Kashihara, A. et al. (Eds.) (2024). Proceedings of the 32nd International Conference on Computers in Education. Asia-Pacific Society for Computers in Education

Factors Influencing ChatGPT Use Behaviour Among Trainee Teachers

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Abstract: The integration of ChatGPT in educational settings has the potential to enhance teaching and learning experiences. This study explores the factors influencing the use behaviour of ChatGPT among trainee teachers at Universiti Putra Malaysia (UPM). Drawing on established Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) models, and risk perception theory, the research focuses on perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence, attitude, and use behaviour for learning purposes. A total of 224 trainee teachers were selected using simple random sampling. The findings highlight that perceived usefulness, social influence, and attitude significantly influence the use behaviour of ChatGPT among trainee teachers. Additionally, the study reveals no significant effect of perceived ease of use, perceived risk, and anxiety on ChatGPT use behaviour among trainee teachers. The result showed that all factors contributed 50% ($R^2 = 0.50$) in impacting ChatGPT use behaviour among trainee teachers. These insights provide valuable guidance for educators and policymakers aiming to integrate ChatGPT into teacher training programs, emphasizing the need to create supportive environments that minimize anxiety and perceived risks while promoting the benefits and ease of use of ChatGPT.

Keywords: ChatGPT, artificial intelligence, AI, chatbots

1. Introduction

One of the most important ways to prepare trainee teachers for the challenges of contemporary classrooms is to include technology into teacher preparation programs (Wong et al., 2003; Saadati et al., 2014). Artificial intelligence is one of the many technologies that may be utilised in teaching and learning, and it has become increasingly popular. Artificial intelligence, commonly known as AI, has rapidly advanced over the past decade, significantly impacting various sectors, including education, industry, health, economy, and transportation (Wang et al., 2023). The integration of AI in educational settings is transforming traditional teaching and learning methods, offering personalized learning experiences and innovative solutions. AI systems, while not possessing human intelligence, can enhance the efficiency of educational tasks and improve learning outcomes (Dwivedi et al., 2020). AI has become an essential education component, offering benefits such as personalized learning experiences and enhanced student engagement (Puspitaningsih et al., 2022). AI applications in education include personal tutors, collaborative learning environments, and virtual reality tools, all aimed at enhancing the learning experience (Ahmad et al., 2020).

Among these AI applications, ChatGPT, an AI-powered chatbot using OpenAI's GPT-4.0 architecture, has gained significant attention in educational settings. ChatGPT communicates with users in natural language, completes specific tasks, and mimics human-to-human interactions (Deng et al., 2023). Its ability to engage in human-like conversations offers personalized support and guidance to educators and learners (Fergus et al., 2023). Despite its potential benefits, the integration of ChatGPT in education also raises concerns. There are ethical considerations and challenges, such as ensuring fairness, preventing academic dishonesty, and addressing biases and privacy concerns (De Castro, 2023). Educators, students, and trainee teachers need to adapt to the changing educational landscape and understand the capabilities and limitations of AI (Celik et al., 2022).

The rapid advancement of artificial intelligence (AI) and its integration into various sectors, particularly education, present both opportunities and challenges. ChatGPT, a prominent AI application developed by OpenAI, has demonstrated significant potential in enhancing educational practices through personalized learning experiences, automation of tasks, and support in curriculum development (Lund & Wang, 2023). However, the recent introduction of ChatGPT in 2022 means that academic studies examining its application in education, especially among trainee teachers, remain limited (Deng & Lin, 2023).

Trainee teachers, as future educators, represent a critical demographic whose perceptions and experiences with ChatGPT can profoundly impact its integration into teaching and learning practices (Celik et al., 2022). Despite their pivotal role, there is a noticeable gap in the literature regarding the factors influencing ChatGPT use behaviour among trainee teachers. Existing research primarily focuses on general educational technologies without addressing the unique needs, challenges, and attitudes towards ChatGPT (Deng & Yu, 2023). Moreover, psychological factors such as perceived risk, anxiety, and social influence remain underexplored, although these factors are known to significantly impact technology adoption (Venkatesh et al., 2003; Dwivedi et al., 2020).

