

Adoption of Generative AI Tools In Higher Education: The Role of Attitude, Subjective Norms, and Perceived Behavioural Control

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ABSTRACT

Artificial Intelligence (AI) technologies are increasingly transforming higher education by providing innovative tools that support students in learning, academic writing, and information processing. Despite the rapid adoption of generative AI tools such as ChatGPT, Grammarly, and QuillBot, the factors influencing undergraduate students' intention to use these tools for learning remain insufficiently understood. This study aims to examine the determinants of students' intention to use AI tools based on the Theory of Planned Behaviour (TPB). Specifically, the study investigates the influence of attitude, subjective norms, and perceived behavioural control on students' behavioural intention to adopt AI technologies in academic contexts. This study adopts a quantitative approach, where data will be collected from approximately 300 undergraduate students from Universiti Teknologi MARA (UiTM), Malaysia, using a structured questionnaire. The measurement items are adapted from established literature and assessed using a five-point Likert scale. The collected data will be analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) through SPSS and SmartPLS software. The proposed framework suggests that students who perceive AI tools as useful and beneficial are more likely to develop positive attitudes toward their use. In addition, social influences from lecturers, peers, and institutions are expected to shape students' perceptions and acceptance of AI tools. Furthermore, students' confidence in their digital skills and access to technological resources may enhance their perceived behavioural control, which in turn strengthens their intention to use AI tools. This study contributes to the growing body of knowledge on AI adoption in higher education by applying TPB in the context of generative AI tools. The findings are expected to provide practical insights for universities in developing policies, training programs, and ethical guidelines to promote responsible and effective use of AI in academic learning environments.

Keywords: Intention, Artificial Intelligent Tools, TPB, Undergraduate, Learning

INTRODUCTION

Artificial Intelligence (AI) has become increasingly integrated into higher education, offering tools that support learning, writing, and research activities (Khalifa & Albadawy, 2024). Generative AI applications such as ChatGPT, Grammarly, and QuillBot have significantly transformed how students search for information, draft assignments, and refine academic writing (Lo et al., 2025). Recent studies indicated that generative AI could enhance cognitive engagement, improve writing quality, and facilitate personalized learning support when used appropriately (Dwivedi et al., 2023; Kasneci et al., 2023). Undergraduate students frequently use AI tools to summarize academic articles, generate research ideas, clarify difficult concepts, and receive instant feedback. However, while usage is growing rapidly, the extent to which students intend to use AI tools effectively and responsibly for learning remains insufficiently understood (Crompton & Burke, 2023), particularly regarding their awareness of ethical considerations and potential biases in AI-generated content.

The Theory of Planned Behavior (TPB) developed by Icek Ajzen (1991) provides a robust theoretical framework for explaining behavioural intentions in technology adoption contexts. According to TPB, behavioural intention is influenced by three core determinants: attitude toward the behaviour, subjective norms, and perceived

behavioural control (Ajzen, 1991). In the context of AI adoption in higher education, a student who holds a positive attitude toward AI tools (e.g., perceives them as useful and beneficial), perceives supportive social norms (e.g., encouragement from lecturers, peers, or institutional policies), and feels confident in their ability to use AI tools effectively is more likely to develop a strong intention to use them consistently. Recent empirical studies applying TPB to AI and educational technology adoption confirm the significant role of these constructs in predicting students' intention to use generative AI tools (Wang et al., 2024).

Despite the widespread availability of AI technologies, some students remain hesitant to adopt them due to ethical concerns (e.g., academic integrity and plagiarism issues), lack of digital literacy, uncertainty about institutional guidelines, or limited access to reliable internet and premium AI features (Baidoo-Anu & Ansah, 2023; Cotton et al., 2023). Furthermore, emerging discussions highlight the importance of responsible AI use, transparency, and digital competence in ensuring that AI enhances rather than undermines learning outcomes. Therefore, investigating the determinants of AI usage intention among undergraduates is critical for universities seeking to develop clear governance frameworks, training programs, and pedagogical strategies that promote ethical, responsible, and effective AI integration into higher education learning environments.

