

Assessing Students' Acceptance of DeepSeek AI Tools: A UTAUT Perspective

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Abstract

Artificial intelligence (AI) is rapidly changing academic methods and learning experiences in education, bringing both significant benefits and challenges. DeepSeek is one of the examples of an AI-powered learning tool that is showing potential in improving student performance and research in education by offering detailed information and comprehensive explanations. This also allows students for deeper understanding and meaningful learning. This research focus on examining the factors influencing students' acceptance to use DeepSeek AI tools based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

Keywords: Deepseek, AI, UTAUT model, student, acceptance.

1.0 Introduction

The integration of AI-powered learning tools is transforming educational landscapes, particularly in social sciences, by enhancing research capabilities, academic performance, and student engagement. DeepSeek AI has emerged as significant tools, offering specialized support for academic investigations and learning enhancement. For social science students, who often deal with qualitative analysis, extensive readings, and critical thinking, AI tools can provide automated summarization, research assistance, and data analysis. Artificial intelligence is rapidly evolving the learning environment in a way that presents both opportunities and challenges for students and teachers [3].

The previous research literature emphasizes the need to understand the student and faculty perspective to develop an overall assessment of AI's role in higher education [6]. This article shows that AI significantly influences student learning and academic development through many challenges. It is important to assess the impact of the AI tools on learners' learning in diverse educational settings in the rapidly-changing world [4]. In order to evaluate the use of the AI tools and to ensure a positive impact on the learning outcomes is very important to know how the students think and reflect about the AI tools in academic results. Learning experiences in education, particularly in technical and vocational training, are being provided by artificial intelligence approaches [5]. However, the recent emergence of DeepSeek represents a paradigm shift that warrants investigation beyond existing Western-centric tools like ChatGPT. As a non-Western AI tool, DeepSeek highlights the intersection of technology and global governance. It helps us understand if a user's decision to adopt AI is based on the tool's performance or on the political narratives and security fears they see in the news [37]. The Unified Theory of Acceptance and Use of Technology (UTAUT) model is used in this study to assess how well DeepSeek AI is being accepted in the educational environment.

1.0 Literature Review

1.1 AI powered learning tools

AI technology promotes a flexible, customized, and effective learning environment, as well as improves other educational competencies via personalized learning [7]. Students can use an AI powered learning tools in their education style. Among the many of AI tools available today, this context specifically highlights DeepSeek. AI tools such as DeepSeek and ChatGPT can help students in academic assignments, including writing, data analysis, and research evaluations. Because of DeepSeek's reliability and detailed explanations, particularly in the social sciences, students found it is so beneficial for them. And, ChatGPT is commonly selected because of its fast responses. AI has been shown in recent studies to improve academic performance and increase teacher and student engagement [9]. Tools like ChatGPT and Bard can help with questions and answers right away [10], provide automated teaching and feedback and even help with coding activities like writing and debugging code [11]. Education has changed as an impact of AI. They help students engage with the course materials more authentically while simultaneously saving time [12]. They also utilise it to make presentations easier to understand and to simplify research materials [13].

1.2 DeepSeek AI in the context of existing research

DeepSeek significantly enhances academic results in postgraduate social science programs. Based on comparative studies, students who used DeepSeek had a 25.9% increase in their post-test results, while those who used ChatGPT saw a 17.7% gain, indicating a discernible edge in academic efficacy [29]. Further, DeepSeek performed better at producing comprehensive and scientific responses suitable for social science studies, while ChatGPT excelled at conversational interaction and generating results more quickly [1]. Considering these advantages, both platforms continue to have limitations such as problems about out-dated material and improper related academic citations [29]. Beyond the social sciences, DeepSeek's influence has also been noted in pre-medical and accounting courses, where it has improved the ability of learners for critical thinking and problem-solving [2]. Additionally, recent studies highlight successful implementation relies on how these AI tools interact with the educational infrastructure, including data protection, user trust, and the requirement for continuous system enhancements, especially in developing countries [14].

1.3 Technology adoption in education

Academic research has focused a lot of study on the use of AI tools in education. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a common framework for examining these dynamics. This methodology provides an organised method for examining how students assess and use AI technologies like DeepSeek. It places a significant value on fundamental elements like social impact, performance and effort expectations, and facilitating circumstances. These factors are essential for estimating the adoption and implementation of technology.