This study aims to address this gap by comprehensively exploring the perceived usefulness, perceived ease of use, attitude, social influence, perceived risk, and anxiety influencing ChatGPT use behaviour among trainee teachers. Understanding these factors is crucial for harnessing the full potential of AI in education and effectively integrating ChatGPT into educational practices. By bridging this gap, the study contributes valuable insights necessary for maximizing the potential of ChatGPT in enhancing the quality, efficiency, and effectiveness of teaching and learning. Ultimately, this research aims to inform teacher education programs and curriculum development efforts, ensuring that the integration of ChatGPT supports trainee teachers and enhances teaching and learning experiences.

2. Literature Review

Chatbots, AI-powered conversational agents, are increasingly recognized in education for their potential to enhance learning, provide instant feedback, and engage students (Chen et al., 2020; Ahmad et al., 2020). These systems utilize natural language processing (NLP) to interact with users, offering personalized assistance and reducing teachers' workload by automating tasks (Ahmad et al., 2020). Factors influencing their adoption include perceived usefulness, ease of use, and organizational support (Isiyaku et al., 2018; Tlili et al., 2023).

AI-enabled chatbots like ChatGPT are applied in educational settings to enhance learning experiences through personalized assistance and collaborative learning (Adetayo, 2023; Kuhail et al., 2022). Studies explore factors influencing students' attitudes and intentions towards learning AI, including knowledge levels, anxiety, and social norms (Chai et al., 2020). They also highlight AI's potential in language learning, motivation enhancement, and the development of cognitive learning strategies among students (Chen et al., 2020; Al-Abdullatif et al., 2023).

The Technology Acceptance Model (TAM), introduced by Davis in 1989, provides a foundational framework for understanding users' acceptance and utilisation of technology. Within the context of ChatGPT use behaviour, TAM highlights perceived usefulness, perceived ease of use, and attitude as pivotal factors influencing utilisation decisions. Perceived usefulness, as defined by Davis (1989), pertains to the user's belief that employing a technology will enhance their job performance or task completion. Studies by Chen (2020) and Kwak et al. (2019) affirm that perceived usefulness significantly impacts users' intentions to adopt innovative technologies like ChatGPT.

Perceived ease of use, another core construct of TAM, refers to the user's perception of the effort required to use the technology. Venkatesh et al. (2016) demonstrate that perceived ease of use is crucial for users' acceptance of new technologies, including AI-driven systems like ChatGPT. Attitude, as conceptualized in TAM, represents the user's overall evaluation or favourability towards using the technology. Research by Hsiao (2021) and Chen

et al. (2018) indicates that users' attitudes significantly affect their utilisation decisions, highlighting the importance of considering attitude in the context of technology use behaviour.

The Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh et al. (2003), offers a comprehensive understanding of technology use behaviour by incorporating constructs such as social influence and use behaviour. Social influence refers to the impact of external factors like peers, mentors, and societal norms on users' acceptance and utilisation of technology. Venkatesh et al. (2016) underscores the significant role of social influence in shaping users' intentions to adopt and use new technologies. Use behaviour, another key construct of UTAUT, encompasses the user's actual usage of the technology following their intention to use it. Studies by Liu et al. (2017) and Wu et al. (2018) demonstrate that use behaviour is influenced by factors like perceived usefulness, perceived ease of use, and social influence, indicating the integration of these constructs in shaping technology use behaviour.

Risk Perception Theory posits that individuals' perceptions of risk significantly influence their decision-making and behaviour. In the context of technology utilisation, individuals assess the perceived risks associated with using a new technology, which can impact their acceptance and usage behaviour. Anxiety refers to individuals' feelings of unease or apprehension when faced with uncertain or potentially threatening situations. In the context of ChatGPT use behaviour, anxiety may stem from concerns about the technology's reliability, privacy implications, or potential impact on traditional teaching methods. Research by Tsai and Lin (2020) reveals that anxiety can negatively affect users' perceptions of new technologies. Therefore, understanding trainee teachers' anxiety towards ChatGPT is crucial for mitigating barriers in their educational practices.

Perceived risk encompasses individuals' subjective evaluations of the potential negative consequences associated with using a technology. Literature by Tsai and Lin (2020) suggests that perceived risk significantly influences users' technology decisions. In the context of ChatGPT, perceived risks such as privacy concerns regarding student data, the accuracy of generated responses, and potential biases in content may shape trainee teachers' perceptions and attitudes towards its use. Addressing these perceived risks is essential for fostering trust and confidence among users, thereby promoting effective utilisation of ChatGPT in educational settings.