LITERATURE REVIEW

Theory of Planned Behaviour

The Theory of Planned Behavior is an extension of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) that addresses the limitations of the original model in dealing with behaviors for which people have incomplete volitional control. Ajzen (1991) developed the Theory of Planned Behavior (TPB), which provides a widely used framework for predicting and explaining human behavior. The theory proposes that behavioral intention is the most immediate determinant of actual behavior. Behavioral intention is influenced by three key constructs: attitude toward the behavior, subjective norms, and perceived behavioral control. Attitude reflects an individual's evaluation of performing the behavior, subjective norms represent perceived social pressure from significant others, and perceived behavioral control refers to individuals' perception of their ability to perform the behavior. When individuals hold favorable attitudes, perceive social support, and believe they have sufficient capability to perform the behavior, their intention to do so becomes stronger.

Attitude Toward the Behaviour

Attitude toward the behavior refers to an individual's overall positive or negative evaluation of performing a specific behavior (Ajzen, 1991). According to the Theory of Planned Behavior, individuals are more likely to develop a strong behavioral intention when they perceive the behavior as beneficial and valuable. In the context of this study, attitude toward AI tools reflects undergraduates' perceptions of the usefulness and benefits of using artificial intelligence technologies for learning purposes. These tools include generative AI systems such as ChatGPT, Grammarly, QuillBot, and other AI-based educational applications that support academic activities.

Students may develop a positive attitude toward AI tools if they believe that these technologies can enhance their learning experience. For example, AI tools allow students to obtain instant explanations for complex topics, generate ideas for writing assignments, summarize lengthy academic readings, and improve language accuracy. Such functionalities enable students to perform academic tasks more efficiently and effectively.

Research indicates that students who perceive AI technologies as useful and beneficial tend to demonstrate more favorable attitudes toward using them in educational contexts (Shata & Hartley, 2025). Likewise, research regarding AI implementation in higher education indicates that favorable attitudes towards AI tools markedly enhance students' readiness to incorporate these technologies into their educational pursuits (Gong et al., 2025). Furthermore, AI technologies can support self-directed learning, allowing students to explore new concepts independently and receive personalized feedback during the learning process. When students perceive AI tools as enhancing their academic performance, their attitudes toward AI adoption become more favorable. Consequently, students who believe that AI tools can improve learning efficiency, support academic writing,

and enhance conceptual understanding are more likely to develop positive attitudes toward AI technologies, which in turn increases their intention to use AI tools for learning.

Subjective Norms

The Subjective norm refers to the perceived social pressure to perform or not perform a particular behavior (Ajzen, 1991). This construct reflects the extent to which individuals believe that important people in their social environment approve or disapprove of a specific behavior. In the context of AI adoption in higher education, subjective norms represent the social influences that shape students' decisions to use AI tools for learning. These influences may come from several sources, including lecturers, classmates, academic institutions, and broader academic communities (Muhammad Nurtanto et al., 2025).

Lecturers play an important role in shaping students' perceptions of AI technologies (Fauzi et al., 2018). When instructors encourage responsible use of AI tools for brainstorming ideas, checking grammar, or improving writing quality, students may perceive AI adoption as acceptable and beneficial within academic settings. Conversely, if lecturers emphasize academic integrity concerns or discourage AI-assisted work, students may become hesitant to use these tools (Barrett & Pack, 2023). Peers also represent an important social influence in technology adoption (Fauzi et al., 2018). Students frequently learn about new technologies through their classmates and academic networks. When peers actively recommend AI tools or share positive experiences using AI technologies for academic tasks, students may perceive these tools as widely accepted and valuable for learning (Muhammad Nurtanto et al., 2025). Institutional policies and guidelines can also influence students' perceptions of AI usage (Mustofa et al., 2025). Universities that provide clear policies regarding responsible AI usage may create an environment that supports the ethical integration of AI technologies in learning activities (Huang et al., 2022).

Previous studies on technology adoption highlight that social influence significantly affects individuals' intentions to adopt emerging technologies (Venkatesh et al., 2003). In the context of AI adoption, research indicates that students are more likely to use AI tools when they perceive positive support from lecturers, peers, and educational institutions (Fauzi et al., 2018; Mustofa et al., 2025). Prior research indicates that subjective norms significantly motivate students to use AI technology in their academic activities (Alvarez et al., 2024; Dermentzi & Papagiannidis, 2018; Ivanov et al., 2024; Fauzi et al., 2018). Therefore, when undergraduates perceive that important individuals or groups within their academic environment support the use of AI tools, their behavioral intention to adopt AI technologies for learning is likely to increase.

