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Factors Influencing High School Students' Attitudes Towards Using ChatGPT In Mathematics Learning: A Case Of Vietnam

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ABSTRACT: The proliferation of artificial intelligence tools, most notably ChatGPT, has driven fundamental shifts in pedagogical approaches and methodologies within general education. In the context of contemporary digital transformation in education, this study explores the factors influencing high school students' attitudes toward utilizing ChatGPT in mathematics learning. Quantitative data were gathered from 389 valid survey responses from high school students in Hanoi and several other provinces, including Lao Cai and Phu Tho. Drawing upon the theoretical framework of Unified Theory of Acceptance and Use of Technology, the empirical analysis indicates that Performance Expectancy, Effort Expectancy, and Social Influence exert statistically significant positive impacts on students' attitudes toward ChatGPT usage; conversely, technology anxiety exhibits a negative impact. These findings initially provide a scientific foundation to support educational institutions in formulating effective strategies to integrate digital tools like ChatGPT into the curriculum, thereby enhancing digital technology application capabilities across the education sector.

1. INTRODUCTION

The rapid expansion of Artificial Intelligence (AI), particularly large language models like ChatGPT, is catalyzing fundamental shifts across all sectors of society, with education experiencing some of the most profound impacts,. Contemporary digital transformation has transcended mere document digitization or online instruction, evolving toward the personalization of learning trajectories through intelligent AI-driven tools,. Consequently, examining the integration of AI into educational contexts is an essential necessity of modern pedagogy rather than a passing trend.

Global scholarly interest in ChatGPT's applications reveals its significant capacity to reshape instructional methodologies by facilitating personalized learning and interactive environments (Grassini, 2023). Evidence suggests that ChatGPT can improve academic achievement by offering learners a broad spectrum of foundational knowledge (Wardat et al., 2023). Conversely, emerging research highlights critical risks. Almarashdi et al. (2024) found that students dependent on ChatGPT for learning tasks achieved lower results than those guided by teachers. Technical limitations, such as restricted proficiency in content areas like spatial geometry, also hinder effective learner interaction,. Additionally, Pepin et al. (2025) caution that current AI models fail to activate metacognitive functions and often neglect vital planning phases during the problem-solving process.

Recent scholarship in Vietnam has increasingly examined ChatGPT integration within the general education curriculum and the empirical realities of student engagement. Beyond the documented advantages, a lack of AI proficiency and an over-reliance on perceived convenience present significant pedagogical impediments (Trần Văn Hưng & Đinh Thị Mỹ Hạnh, 2024). These factors often result in deficiencies in information-seeking and evaluation skills, fostering technological dependency and eroding independent reasoning. Consequently, this research pursues the following objectives:

1. Identify the determinants influencing the Behavioral Intention and attitudes of high school students in Hanoi toward ChatGPT usage.

2. Analyze the current state of student attitudes toward AI adoption within this demographic.

3. Develop a structural model to represent the relationships between these variables, providing evidence-based recommendations for appropriate ChatGPT engagement.

2. LITERATURE REVIEW

2.1. ChatGPT

Morandín-Ahuerma (2022) characterizes Artificial Intelligence as the capacity of computational systems to simulate human cognitive functions, specifically logical reasoning, learning, and autonomous problem-solving. These human-engineered instruments mirror human intelligence to enhance operational efficacy within both educational and professional spheres. Within this landscape, ChatGPT represents a sophisticated conversational generative AI model that utilizes deep learning and natural language processing to generate human-like interactions (Wolfram, 2023).

Beyond its utility in virtual assistance, ChatGPT is identified as a proficient tool for supporting mathematics education (Pepin et al., 2025). Its pedagogical value lies in its ability to heighten learner engagement, deliver personalized feedback, and facilitate self-regulated study alongside critical reasoning. By simulating the interactive functions of an Intelligent Tutoring System (ITS), the technology establishes Socratic environments that allow students to navigate complex mathematical constructs with greater precision.