The present study intends to investigate factors influencing ChatGPT use behaviour for learning purposes among trainee teachers. The conceptual framework outlining the relationships between independent variables (perceived usefulness, perceived ease of use, perceived risk, attitude, social influence, and anxiety) and the dependent variable (ChatGPT use behaviour) was developed as depicted in Figure 1.

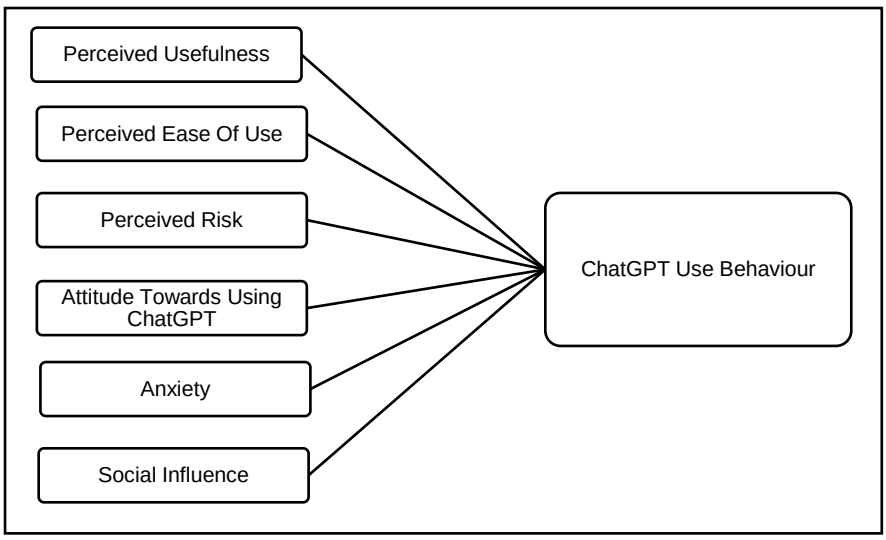

Figure 1. The conceptual framework

3. Research Design

This study employs cross-sectional study to identify factors that impact the use behaviour of ChatGPT among trainee teachers. To achieve this goal, the most suitable analysis is multiple linear regression. In this study, the researcher aims to assess the extent of the relationship or make predictions about specific outcomes by analysing the correlation coefficient between two or more variables (Fraenkel, Wallen & Hyun, 2012, pp. 331-332).

This research used a set of questionnaires to obtain data from the selected sample. The language used in the questionnaire is English, with a translation into Malay to facilitate better understanding for local students. The questionnaire was evaluated by three (3) experts in the field of educational technology to ensure its accuracy and validity. Surveys with questionnaire in education is efficient, time-saving, and cost-effective due to its ability to explore all problems and issues (Creswell, 2017). The survey questionnaire was used to determine the factors influencing ChatGPT use behaviour among trainee teachers. Seven aspects were measured: perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence, attitude, and ChatGPT use behaviour among trainee teachers. In addition, one open-ended survey question was included to obtain students' opinions on the use of ChatGPT in learning.

The research population for this study consists of UPM student trainee teachers who are currently engaged in pedagogical training and coursework to pursue a career in education. This population excludes individuals from outside UPM and those from other faculties or unrelated fields, such as Human Resource Development.

A simple random sampling technique was used for this study. After identifying the population of UPM trainee teachers, the researcher calculated the sample size needed to represent it. Out of the 311 trainee teachers in the population, the researcher used Cochran's (1977) formula for continuous data to determine the minimum sample size required, which was calculated to be 172. To ensure a sufficient sample size, the researcher increased this number by 30 percent, resulting in a total of 224. Using SPSS's random number generator, 224 individuals were randomly selected from the list to ensure each had an equal chance of being included in the sample.

A pilot study was conducted to assess the instrument's reliability and validity. 32 trainee teachers were involved in the pilot study. The reliability of the instrument was measured using Cronbach's Alpha, with values between 0.80 and 0.92, indicating that all items of the research instrument are suitable for use in this study. The data was collected using a link to a Google Form. Approval was obtained from the university's ethics committee to collect data from the trainee teachers.

The data analysis process involved using SPSS to perform both descriptive and inferential analyses. Descriptive analysis was used to report the respondents' personal information (i.e., education programmes), while inferential analysis was used to identify the relationships between the independent variables (perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence, attitude) and the dependent variable (ChatGPT use behaviour). Normal probability plots and boxplots were used to assess the data's normality and identify any outliers. Prior to analysis, the data were checked and confirmed to be normally distributed, with no outliers identified.