UTAUT provides helpful guidance for teachers and developers who deal with social science students. It brings attention to the factors that promote and prevent the use of AI tools in academia, such as the need for more efficient methods of implementation. According to recent DeepSeek research, students' perceptions and interactions with the tools are significantly impacted academically. When evaluating the integration of advanced AI tools like DeepSeek among social science students, the Unified Theory of Acceptance and Use of Technology framework—which was first presented by Venkatesh [8] offers a strong theoretical basis for investigating the multiple factors that impact technology acceptance [11,15]. The value of UTAUT in higher education is generally acknowledged, especially when it comes to assessing student conduct, involvement, and adoption of new digital tools [18].

Four main constructs are described in the model. Performance expectancy (PE): the conviction that employing a particular technology would enhance performance in the workplace or in the classroom. Effort expectancy (EE): how much of use of the technology. Social impact (SI): the degree to which instructors or peers support its application. Facilitating conditions (FC): the trust that there is sufficient technical and organizational support available for efficient use of the technology.

The use of Internet of Things devices and AI-based applications [19] are just two examples of the fields in which UTAUTs have been shown. ChatGPT and DeepSeek are two AI learning tools that are updates from the initial model as well as capture the special characteristics and difficulties of generative technologies [20]. The following theories have been set out to direct the study regarding the acceptability of DeepSeek by university students:

Performance Expectancy

This performance expectancy is the extent to which students think DeepSeek would improve their academic performance [15]. According to earlier research, students' interactions with educational AI are significantly influenced by the performance expectancy variable [22].

H1: Performance expectancy positively influences students' acceptance of DeepSeek.

Effort Expectancy

Effort expectancy captures how intuitive and accessible students find the platform [30]. Research has found that the user's effort to use technology have a big impact on its adoption and utilization [23].

H2: Effort expectancy positively influences social science students' acceptance of DeepSeek.

Social Influence

Social influence signifies encouragement and support from others, promoting sustained use by Venkatesh [8]. Studies found that social influence plays a significant role in user's willingness to use certain technologies [25].

H3: Social influence positively influences students' acceptance of DeepSeek.

Facilitating Conditions

Facilitating conditions refers to how students think there is a technological and organisational framework in place to enable the usage of AI tools. It indicates the assurance that the technological and organisational infrastructure required for continuous use is in place [26]. Reliable internet connectivity, device availability, technical support, and training that help students in apply AI tools into their learning process [28].

H4: Facilitating conditions positively influence students' acceptance of DeepSeek.

1.4 Theoretical framework

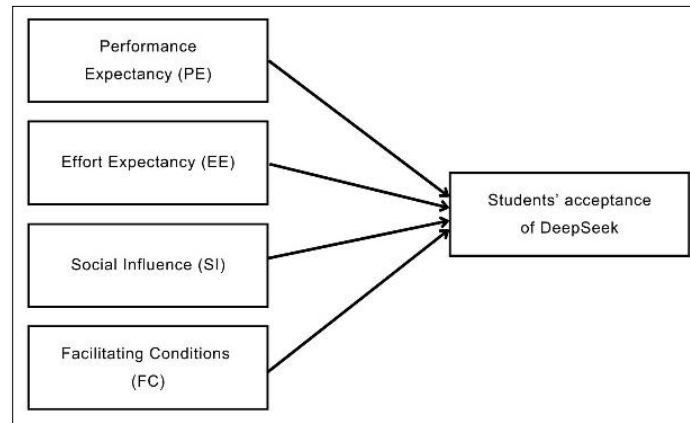


Figure 1. Theoretical framework

The theoretical framework above illustrates the students' acceptance of DeepSeek (AI) based UTAUT model of the Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC). Based on Figure 1, it is crucial for researchers to focus on the UTAUT model of students' acceptance of DeepSeek (AI) as the dependent variable.

2.0 Methodology

This study used a quantitative cross-sectional design to examine the factors influencing students' acceptance of DeepSeek AI in higher education. DeepSeek is a specialized AI tool designed to support higher education learning by offering personalized search, content recommendations, and integration with academic workflows [31][32][33][34]. Unlike general purpose AI tools such as ChatGPT, DeepSeek focuses on improving students' learning experiences and engagement. Studying how students accept DeepSeek can show how AI tools influence learning habits, the trustworthiness of information, and participation in academic activities, which are important for understanding AI use in education and its broader impact on digital learning environments [31][32][33].