From the perspective of the UTAUT framework, these perceived advantages—such as personalized support and enhanced understanding—are direct determinants of Performance Expectancy, as learners believe the system will assist them in achieving significant gains in their mathematical proficiency. Additionally, the interactive nature of such AI-driven environments may influence Behavioral Intention by reducing the perceived effort required to overcome cognitive "blockages" during the mathematical modelling process.

2.2. Attitude toward using ChatGPT (ATU)

Doty and Lipien (2024) investigated student ChatGPT usage frequency, attitudes toward the platform, and learner interest in obtaining instructor-led guidance for Generative AI applications. A majority of participants (54%) reported having never utilized AI for academic purposes. Interestingly, only a marginal 3% of respondents indicated that they employ AI nearly always or consistently for their coursework. The research also evaluated the integration of tools such as ChatGPT across different academic disciplines; 11% of students utilized ChatGPT for subjects beyond the core areas of Mathematics, Science, English, or History. Notably, Mathematics was identified as the core subject where ChatGPT usage was most prevalent, with 37% of students reporting adoption for this discipline.

Additional evidence concerning high school students' attitudes toward ChatGPT as an instructional resource reveals a generally positive reception. This is particularly evident in the behavioral dimension, which demonstrates a high degree of readiness for academic integration and a strong Behavioral Intention to adopt the technology (Francisco et al., 2025).

2.3. Performance Expectancy (PE)

Li and Zeng (2025) demonstrate that Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions significantly determine the Behavioral Intention and actual usage patterns of ChatGPT across diverse educational landscapes. Learners exhibit a higher propensity for adoption when they perceive the platform as a valuable resource for facilitating academic objectives.

From a broader evaluative perspective, empirical research indicates that ChatGPT contributes to improved academic outcomes, enhanced affective-motivational states, and the stimulation of higher-order cognitive processes, while effectively reducing learners' cognitive load (Contel et al., 2025).

H1: PE exerts a statistically significant and positive influence on ATU

2.4. Effort Expectancy (EE)

Effort Expectancy serves as a fundamental determinant of students' Behavioral Intention and their overall readiness to adopt ChatGPT (Feng et al., 2025). Within the UTAUT framework, Saputra et al. (2025) characterize this construct as the user's perception regarding the relative ease (or difficulty) associated with the operation of a system. Evidence suggests that individuals demonstrate a higher propensity for acceptance when a technology is perceived as intuitive, necessitating marginal effort for initial mastery. Alshammari et al. (2026) posit that ChatGPT's conversational interface effectively mitigates access barriers, fostering streamlined interaction and integration within the academic environment.

H2: EE significantly and positively affects ATU

2.5. Social Influence (SI)

Social Influence is defined as the degree to which an individual perceives that significant referent such as peers, instructors, and institutional figures, believe they should adopt a new technology (Venkatesh et al., 2003), specifically ChatGPT within the scope of this investigation. Almogren et al. (2024) explored the determinants of ChatGPT acceptance within higher education

through the lens of smart education, identifying social influence as a primary factor shaping student attitudes and usage behaviors. Their study underscores that peer recommendations, social media presence, and broader cultural dynamics collectively steer students' decisions to integrate AI-driven tools into their academic workflows.

H3: SI has a positive effect on ATU

2.6. Anxiety (ANX)

Technological anxiety, function as a critical determinant that impedes the behavioral intention of both educators and students regarding ChatGPT adoption within instructional environments. Academic frameworks define these barriers as the apprehension or fear users experience when interacting with unfamiliar or novel technologies (Simonson et al., 1987). This concept is theoretically rooted in the understanding of anxiety as an affective response that negatively influences an individual's propensity to participate in specific technology-mediated behaviors (Alanzi et al. 2025).