4. Finding and Discussion

This study involved 224 trainee teachers from various educational programs. Table 1 presents data on the educational programmes of the study participants. The most prevalent programmes are the Bachelor of Education in Malay Language with Honours, comprising 21.9%, and the Bachelor of Education in Home Science with Honours, comprising 19.6%.

Table 1. *Programme Name*

Demographic information		Frequency	Percentage
Programme name	Bachelor of Education in Malay Language with Honours	49	21.9
	Bachelor of Education in Home Science with Honours	44	19.6
	Bachelor of Education in Guidance and Counselling with Honours	40	17.9
	Bachelor of Education in Teaching English as A Second Language with Honours	36	16.1
	Bachelor of Science in Chemistry with Education (Honours)	18	8.0
	Bachelor of Science in Physics with Education (Honours)	15	6.7
	Bachelor of Science in Statistics with Education (Honours)	1	0.4

Before proceeding with the inferential analysis, multicollinearity was evaluated. Table 2 presents metrics for evaluating multicollinearity, namely tolerance and VIF (Variance Inflation Factor), as discussed by Pallant (2007). Tolerance, which measures the extent to which the variability of a particular independent variable is not accounted for by other independent variables in the model (Pallant, 2007), ranges from 0.27 to 0.62 in this study. These values exceed the minimum threshold of 0.20, indicating no significant multicollinearity. Similarly, the VIF values range from 1.63 to 3.74, all below the established threshold of 5. According to Hair et al. (2010), vigilance regarding multicollinearity is warranted when the VIF surpasses 5, and tolerance falls below 0.20. Thus, based on these findings, multicollinearity is not a concern in the present study.

Table 2. *Multicollinearity analysis of perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence and attitude among trainee teachers*

Variables	Collinearity Statistics	
	Tolerance	VIF
Perceived usefulness	0.42	2.38
Perceived ease of use	0.47	2.14
Perceived risk	0.60	1.66
Anxiety	0.62	1.63
Social influence	0.27	3.70
Attitude towards using ChatGPT	0.27	3.74

Table 3 summarizes multiple regression analyses of impact of perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence and attitude on ChatGPT use behaviour among trainee teachers. The result showed that a combination of all factors contributed 50% (R^2 = 0.50) in impacting ChatGPT use behaviour among trainee teachers.

Table 3. *Model Summary*

Model	R	R Square (R^2)	Adjusted R Square	Std. Error of the Estimate
1	0.71	0.50	0.48	0.63

The provided ANOVA table outlines the findings of a multiple linear regression analysis aimed at predicting ChatGPT use behaviour among trainee teachers. The regression section shows that the model, which includes predictors such as perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence, and attitude, significantly accounts for the variability in the dependent variable. The F-statistic of 35.64, with a corresponding p-value of 0.00, highlights the statistical significance of the model as a whole. Overall, the ANOVA results demonstrate that the regression model is highly effective in identifying and understanding the factors that predict ChatGPT use behaviour among trainee teachers.

Table 3. *ANOVA*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83.64	6	13.94	35.64	0.00
	Residual	84.83	217	0.39		
	Total	168.46	223			

Table 4 provides a summary of multiple regression analysis examining the impact of perceived usefulness, perceived ease of use, perceived risk, anxiety, social influence and attitude on ChatGPT use behaviour among trainee teachers. The table includes the unstandardized regression coefficients (B), standardized beta coefficients (β), t-values, and associated p-values for each predictor variable.

Table 4. *Summary of multiple regression analysis*

Variable	Unstandardized B	Standardized Beta	*t*	*p*
Perceived usefulness	0.24	0.20	2.65	0.01
Perceived ease of use	0.02	0.01	0.16	0.87
Perceived risk	0.07	0.06	1.01	0.31
Anxiety	0.05	0.04	0.65	0.52
Social influence	0.29	0.28	2.99	0.00
Attitude towards using ChatGPT	0.38	0.26	2.80	0.01

The findings of this study indicate that perceived usefulness, social influence, and attitude towards using ChatGPT emerge as significant predictors of ChatGPT use behaviour among trainee teachers, while perceived ease of use, perceived risk, and anxiety do not exhibit significant impacts in this analysis. These findings provide valuable insights into the factors influencing ChatGPT use behaviour within educational contexts.

