ChatGPT in Education: Investigating Students Online Learning Behaviors

Anindita Pratita[1], Tri Lathif Mardi Suryanto[1,*], Arista Pratama[1], and Adi Wibowo[2]

[1]Department of Information System, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, East Java, Indonesia

[2]Department of Informatics, Faculty of Science and Mathematics, Universitas Diponegoro, Semarang, Indonesia

Email: pratitanindita@gmail.com (A.P.); trilathif.si@upnjatim.ac.id; (T.L.M.S.); aristapratama.si@upnjatim.ac.id (A.P.); adiwibowo@lecturer.undip.ac.id (A.W.)

*Corresponding author

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***Abstract*—The research aims to investigate the intentions and behaviour of high school students regarding their use of ChatGPT. Self-directed learning can be challenging due to a lack of formal structure and external motivation. ChatGPT is a tool that can help address these challenges by providing personalized assistance, immediate feedback, and customized educational resources to enhance self-directed learning. The Unified Theory of Acceptance and Use of Technology (UTAUT) framework was adapted to align with the study's case study requirements, with 385 respondents from four public high schools. The data analysis employed Structural Equation Modelling (SEM) through a Path Analysis approach. The conceptual model was developed, and hypotheses were tested. The validity and reliability of the measurement model were assessed through outer model analysis. The main contribution of this paper is investigating the factors that influence high school students' intentions and behaviour in using ChatGPT by adapting the UTAUT framework to the context of ChatGPT usage in high schools. The study reveals that social influence, hedonic motivation, and habit significantly influence high school students' intention to use ChatGPT. Peer recommendations, enjoyment, and satisfaction influence these factors. The primary drivers of actual usage are facilitating conditions, habit, and behavioural intention. Performance expectancy and Effort expectancy do not significantly affect students' intention to use ChatGPT. The study emphasizes fostering a supportive social environment and positive habitual interactions to enhance ChatGPT adoption and usage. The research results among students are designed to be studied in other developing countries so that researchers can examine students' self-learning motivation through AI.**

***Keywords*—AI in education, ChatGPT, Unified Theory of Acceptance and Use of Technology (UTAUT), self-directed learning**

I. Introduction

Self-learning is learning independently without formal instruction from a teacher or educational institution. It involves using resources such as books, articles, videos, and digital tools to develop skills and knowledge. Self-learning is essential in the digital age to adapt to technological advancements and industry changes. It allows individuals to develop new skills and deepen knowledge independently, supporting personal and professional development. It encourages creativity and innovation by providing the freedom to explore new topics without the limitations of a formal education. Self-learning also encourages students to examine various sources of knowledge independently, provides for flexible learning, and fosters the growth of self-discipline. Rather than only focusing on raising grades or test scores, these soft skills are crucial for students to develop into lifelong learners who can continue to have successful professional lives [1].

Self-learning encounters difficulties sustaining motivation and self-control due to the absence of a formal framework and external responsibility in conventional educational environments [2]. This can result in the tendency to delay tasks and experience emotional volatility, harming one's progress. The reliability and trustworthiness of information sources are of utmost importance, as learners need help discerning between accurate and false information, which can lead to misunderstandings and incomplete knowledge [3].

ChatGPT is a versatile educational aid that is always available, and it elucidates elucidations of challenging ideas and supplies supplementary pertinent sources and materials. It can enhance motivation and self-discipline by offering personalized interactions and immediate replies, reinforcing sustained learning. Furthermore, ChatGPT can customize educational resources according to individual requirements, facilitating the exploration of many subjects and acquiring essential knowledge [4].

Therefore, the factors influencing students' self-learning using ChatGPT should be measured and analyzed. According to Zhao *et al.*, understanding these factors is crucial for tailoring AI tools to enhance the learning experience [5]. Key aspects to evaluate include the effectiveness of ChatGPT in providing accurate and relevant information, the impact of its interactive features on maintaining motivation and engagement, and its role in overcoming challenges such as information overload and quality of resources [6]. By examining these elements, educators and learners can better leverage ChatGPT to support self-directed learning, ensuring that it is valuable in achieving educational goals and fostering a more effective and personalized learning environment.

