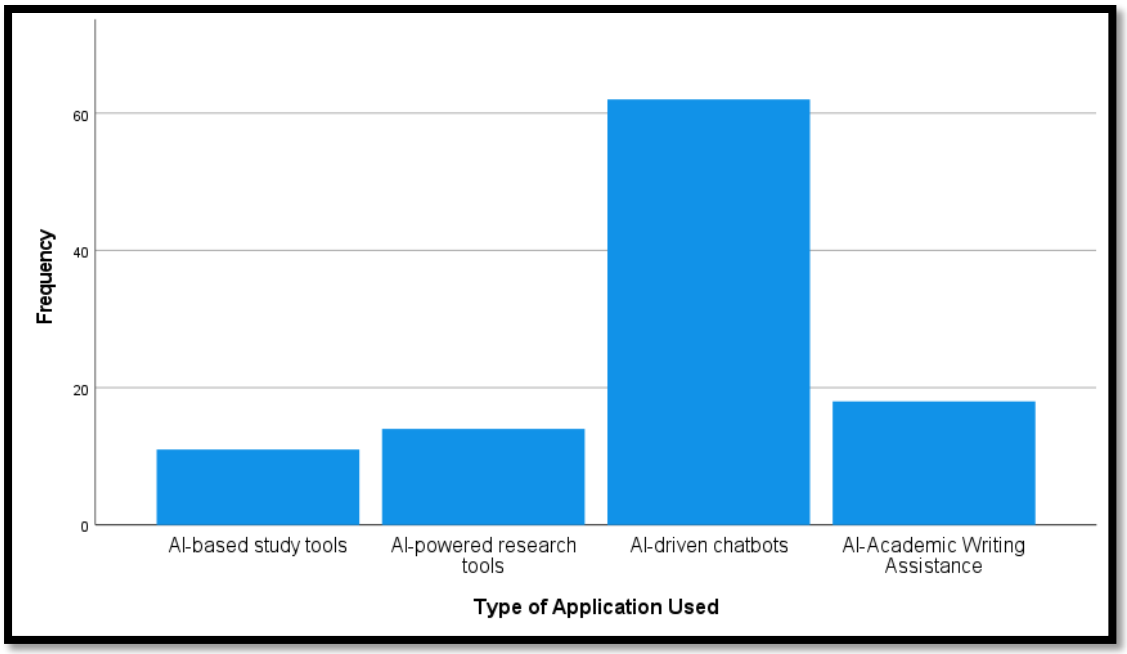

Figure 1: *Type of Application Used*

To further understand the factors influencing AI adoption, a multiple regression analysis was conducted to determine the extent to which perceived usefulness (PU), perceived ease of use (PEOU), and technological skills impact students' actual AI usage behavior. The regression analysis results, as presented in Table 1, reveal that both PU and PEOU significantly influence AI adoption, meaning that students who perceive AI as beneficial and easy to use are more likely to incorporate AI applications into their academic activities.

The results indicate that technological skills act as a moderating factor in the relationship between PU, PEOU, and AI adoption. Students who possess higher levels of digital literacy and technological proficiency are more likely to embrace AI-powered applications with greater ease and confidence. Conversely, students with limited exposure to AI and lower technological skills exhibit lower adoption rates, despite acknowledging the potential benefits of AI in Education.

Technological skill gaps pose a significant barrier to AI adoption, reinforcing the need for digital literacy programs and AI-focused training initiatives in universities. By equipping students with the necessary skills to navigate AI applications effectively, universities can promote wider and more meaningful engagement with AI tools across various academic disciplines.

Discussion and Conclusion

The findings of this study provide valuable insights into the adoption of AI applications among university students, the factors influencing AI engagement, and the statistical relationships between these factors and actual AI usage. The results confirm that students who perceive AI as useful and easy to use are more likely to integrate AI-powered tools into their academic routine. However, technological skills remain a significant barrier for some students, suggesting that a lack of familiarity with AI applications can discourage adoption, even among students who recognize the potential benefits of AI.

One of the key findings from this study is that AI-powered writing assistants, plagiarism detection tools, and virtual chatbots are the most commonly used AI applications among students. These applications provide practical benefits such as instant feedback, improved writing quality, and research assistance, making them indispensable tools in higher Education. However, the study also highlights the underutilization of more advanced AI tools, such as AI-driven tutoring systems and predictive learning analytics, which suggests that students may not be fully aware of the diverse applications of AI in Education.

This study confirms that technological skills play a critical role in AI adoption. Students with higher levels of digital literacy and confidence in using AI-powered tools are significantly more likely to engage with AI applications in their academic work. This reinforces the need for universities to introduce AI literacy programs that provide students with hands-on training and exposure to AI technologies.

The study highlights concerns regarding AI's role in academic integrity, grading automation, and data privacy. Some students expressed hesitation in fully adopting AI due to ethical concerns, particularly regarding plagiarism detection, AI-generated content, and the potential for academic dishonesty. These concerns point to the importance of establishing ethical guidelines for AI usage in Education, ensuring that students use AI tools responsibly and transparently.

The results of this study highlight the growing role of AI in higher Education, particularly in supporting students with academic writing, research, and personalized learning. While many students actively use AI tools, barriers such as limited technological skills and ethical concerns must be addressed to ensure AI adoption is both effective and responsible. Universities must take proactive measures to integrate AI literacy programs into curricula, ensuring that students are equipped with the skills needed to navigate AI-driven learning environments.

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