H4. ANX exerts a negative effect on ATU

3. METHOD

The research sample comprised 389 high school students from Hanoi, Lao Cai, and Phu Tho, recruited during the second semester of the 2025–2026 academic year through a random selection process via Google Forms. Participation spanned more than 30 secondary institutions, encompassing both specialized gifted schools, such as Nguyen Tat Thanh Gifted High School (Lao Cai), and non-specialized schools like My Duc A High School. This cohort represents a demographic of learners who have utilized ChatGPT for mathematical problem-solving tasks, are detailed in the table 1.

Table 1. Description of the research sample

Characteristics		**Frequency**	**Percentage**
Gender	Male	169	43,4%
	Female	220	56,6%
Grade	10	168	43,2%
	11	74	19%
	12	147	37,8%

Of the 389 students surveyed, 168 were in Grade 10 (43.2%), 74 were in Grade 11 (19.0%), and 147 were in Grade 12 (37.8%). Data collection relied on a survey instrument developed via Google Forms, which was structured into two primary sections.

The first section gathered demographic profiles, including gender, current grade level, and the specific high school the participants attended. In the second section, the instrument assessed ATU and the determinants influencing it within the context of mathematics learning, grounded in the UTAUT framework established by Venkatesh et al. (2003).

Measurement utilized a five-point Likert-type scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Resulting quantitative data were categorized into four interpretive thresholds: low-average (1.0–2.6), fair (2.6–3.4), high (3.4–4.2), and very high (4.2-5.0).

4. RESULTS AND DISCUSSION

The present study examines students' Attitude Toward Using ChatGPT within the context of mathematics education. The resulting data are detailed in the table 2:

Table 2. Student Perceptions of ATU in Mathematics learning

ATU	**Mean**	**St. Deviation**
ATU1. I frequently use ChatGPT to solve Math problems	2.75	1.081
ATU2. frequently use ChatGPT to explain and reinforce mathematical concepts	2.98	1.170

ATU3. I frequently use ChatGPT to review and prepare for Mathematics exams	2.85	1.145
ATU4. I use ChatGPT as a useful supporting tool in solving mathematics-related problems	3.13	1.205
ATU5. I frequently use ChatGPT to find solutions for Math exercises when I do not know how to solve them	3.16	1.178
ATU6. I frequently use ChatGPT to check answers and compare results of Math exercises	3.02	1.220
ATU7. I frequently use ChatGPT to summarize mathematical knowledge	2.80	1.205
ATU8. I frequently use ChatGPT to solve Algebra-specific exercises	2.86	1.124
ATU9. I frequently use ChatGPT to solve Geometry-specific exercises.	2.70	1.117
ATU10. I frequently use ChatGPT to solve Statistics and Probability-specific exercises	2.79	1.136
ATU11. I frequently use ChatGPT to solve Calculus-specific exercises	2.77	1.125
Total	**2.892**	**1.155**

The results indicate that the current level of student engagement with ChatGPT remains within a fair interpretive threshold, with mean scores ranging between 2.6 and 3.4. This suggests that while secondary school students utilize ChatGPT with relative frequency, the tool has not yet evolved into a consistently effective aid for mathematics education. Disaggregating the data by specific tasks reveals that employing the platform to solve exercises when the solution path is unknown (3.16) or to address general mathematical problems (3.13) received the highest levels of agreement. These findings imply that ChatGPT is primarily utilized as a reactive resource when students encounter learning obstacles or require targeted information retrieval.

Other activities, including answer verification (3.02) and conceptual reinforcement (2.98), were practiced to a moderate degree. Conversely, tasks such as knowledge synthesis (M = 2.80) or exam preparation (M = 2.85) showed lower usage tendencies. Such data reinforce the observation that the majority of secondary school students have yet to leverage the tool's full potential for academic mastery or technological integration. Regarding subject-specific application—spanning Algebra, Geometry, Calculus, and Statistics—mean scores consistently fell within the fair range when students sought support for difficult topics. Notably, algebraic inquiries were the most prevalent, whereas geometry-related interactions were the least frequent; this reflects established limitations in ChatGPT's capacity to address spatial and geometric problems effectively.