Recent studies have explored the use of ChatGPT in Indonesian education, highlighting both benefits and challenges. According to Harunasari, it can be effectively integrated into EFL writing classes with clear usage policies and proper monitoring [7]. Its usage positively impacted students' learning motivation, particularly among younger male students [8]. However, using ChatGPT raises legal and ethical concerns, potentially leading to copyright infringement and ethical violations in academic settings. Despite these challenges, ChatGPT offers innovative educational opportunities, such as creating learning materials, semester plans, and textbooks. It can assist educators in fulfilling their teaching, research, and community service

responsibilities [9]. These studies emphasize the need for responsible implementation of AI tools like ChatGPT in Indonesian education, balancing their potential benefits with ethical considerations and proper guidelines.

The study was conducted in four public high schools, each with distinct policies and infrastructure supporting AI integration in education. These schools have been proactive in adopting AI technologies to enhance learning experiences, aligning with broader educational trends [1, 10, 11].

The study employed a mixed-methods approach using an online survey with closed and open-ended questions, sampling 583 participants (399 students and 184 teachers) from Hong Kong higher education institutions. Quantitative analysis was conducted through descriptive statistics and t-tests to detect significant differences in Gen AI adoption and perceptions between students and teachers, using a 5-point Likert scale with an additional "Not Sure" option. The qualitative component involved thematic coding of open-ended responses by two independent coders, achieving intercoder agreement rates between 72% and 77% [12].

Chan *et al*. note that This study's limitations highlight the need for cross-cultural comparisons, as its primary focus on Hong Kong restricts the generalizability of the findings. The reliance on self-reported data introduces potential social desirability bias, and the lack of longitudinal data limits understanding of Gen AI's lasting impacts on learning outcomes. Additionally, basing generational attitudes solely on professional roles rather than age groups restricts a more nuanced generational analysis.

A recent study investigated the impact of ChatGPT on PhD students' research methods, focusing on perceived ease of use, usefulness, and satisfaction as factors influencing the tool's utilization and academic value. This quantitative study, which included 80 PhD students from Morocco, analyzed data using a Likert-scale questionnaire and Partial Least Squares Structural Equation Modeling (PLS-SEM) to ensure reliability and validity. The findings demonstrated that perceived ease of use positively impacts perceived usefulness and satisfaction but does not directly improve ChatGPT usage. The study concludes that it can appropriately boost PhD students' productivity and contentment, resulting in better research results.

The study highlights the potential of AI tools such as ChatGPT in academic settings, advocating for their use as supportive resources rather than replacements for human work as written by Boubker, Omar *et al*. The study emphasizes the importance of both skill development and ethical issues in AI use by suggesting the incorporation of AI training into PhD programs. Despite its significant insights, the study admits limitations, such as emphasizing a Moroccan student sample and using only quantitative methodologies. Future studies could benefit from mixed-method approaches and an examination of institutional support to acquire a more complete picture of AI's function in PhD education [13].

The article "ChatGPT's Role in the Education System: Insights from the Research" investigates the perceived benefits and problems of ChatGPT among future educators, emphasizing its ability to improve instruction and its impact on academic integrity and critical thinking. The research, which included 70 Master's students in Teacher Training, collected data from science and humanities backgrounds via surveys rating ChatGPT's utility in educational environments. While prospective instructors see ChatGPT as helpful in developing educational materials and facilitating learning, worries persist about its potential to reduce critical thinking and the difficulties of identifying plagiarism. In particular, humanities students indicated more concern about information quality and academic integrity than their science-focused colleagues.

This study contributes to the discussion on AI in education by emphasizing the significance of designing customized AI integration strategies considering educators' different experiences. It emphasizes the importance of addressing the potential issues that AI tools may provide in sustaining educational standards and integrity. However, the authors recognize that the study's sample size and demographics are limited, which may affect the generalizability of the results. Furthermore, the study did not examine the long-term consequences of AI integration on teaching practices, indicating a need for future research [14].

The study examines Korean in-service teachers' impressions of AI education in K-12 settings, and their experiences with AI training, with the goal of better understanding teachers' perspectives, which are essential for effective implementation but have received less attention than student viewpoints. Using an online survey of 20 instructors and a focus group with four participants, the study discovered that teachers usually have positive opinions regarding AI in education and want to adopt AI-based platforms. Teachers expected AI to improve student skills (50%), promote professional growth (45%), and reduce workload (30%). However, opinions on its usefulness in student counseling differed.