Perceived Behavioural Control

The Perceived behavioral control refers to individuals' perception of their ability and capacity to perform a particular behavior (Ajzen, 1991). It reflects the extent to which individuals believe they possess the necessary resources, skills, and opportunities to perform the behavior successfully. In the context of this study, perceived behavioral control refers to students' confidence in their ability to use AI tools effectively for academic purposes. This includes their belief that they have the required knowledge, technological skills, and resources to interact with AI systems successfully.

Several factors may influence students perceived behavioral control regarding AI adoption. One important factor is digital literacy, which refers to students' ability to use digital technologies effectively for learning, communication, and problem solving (Zuo et al., 2025). Students with higher levels of digital literacy are generally more comfortable experimenting with new technological tools, including AI-based learning applications (Zhang, 2025), which can enhance their learning experiences and improve their academic performance.

Another important factor is familiarity with AI tools. Students who have prior experience using AI technologies may develop greater confidence in their ability to interact with AI systems and interpret AI-generated outputs (Ayanwale et al., 2022). Familiarity with AI tools can reduce uncertainty and increase users' perceived control over the technology, which in turn can enhance their overall effectiveness in utilizing AI systems for various tasks. Access to technological infrastructure also plays a significant role (Ayanwale & Ndlovu, 2024). Students

who have reliable internet access, suitable digital devices, and supportive technological environments are more likely to perceive AI tools as accessible and manageable (Ayanwale et al., 2022). Research on technology adoption consistently demonstrates that individuals' perceived capability to use technology significantly influences their intention to adopt it (Ajzen, 1991). Similarly, studies examining AI adoption in educational settings indicate that students with higher levels of technological competence and digital literacy are more likely to integrate AI tools into their learning activities (Zuo et al., 2025). Therefore, students who feel confident in their ability to use AI tools effectively are more likely to develop stronger behavioral intentions to incorporate AI technologies into their academic learning processes.

Conceptual Model of the Study

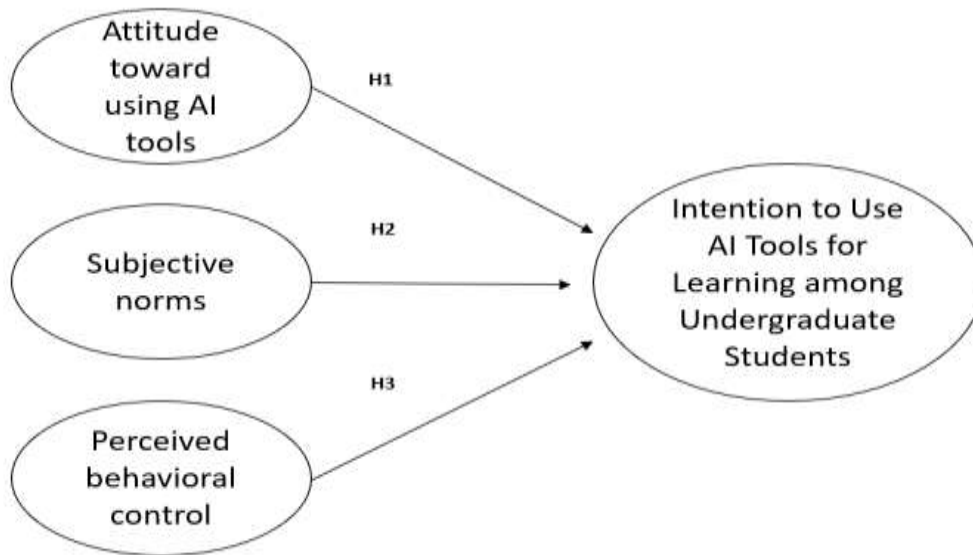


Figure 1: Proposed Conceptual Framework for Intention to Use Artificial Intelligence Tools for Learning among Undergraduate Students: A TPB Approach

This study adopts the Theory of Planned Behaviour (TPB) proposed by Ajzen (1991), which states that behavioural intention is influenced by attitude, subjective norms, and perceived behavioural control. To achieve this purpose, this study uses questions developed from previous literature and adapted by a few studies that related (Muhammad Nurtanto et al., 2025; Ayanwale et al., 2022; [Chai et al., 2021](#)). Thus, it is hypothesized that they may have a good link with TPB theory and intention to use AI tools for leaning among undergraduate students. Hence, the following hypotheses are suggested for this study:

Table 1: Hypothesis Development

Hypothesis	Hypothesis statement
H1	There is a significant positive relationship between attitude and intention to use AI tools for learning among undergraduates.
H2	There is a significant positive relationship between subjective norms and intention to use AI tools for learning among undergraduates.
H3	There is a significant positive relationship between perceived behavioural control and intention to use AI tools for learning among undergraduate students.