Standard deviations for the observed variables ranged from 1.081 to 1.220, highlighting distinct variations in usage patterns and frequencies among the surveyed population. These disparities likely stem from individual differences in technical proficiency, platform familiarity, or personal study habits. Overall, the evidence suggests that ChatGPT currently functions as an ad hoc support mechanism rather than a systematically integrated pedagogical medium. Nevertheless, given that adoption levels currently sit at a fair threshold, the technology demonstrates significant potential to enhance mathematics learning if utilized with more effective strategic guidance and systematic orientation

Table 3. Student Perceptions of PE in Mathematics learning

PE	**Mean**	**St. Deviation**
PE1. ChatGPT provides fast and easy-to-understand solutions	2.96	1.074
PE2. ChatGPT helps me better understand the steps to solve math problems	3.03	1.076
PE3. ChatGPT helps me access multiple different ways to solve the same math problem	3.01	1.094

PE4. ChatGPT supports me in reviewing effectively before tests and exams	2.98	1.085
PE5. ChatGPT helps me save time when doing math homework	3.16	1.157
PE6. ChatGPT helps me detect and fix errors in my work	3.05	1.123
PE7. ChatGPT contributes to improving my self-study ability	3.03	1.138
PE8. ChatGPT can be used at any time, helping me study more flexibly	3.19	1.149
PE9. ChatGPT provides a rich source of information, supporting math learning	3.20	1.089
PE10. ChatGPT helps me learn math more easily than before	3.10	1.108
Total	**3.07**	**1.108**

The survey results indicate that high school students have a relatively positive perception of ChatGPT's effectiveness in learning Mathematics. The mean scores of the 10 observed variables within the performance expectancy category ranged from 2.96 to 3.20, with an overall average of 3.07. This score lies above the neutral threshold of the Likert scale (3.00), demonstrating that the majority of students tend to agree that ChatGPT brings certain benefits to their Math learning process. However, the average value has not yet reached a high level, reflecting that although the effectiveness of this tool is recognized by students, their level of trust and utilization remains moderate. This aligns with the context that ChatGPT is still a relatively new technology for high school students.

Table 4. Student Perceptions of EE in Mathematics learning

EE	**Mean**	**St. Deviation**
EE1. I frequently try different ways of prompting/asking questions to get the best answer	3.14	1.167
EE2. I double-check ChatGPT's solutions by re-solving them myself or looking them up further	3.27	1.119
EE3. I learn from ChatGPT's phrasing/expression to improve my ability to present math problem solutions	2.93	1.111
EE4. I take notes on good ways to solve math exercises provided by ChatGPT	3.02	1.43
EE5. I discuss solutions from ChatGPT with my teachers and friends	2.89	1.097
EE6. I combine ChatGPT with other reference materials to gain a deeper understanding of the problem	3.16	1.153
EE7. I self-assess my math-solving ability after using ChatGPT	2.95	1.104
EE8. I ask more follow-up questions to deeply understand the problem rather than just looking for the answer	3.21	1.134
Total	**3.07**	**1.129**

Data summarized in Table 4 suggest that students proactively engage in behaviors to optimize their application of ChatGPT for mathematical problem-solving, with agreement levels ranging from 2.89 to 3.27.

Participants frequently verified ChatGPT-generated solutions by re-solving problems independently or consulting supplementary resources (3.27). By integrating platform outputs with other reference materials to deepen their understanding of a problem (3.16), students demonstrated that they do not exercise absolute trust in the AI's accuracy, preferring instead to validate results through independent calculation. Rather than utilizing the tool for simple answer retrieval, students employed iterative

questioning to clarify mathematical contexts (3.21) and varied their prompting strategies to identify optimal solutions (3.14). This behavioral pattern characterizes ChatGPT as a cognitive support tool or a "virtual tutor" that facilitates immediate feedback and procedural inquiry.