This study emphasizes the necessity of practical and hands-on AI training in teacher development. While AI training enhances knowledge and professional progress, it currently needs more practical use due to its theoretical focus. The authors argue for training programs that incorporate project-based applications matched with curricula, arguing that better-designed training can improve educational outcomes and assist teachers in integrating AI. The paper also recommends topics for future research to improve AI training and close gaps identified by educators [15].

The practical consequences of the research findings on students' use of ChatGPT should be sufficiently covered in the text. While the results show which factors affect students' intents and behaviors while using ChatGPT, more information must be provided to understand how these findings might be used in regular classroom settings. A more thorough explanation is required to demonstrate how ChatGPT may improve learning effectiveness, foster responsible technology usage habits, and address ethical and privacy concerns. Also, the significance of having suitable infrastructure and access for ChatGPT must be sufficiently discussed. Given the need to provide all students with fair access to technology, the document should analyze the requirements for digital infrastructure, including dependable internet connections and sufficient gadgets. The advantages of utilizing ChatGPT in the classroom might become unequal and restricted to students with solid access without the necessary infrastructure.

Implementing a learning model that combines ChatGPT

with conventional and digital teaching techniques is one innovative addition that may be made. Case studies or pilot programs at several schools to evaluate the efficacy of these methods might be a part of this. This study's results might significantly impact education by fusing AI technology with current teaching methods. While there are numerous studies on adoption models and AI, this study distinguishes itself by focusing on the context of high school students' use of ChatGPT for learning, which has yet to be extensively explored. The selection of particular constructs Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Habit (H), Behavioral Intention (BI), and ChatGPT Use (GPTU) is grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

II. Literature Review

A. UTAUT

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a model for technology acceptance and usage proposed by Venkatesh *et al*. This model includes four key variables: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy relates to five variables from previous models: perceived usefulness (TAM, TAM2, and CTAMTPB), extrinsic motivation (MM), job fit (MPCU), relative advantage (IDT), and outcome expectations (SCT). Effort expectancy corresponds to three variables from previous models: perceived ease of use (TAM, TAM2), complexity (MPCU), and ease of use (IDT). Social influence relates to four variables from previous models: subjective norm (TRA, TAM2, TPM/DTPB, and C-TAM-TPB), social factors (MPCU), and image (TAM2, IDT). Facilitating conditions relate to three variables from previous models: perceived behavioral control (TPB, DTPB, CTAMTPB), facilitating conditions (MPCU), and compatibility (IDT) [16].

The UTAUT method is a user acceptance research model that explains user intentions to use a system and subsequent usage behavior. According to Venkatesh *et al*., the strength of UTAUT lies in its ability to explain how individual differences influence technology usage, elucidating the relationships between perceived benefits, ease of use, and the intention to use technology [16]. In 2012, Venkatesh and colleagues developed the UTAUT model further into UTAUT 2. The focus of UTAUT 2 is on the user context, adding new variables such as habit, hedonic motivation, and price value. For analyzing technology acceptance and usage, UTAUT 2 is more appropriate as it is the latest model, incorporating and summarizing eight existing technology acceptance theories. UTAUT 2 provides insights into technology acceptance within the context of consumer use [17].

B. ChatGPT in Education

The swift advancement of technology has dramatically facilitated daily human activities. One notable technological innovation is ChatGPT, which aims to assist in efficiently finding information and generating written content. Introduced by OpenAI in November 2022, the Generative Pre-Trained Transformer (GPT) is a form of artificial intelligence capable of producing text responses that closely mimic human writing [4]. As a chatbot, ChatGPT can respond to text-based user queries, complete tasks, and address productivity challenges [18]. AI advancements are revolutionizing the education sector, enabling students to gain knowledge and access information through AI applications [19].

Educators view ChatGPT as a potential tool to transform and enhance future learning and research. However, there are concerns among some educators about its ability to generate content that should be used more by students. ChatGPT can engage in humanlike conversations and develop content based on user input. The rapid growth of artificial intelligence (AI) is creating new habits, with society increasingly relying on AI to simplify daily activities. This rapid growth raises concerns due to the need for a more adequate understanding of AI usage. Addressing this issue requires a better understanding of AI functions within society. In the academic realm, AI's development threatens to replace creative roles traditionally held by students, such as writing scientific and academic papers. Researchers have developed chatbots, AI, and ChatGPT to offer various conversational services tailored to human needs [20]

AI in education significantly impacts students by making their tasks and writing processes quicker and more efficient. AI has been widely implemented in educational settings, including schools and higher education institutions. ChatGPT and AI applications can improve the efficiency of creating assignments, essays, and papers. However, their use also poses risks related to plagiarism, and there are concerns that students may lose creativity and critical thinking skills by relying too heavily on this technology. Therefore, this research aims to investigate the intentions and behavior of high school students regarding their use of ChatGPT.