Trainee teachers are more likely to use ChatGPT when they perceive it enhances learning performance and learning efficiency, a perception that aligns with Technology Acceptance Model (TAM) (Shao, 2019; Cukurova et al., 2019). A positive attitude encourages trainee teachers to integrate ChatGPT into educational tasks (Mahat et al, 2012; Tlili et al., 2023; Widiar et al., 2023). Moreover, peer recommendations and societal perceptions significantly influence ChatGPT use behavior, as positive social validation play crucial roles (Tlili et al., 2023; Crawford et al., 2023).

However, concerns about accuracy, ethical use, and risk issues do not negatively influence ChatGPT use among trainee teachers (Lund & Wang, 2023; Sebastian, 2023). At the same time, the ease of use does not appear to be a crucial factor for ChatGPT use behaviour, which contrasts with findings from past studies. This divergence from previous research suggests that while ease of use has been emphasized as a key determinant in the adoption of technology in some studies, it may not be as influential in the context of ChatGPT usage among trainee teachers.

"*I think ChatGPT is great for people who need explanations in simple words. Sometimes, when we do not understand a certain topic, ChatGPT has the ability to explain it to us in simpler terms, which makes it easier to understand. However, in some cases, it also provides information that is not entirely credible or accurate*."

Student A

"*It's a good platform to learn something new and to help with assignments. However, relying too much on it may affect our thinking skills, and this platform is not completely reliable. Therefore, it's a good alternative for finding information but should not be used as a primary resource*."

Student B

To complement the quantitative data collected from the survey, an open-ended questionnaire was used. Student A emphasized ChatGPT ability to simplify complex topics which is highlighting its perceived usefulness. Similarly, Student B acknowledged the ChatGPT's role in facilitating learning and supporting assignment completion. Both responses reflect positive attitudes towards the use of ChatGPT. The qualitative responses from students align with the quantitative findings, indicating that perceived usefulness and attitude towards using ChatGPT significantly predict use behaviour, as outlined in both the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT).

In addition, both Student A and Student B express concerns about ChatGPT's reliability. However, these concerns do not deter them from using the platform. The finding could contribute to the literature by highlighting that perceived risk does not necessarily negatively impact the adoption and continued use of educational technologies. Nevertheless, the findings further support the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) by demonstrating that perceived usefulness, attitudes, and social influence are influential in determining ChatGPT use behaviour.

The study's findings are essential despite several limitations. The cross-sectional design restricts establishing causal relationships between variables, suggesting a need for longitudinal studies to explore the evolution of these factors over time in relation to ChatGPT utilisation among trainee teachers. Furthermore, reliance on self-report measures for anxiety and ChatGPT usage may introduce biases like social desirability and recall bias. Exploring moderating variables like prior technology experience and institutional support could deepen understanding of how these factors interact in educational settings.

These findings have practical implications for educators and policymakers aiming to foster effective technology integration in education. Recognizing and addressing trainee teachers' perceptions of usefulness and attitudes toward ChatGPT could enhance acceptance and utilisation. Targeted interventions, professional development programs, and support mechanisms could alleviate concerns about ethical use, risks, and anxiety, promoting a more favourable environment for ChatGPT adoption. Future research should delve deeper into these dynamics, exploring specific types of anxiety and their impacts on learning outcomes to inform tailored interventions and strategies for sustainable technology integration in educational practices.

4. Conclusion

This study highlights the significant relationship between various factors and ChatGPT use behaviour among trainee teachers. The findings revealed that perceived usefulness, social influence, and attitude towards using ChatGPT influence trainee teachers' use behaviours. However, perceived ease of use, perceived risk, and anxiety do not have a significant effect on ChatGPT use behaviour.

Future research should employ longitudinal designs and objective measures to better understand anxiety and ChatGPT use behaviour. Despite these limitations, the study provides valuable insights for research and practice. Educators and policymakers should address the role of anxiety in shaping teachers' use behaviours and implement targeted interventions to alleviate it. Additionally, fostering a positive organizational culture that values innovation and experimentation is crucial for reducing anxieties and promoting the effective integration of ChatGPT into academic tasks.

Overall, this study enhances our understanding of the complex interplay between various factors and ChatGPT use behaviour in educational settings. By addressing anxiety and other barriers, trainee teachers can leverage the transformative potential of ChatGPT to improve their learning experiences and educational outcomes.

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