In contrast, the data indicate lower scores for post-usage self-assessment of mathematical proficiency (2.95). This suggests that student focus remains largely confined to the immediate resolution of tasks rather than the reflective evaluation of their long-term skill development. Similarly, little emphasis was placed on internalizing ChatGPT's linguistic style for formal mathematical presentation (2.93). Regarding social engagement, students rarely initiated discussions with teachers or peers concerning ChatGPT's specific solution pathways (2.89). Although the platform's presence appears socially normalized within the learning environment (Social Influence - SI4), it has not yet stimulated profound collaborative discourse.

The external determinants influencing how students integrate ChatGPT into their mathematics studies are further detailed in Table 5, which outlines specific Social Influence factors.

Table 5. Student Perceptions of SI in Mathematics learning

SI	**Mean**	**St. Deviation**
SI1. My friends think that I should use ChatGPT	2.85	1.014
SI2. Teachers encourage me to use ChatGPT	2.64	1.062
SI3. I am guided by teachers or friends on how to use ChatGPT effectively	2.69	1.116
SI4. I feel anxious/fearful if people know I use ChatGPT to solve Math exercises	2.55	1.165
SI5. I will use ChatGPT if my friends use it effectively	2.85	1.083
Total	**2.72**	**1.088**

Survey results indicate that SI exerts a moderate effect, with mean scores ranging from 2.55 to 3.24. Peer-related factors showed a more substantial impact (2.85–3.24), which suggests that social dynamics among students are a primary driver for utilizing ChatGPT in mathematical problem-solving. The highest level of agreement (3.24) was recorded for the item concerning guidance from teachers or peers on effective application; peer expectations and the observation of successful peer usage tied for the second-highest score at 2.85. This highlights a mechanism where peer encouragement, combined with the perception that ChatGPT improves academic productivity - a key facet of PE - increases ATU to adopt the tool for mathematics.

In contrast, formal teacher influence was notably less significant (2.64). The lack of robust pedagogical orientation from instructors, paired with peer-driven adoption trends, has led students toward autonomous inquiry and self-regulated exploration of the technology. Finally, the moderate score (2.55) regarding the fear of social judgment suggests that the integration of ChatGPT is increasingly viewed as a normalized practice within the secondary school context.

Table 6. Student Perceptions of ANX in Mathematics learning

ANX	**Mean**	**St. Deviation**
ANX1. I have difficulty evaluating the accuracy of answers from ChatGPT	3.29	1.124
ANX2. ChatGPT does not yet handle math problems with diagrams or complex data well	3.38	1.148
ANX3. I face difficulties when inputting problem statements or articulating requests to ChatGPT	2.98	1.171
ANX4. I do not yet know how to ask questions effectively to receive accurate answers	2.94	1.130
ANX5. Using ChatGPT may reduce my thinking and self-study abilities	2.99	1.158
Total	**3.116**	**1.146**

When applying ChatGPT to mathematical problem-solving, high school students exhibit a keen awareness of the platform's technical constraints. Specifically, the system's current inability to effectively process geometric illustrations or complex data sets (3.38) frequently complicates students' efforts to evaluate solution accuracy (3.29). These systemic limitations represent the primary barrier to adoption, necessitating a robust foundational knowledge to verify procedural steps and mitigate the risk of internalizing misinformation resulting from AI-generated inaccuracies.

In contrast to these external, system-related obstacles, subjective barriers linked to individual proficiency were rated considerably lower. The survey indicates that contemporary students possess relative confidence in their ability to interact with AI, reporting minimal difficulty in articulating problem statements or specific requirements to the platform (2.98). Similarly, the perceived challenge of formulating effective queries—or prompting strategies—to elicit accurate responses was not viewed as a major deterrent (2.94). These results suggest that the technical gap in usage and "prompt engineering" is narrowing among the current student population, indicating high levels of ChatGPT self-efficacy.