The survey was distributed online using Google Forms, accompanied by a detailed explanation of the study's purpose and assurances of confidentiality to encourage honest and thoughtful participation. Respondents were given a specified timeframe to complete the survey, and the submissions were actively monitored to ensure completeness. The target population of this study consisted of undergraduate students from UiTM Melaka. A simple random sampling technique was applied, where students were randomly selected to ensure that each individual had an equal chance of being included in the study. The questionnaire was structured into 24 items across four sections. The first section is focused on demographic information, including participants' gender, faculty, and level of education. The second Section explored the UTAUT model factors and acceptance of DeepSeek (AI). Respondents rated their agreement with statements using a 5-point Likert scale, where 1 indicated "Strongly Disagree" and 5 indicated "Strongly Agree."

A total of 186 valid responses were obtained. The questionnaire was developed using four primary independent variables, which were based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model: Social Influence (SI), Performance Expectancy (PE), Effort Expectancy (EE), and Facilitating Conditions (FC). The dependent variable was the level of student acceptance of DeepSeek AI. Binary logistic regression analysis was done in order to find out how these factors correspond to students' acceptance and use of DeepSeek AI in their studies.

3.0 Results

4.1 Demographic Profile of the Respondents

TABLE 1
The demographic profile of the respondents (N=186)

Profile		Frequency, n	Percentage, %
Gender	Male	35	18.8
	Female	151	81.2
	Total	186	100
Education Level	Degree	27	14.5
	Diploma	159	85.5
	Total	186	100
Faculty	Business and Management	135	72.6
	Accounting	22	11.8
	Computer and Mathematical Sciences	2	1.1
	Academy of Contemporary Islamic Studies	7	3.8
	Hotel and Tourism Management	20	10.8
	Total	186	100
Frequency DeepSeek AI for learning in a week	1 - 2 times	69	37.1
	3 - 4 times	65	34.9
	5 - 6 times	32	17.2
	7 - 8 times	2	1.1
	More than 8 times	18	9.7
	Total	186	100

Total of 186 respondents participated in the study. The majority were female, comprising 81.2% ($n = 151$) of the sample, while male respondents made up 18.8% ($n = 35$). Most participants were diploma students (85.5%), followed by degree students (14.5%). In terms of faculty distribution, the highest number of respondents came from the Faculty of Business and Management (72.6%), followed by the Faculty of Accounting (11.8%), Faculty of Hotel and Tourism Management (10.8%), Academy of Contemporary Islamic Studies (3.8%), and the Faculty of Computer and Mathematical Sciences (1.1%).

Regarding their usage of DeepSeek AI for learning, 37.1% of respondents reported using it one to two times per week, while 34.9% used it three to four times weekly. Additionally, 17.2% of the students used the tool five to six times per week, 1.1% used it seven to eight times, and 9.7% indicated using it more than eight times in a week. This suggests that most users engaged with DeepSeek AI on a moderate basis, with a smaller group using it more intensively.

Performance Expectancy

Students generally believed that DeepSeek AI supports their understanding of difficult academic concepts, suggesting that the tool plays a helpful role in simplifying complex materials ($M = 3.52$, $SD = 1.082$). They also perceived that using DeepSeek AI improves the quality of their academic tasks, reflecting a positive view of the tool's contribution to coursework and assignments ($M = 3.59$, $SD = 0.880$). Many students agreed that the tool helps them complete their academic work more efficiently, which shows its

usefulness in managing time and workload ($M = 3.99$, $SD = 0.845$). In addition, students viewed DeepSeek AI as more beneficial than traditional learning resources, highlighting a preference for digital tools in supporting their studies ($M = 3.61$, $SD = 0.959$).

Effort Expectancy

Students generally found the interface of DeepSeek AI to be user-friendly and easy to navigate, reflecting a positive perception of its design and accessibility ($M = 3.67$, $SD = 0.898$). They also expressed confidence in locating the necessary features for their studies, indicating that the platform's functions are well-organized and accessible ($M = 3.72$, $SD = 0.928$). Most students felt that learning how to use DeepSeek AI required minimal effort, which suggests that the tool is straightforward to adopt even for new users ($M = 3.80$, $SD = 0.899$). However, some students experienced occasional confusion while using the tool, suggesting that while generally easy to use, there may still be areas for improvement in clarity or guidance ($M = 3.37$, $SD = 0.928$). Overall, these findings indicate that students perceive DeepSeek AI as relatively easy to use, which may support their willingness to engage with the platform.