METHODOLOGY

The population of this study is undergraduate students from Universiti Teknologi MARA Malaysia. A sample size of approximately 300 respondents will be collected for analysis using PLS-SEM. The questionnaire is used as the main data collection tool for this study. In particular, online questionnaires using Google Form will be used in conjunction with offline methods like in-person data collection to lower method bias and boost response

rates. This strategy also ensures the value of an online email questionnaire due to its broad geographical coverage and the potential for better generalizability.

All items in the questionnaires will be developed by referring to previous literature and the five-point Likert-scale questions will be utilized. The participants must respond to the questions within 15 minutes. The obtained data will be entered into a computer for subsequent analysis utilizing SPSS. and Smart PLS. The first phase of data analysis will be performed by SPSS to obtain the descriptive statistical results, such as means, standard deviations, Cronbach's alphas and Exploratory Factor Analysis (EFA). Meanwhile, analysis of Smart PLS will be used in the second phase for structural equation modeling (SEM) purposes, where the measurement model, structural model and hypotheses will be tested.

Conclusion

The Artificial Intelligence (AI) technologies are increasingly transforming higher education by providing innovative tools that support students in learning, academic writing, and information processing. The emergence of generative AI tools has enabled students to access instant explanations, generate ideas, and improve the quality of their academic work. Despite these advantages, the extent to which undergraduates intend to adopt AI tools for learning purposes remains an important area of investigation. Understanding the behavioural factors that influence students' intention to use AI technologies is therefore essential for ensuring that these tools contribute positively to academic learning outcomes.

This conceptual paper adopts the Theory of Planned Behavior (TPB) as the theoretical framework to explain undergraduate students' intention to use AI tools for learning. According to TPB, behavioural intention is influenced by three key determinants: attitude toward the behavior, subjective norms, and perceived behavioural control. Within the context of AI adoption in higher education, students who perceive AI tools as useful and beneficial for academic tasks are more likely to develop positive attitudes toward their use. Similarly, social influences from lecturers, peers, and educational institutions may shape students' perceptions regarding the acceptability and usefulness of AI technologies in academic settings. In addition, students' confidence in their technological abilities, digital literacy, and access to technological resources may enhance their perceived behavioural control in using AI tools.

The proposed conceptual framework suggests that attitude, subjective norms, and perceived behavioural control play significant roles in shaping undergraduate students' intention to use AI tools for learning. By integrating these determinants into a structured framework, this study contributes to the expanding body of literature on technology adoption and AI integration in higher education. Furthermore, the research emphasizes the necessity of creating supportive learning environments that promote responsible and effective AI usage. Universities and educators should focus on improving students' digital literacy, providing clear guidelines on ethical AI usage, and encouraging the integration of AI-assisted learning approaches into teaching practices. Such initiatives can help ensure that AI technologies serve as valuable tools that enhance students' academic performance and learning experiences.

Suggestions For Future Research

Future research may also extend the proposed framework by incorporating additional variables that could influence AI adoption in educational contexts. For instance, factors such as AI literacy, perceived usefulness, ethical awareness, trust in AI technologies, and perceived risks may better understand students' behavioral intentions toward AI tools. Including these variables could enhance the explanatory power of the model and provide a more comprehensive understanding of AI adoption among students. In addition, comparative studies across different universities, academic disciplines, or countries could be conducted to explore how institutional environments and cultural contexts influence students' attitudes toward AI technologies. Such studies would help identify potential differences in AI adoption patterns among students in diverse educational settings. Finally, future research may also employ mixed-method approaches by combining quantitative surveys with qualitative interviews or focus group discussions. This approach could better understand students' experiences, perceptions, and ethical considerations related to AI usage in learning environments. By expanding the scope of research in

this area, future studies can contribute to the development of more effective strategies for integrating AI technologies into higher education teaching and learning practices.

Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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