Regarding psychological impact and longitudinal study habits, concerns involving tool dependency, specifically the fear that ChatGPT usage might diminish independent thinking and self-regulated learning (2.99), remained at a moderate level. Such data reflects a proactive learning disposition; students appear to position ChatGPT as a supplementary "virtual tutor" for procedural reference rather than a total substitute for independent cognitive exercise. This behavioral pattern aligns with a balanced approach to technology integration, where students leverage AI to enhance understanding while maintaining a commitment to independent problem-solving skills.

To see clearly which factors have the strongest/weakest impact on ATU, I built a multivariate regression model and presented the results in Table 7.

Table 7. Regression coefficients of PE, EE, SI, ANX with ATU

	Unstanda -rdized B	t	Sig.	VIF
(Constant)	0.136	4.210	0.00	
PE	0.458	9.000	0.00	1.225
EE	0.226	4.609	0.00	1.276
SI	0.241	5.284	0.00	1.568
ANX	- 0.175	4.449	0.00	1.251

The results show that the Sig. regression coefficients of the independent variables are all less than 0.05, so these variables are all significant to the dependent variable, no variable is eliminated. The VIF value indicates that the model does not exhibit multicollinearity. All the above factors have an impact on ATU. In which, PE has the strongest impact (Beta = 0.458), followed by SI (Beta = 0.241), EE (Beta = 0.226), and ANX (Beta = – 0.175).

This indicates that the constructed model is statistically significant. The results of the hypothesis are shown in Figure 1.

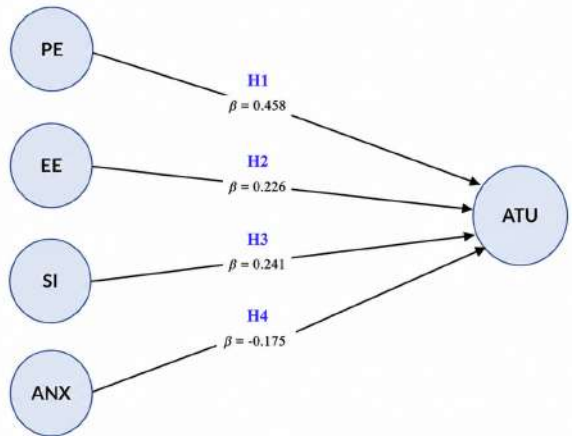

Figure 1. Results of hypotheses

5. CONCLUSION

Generative AI applications, specifically ChatGPT, have gained considerable traction in mathematics education; however, student proficiency in leveraging these tools effectively remains suboptimal. The present research elucidates the theoretical and empirical foundations of ChatGPT as a supportive resource for secondary school mathematics. Analysis of survey and experimental data substantiated the research hypotheses, demonstrating the platform's efficacy in conceptual explication,

methodological guidance, and the generation of comprehensive solutions. These affordances contribute to enhanced self-regulated learning while alleviating academic pressure for students.

Despite these advantages, the results also identify systemic constraints, such as occasional inaccuracies and a pedagogical misalignment between AI-generated explanations and learner proficiency. There remains a substantial risk of tool dependency in the absence of structured pedagogical orientation.

Empirical evidence indicates that high levels of PE significantly correlate with a propensity to adopt ChatGPT for academic purposes. Adoption patterns are also shaped by SI, specifically teacher-led guidance and peer-to-peer discourse. Educators must therefore establish formal protocols and ethical standards for AI integration, with a particular emphasis on research integrity. Individual EE significantly impacts the ATU. Conversely, technical anxiety regarding platform interaction can impede engagement, potentially yielding suboptimal outcomes that fail to satisfy academic requirements.

ChatGPT functions as a high-potential auxiliary tool within the broader landscape of educational digital transformation. Successful integration necessitates teacher-mediated orientation to ensure students utilize the platform as a cognitive scaffold rather than a repository for ready-made solutions. When properly harnessed, technology fosters autonomous learning, critical inquiry, and advanced problem-solving competencies in mathematics. Building upon these findings, longitudinal evaluations of instructional efficacy and the development of specialized pedagogical models for AI-integrated curricula are recommended to enhance overall educational quality.

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