Social Influence

Many students reported that their peers also use DeepSeek AI, indicating that the platform has gained a certain level of popularity among classmates and study groups ($M = 3.53$, $SD = 0.998$). There is also moderate encouragement from lecturers to explore and use AI tools like DeepSeek in a responsible manner, suggesting some institutional support for its integration in learning ($M = 3.34$, $SD = 1.008$). Students are generally more inclined to use the platform when they see others doing the same, reflecting the influence of peer behavior on personal learning habits ($M = 3.59$, $SD = 0.989$). In addition, students show a fair level of willingness to recommend DeepSeek AI to others, which suggests growing confidence in its usefulness within their academic circles ($M = 3.38$, $SD = 0.980$). These insights show that while social factors moderately support the adoption of DeepSeek AI, there is still room to strengthen its promotion through peers and educators.

Facilitating Conditions

Students expressed moderate agreement that their university provides access to AI learning tools, indicating a foundational level of institutional support for integrating such technologies ($M = 3.30$, $SD = 0.995$). Many students reported having a stable internet connection on campus, which is essential for uninterrupted use of AI platforms like DeepSeek AI ($M = 3.46$, $SD = 0.970$). There is also a fair level of peer and lecturer support when technical or usage issues arise, which contributes to a more encouraging environment for adoption ($M = 3.41$, $SD = 0.989$). Additionally, the majority of students found that AI tools like DeepSeek function well on their personal devices, with minimal technical disruptions ($M = 3.57$, $SD = 1.044$). Overall, the available support and resources seem sufficient, though there is still room for improvement, especially in terms of institutional provision of AI learning tools.

4.2 Reliability Test

In this study, the reliability of the constructs adopted from the Unified Theory of Acceptance and Use of Technology (UTAUT) was evaluated using Cronbach's alpha to assess internal consistency. The four constructs included Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC), which were designed to measure student acceptance of DeepSeek AI for learning purpose. The Cronbach's alpha reliability analysis results of $PE = 0.902$, $EE = 0.844$, $SI = 0.811$, $FC = 0.860$ indicating internal consistency of the constructs meet the minimum cut-off value of 0.70[24][27]. The reliability coefficients for each of the constructs indicated that the measurement items were both

reliable and consistent in capturing students' perception and experiences while using DeepSeek AI as part of their learning activity. According to Al-Emran [16], high reliability coefficients are essentials to ensure stability of measures in behavioural intention research, especially in studies associated with learning technologies. Therefore, after performing the reliability test, this study proceeds with binary logistic regression analysis to examine the factors influencing the acceptance of DeepSeek AI.

4.3 Binary Logistic Regression Analysis

TABLE 2

Cross Tabulation of The Predicted Response

Observed			Predicted		
			Acceptance		Percentage Correct
			1 – 2 times	More than 2 times	
Step 1	Acceptance	1 – 2 times	15	53	22.1
		More than 2 times	6	112	94.9
	Overall Percentage				68.3

The independent variables consisted of four factors which were (i) Performance Expectancy (PE), (ii) Effort Expectancy (EE), (iii) Social Influence (SI), and (iv) Facilitating Conditions (FC). Table 2 shows the cross tabulation of the predicted response categories with observed (actual) response categories. The overall classification accuracy was 68.3%, which was more than the benchmark of 25% above the proportional by chance accuracy criteria of 65.0%. Thus, it suggests that the independent variables could be categorized as modestly useful predictors in distinguishing survey respondents who use DeepSeek more than twice a week from those who use it only once or twice per week.

The dependent variable represents the frequency of using DeepSeek AI for learning per week. Students who used DeepSeek AI one to two times per week were coded as 0, while those who used it more than two times per week coded as 1. The classification was used to separate fewer active users and active users, where students who use the system more frequently are considered to have a higher level of acceptance. Recent studies in technology acceptance show that actual usage behaviour is often used as an indicator of acceptance, although it is different from behavioural intention [31].

In addition, studies on AI and educational technologies also highlight that frequent system use reflects stronger engagement and adoption behaviour among users [32]. Therefore, the cut-off point of more than two times per week was used as a practical way to identify students who are actively using and engaging with DeepSeek AI, rather than just trying it occasionally. However, this cut-off is based on practical decision and may not fully capture different levels of acceptance. Future studies are recommended to use continuous measures, such as frequency scales of behavioural intention, for a more accurate analysis.

TABLE 3

Summary of Test Statistics For Logistic Regression

Tests	Statistics
Omnibus (p-value)	11.688 (0.02)
2Loglikelihood	232.555
R-square	0.083
Hosmer and Lemeshow (p-value)	13.068 (0.110)

Table 3 shows the summary of test statistics for logistic regression. Based on the result, the statistically significant chi-square for the omnibus test of model coefficients suggests tests Statistics that collectively, the explanatory variables included in this analysis are useful predictors for distinguishing between respondents who use DeepSeek more than twice a week from those who use it only once or twice per week. The chi-square value is 11.688 with 4 degrees of freedom with corresponding significance p-value less than 0.05. This led to the conclusion that the model is significant. The value of Nagelkerke R-Square of 0.083 shows that approximately 8.35 of the variation in student acceptance is explained by the model. This indicates weak explanatory power, which is common in behavioural studies where multiple unmeasured factors affect outcomes [35][36]. The Hosmer and Lemeshow test is not significant ($p = 0.110$), suggesting the model fits the data well

TABLE 4
Variable Contribution For Logistic Regression

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1^a	Performance Expectancy	0.609	0.207	8.659	1	0.003	1.839
	Constant	-1.663	0.761	4.773	1	0.029	0.190
a. Variable(s) entered on step 1: Performance Expectancy.							

Table 4 shows the contribution of each independent variable in predicting students' use of DeepSeek AI more than twice per week. Only Performance Expectancy (PE) significantly predicted usage ($B = 0.609$, $p = 0.003$, $\text{Exp}(B) = 1.839$). This indicates that students who score one higher in Performance Expectancy are 1.839 times more likely to use DeepSeek more than twice per week. Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) were not statistically significant, suggesting that these factors do not strongly influence usage among the respondents in this study.

The final model regression model can be expressed as:

$$\left[\frac{\pi_t}{(1 - \pi_t)} \right] = \beta_0 + \beta_1 X_1$$

$$\left[\frac{\pi_t}{(1 - \pi_t)} \right] = -0.1663 + 0.609X_1$$

Where,
 $\pi_t = P(\pi(y) = 1)$ = Probability of acceptance
 β_0 = Intercept
 β_1 = Coefficient of Performance Expectancy
 X_1 = Factor of Performance Expectancy

(B) for the Performance Expectancy is 1.839. The model indicates that for every one unit increase in the performance expectancy, the odds of respondents using DeepSeek more than twice a week increases by 18.39%.

4.0 Discussions

Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) are the four UTAUT constructs that were studied in this study. The only significant predictor of students' acceptance of DeepSeek AI was Performance Expectancy. It means that when students believe DeepSeek will improve their academic performance, they are more likely to accept and utilise it. With a coefficient of chance of 1.839 and a significant positive relationship ($p = 0.003$), the logistic regression result indicated that the student using DeepSeek more than twice a week increased by almost 84% for every unit increase in performance expectancy. This strengthens the basic principle of the UTAUT model, which states that performance improvements are a key factor in the adoption of new technologies.

The remaining factors which are Effort Expectancy, Social Influence, and Facilitating Conditions was not significantly impacted on students' usage patterns. Despite considering that the website was generally user-friendly and socially acceptable, students did not use it more regularly. According to this, students are encouraged to consistently use AI tools like DeepSeek by the academic benefits, even though peer pressure and ease of use provide an enjoyable environment. Additionally, the demographic profile indicate strong acceptance among Faculty of Business and Management students about specific demands are impacting acceptance patterns. These results are in accordance with earlier studies showing that perceived usefulness usually overcomes other motivational variables when it comes to determining the use of educational tools.

5.0 Conclusion

This study examines students' acceptance of DeepSeek AI at UiTM Melaka using the UTAUT framework, contributing to the expanding database of research on artificial intelligence in education. The findings indicate that students' intention to use the tool is mainly determined by Performance Expectancy. It is showing the significance of proving the technology in academic is usefulness in order to encourage acceptance.

Although they were considered positively, other factors including institutional support and usability did not significantly predict frequent usage behaviour. These findings suggest that measurable improvements in task efficiency and academic achievement are required for solutions that use AI like DeepSeek to achieve broad acceptance.

This indicates that when introducing an AI platform into learning environments, educators and institutions must highlight the platforms' clearly about the benefits for education. This study could be expanded in the future by examining educator influence, comparing various AI tools from various fields, or including qualitative findings. Designing effective and significant digital learning environments needs knowledge of how and why students use these tools as AI continues to affect today's education.

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