Students accessed ChatGPT through school-provided devices, including computers and tablets, available in computer labs and classrooms. The schools ensured these devices had stable internet connections to facilitate the seamless use of AI tools. Training sessions and tutorials were also provided to students and teachers to familiarize them with ChatGPT and its functionalities.

The schools have implemented specific policies to regulate AI technologies, including ChatGPT. Considering the age restrictions and potential risks associated with AI, these policies are designed to ensure safe and ethical use. Critical aspects of these policies include [4]:

1) Age Restrictions: Given that ChatGPT has an age restriction, the schools obtained parental consent for students under 18 to use the tool. This was part of a broader effort to comply with legal and ethical standards.
2) Usage Guidelines: The schools established clear guidelines on how ChatGPT should be used in educational settings. These guidelines emphasize the importance of using the tool for educational purposes only and discourage misuse, such as generating content for assignments without proper understanding.
3) Privacy and Security: Policies were implemented to protect students' privacy and data security. This includes measures to ensure that any data generated or shared through ChatGPT is handled in compliance with data protection regulations.
4) Monitoring and Evaluation: The schools regularly

monitor the use of ChatGPT to ensure compliance with the established policies. Feedback from students and teachers is collected to continuously improve the implementation and effectiveness of AI tools in education.

C. Hypotheses

1) Performance Expectancy (PE)

According to Venkatesh *et al*., performance expectancy is the extent to which a person believes using the system will help him achieve his goals [16]. Previous studies from Alhwaiti, Wu *et al*. stated that PE was a significant predictor of BI. The study found that performance expectancy is the most vital variable in determining a person's behavior when adopting technology. One of its applications can be seen from the ChatGPT application feature, which makes it easy for users to find answers to solve student problems and complete student assignments [21–23]. The convenience is then felt by users so that it can influence their behavior when using artificial intelligence applications. Thus, the following hypothesis is proposed:

H1: Performance Expectancy (PE) positively and significantly affects Behavioral Intention (BI).

2) Effort Expectancy (EE)

Effort Expectancy, according to Venkatesh *et al*., is how much effort the ease of use is associated with using the system [13]. This variable is identical to the ease of use construct described in research by Alhwaiti [21]. Effort expectancy (EE) was shown to have an indirect effect on Behavioral Intention through other factors [10, 24]. Students' use of the ChatGPT application depends on individual behavioral characteristics. How often students' experience using technology can also affect the ease of students in using the ChatGPT application. The main findings of the study from Chen *et al*., that factors such effort expectancy were positively associated with students' behavioral intention to use AI for language learning [25]. So, the following hypothesis is proposed:

H2: Effort Expectancy (EE) positively and significantly affects Behavioral Intention (BI).

3) Social Influence (SI)

According to Venkatesh *et al*., social influence is the extent to which a person perceives that other people believe he should use a new system [16]. The views of teachers and close relatives in the school environment can influence student behavior toward using artificial intelligence applications because the teacher influences his students to use the application. Previous research by Habibi *et al*. found that social influence significantly affects behavioral intention [26]. Among the most potent predictors of students' behavioral intention, prior research has shown that studying AI is helpful for society, and social influence significantly influences behavioral intentions to utilize AI in education [27, 28]. Social influence positively and significantly impacts behavioral intention toward online learning during COVID-19 [29]. Thus, the following hypothesis is proposed:

H3: Social Influence (SI) positively and significantly affects Behavioral Intention (BI).

4) Hedonic Motivation (HM)

According to Venkatesh *et al*., Hedonic motivation is satisfaction or pleasure obtained by a person through technology [14]. Hedonic motivation has a role in determining technology acceptance in research conducted by Alhwaiti [21]. Then, the researcher wants to find out whether using the ChatGPT application for students can cause a sense of pleasure and satisfaction. The ChatGPT application is currently easily accessible to anyone via the Internet so that students become happy when using it. Previous studies have shown that hedonic motivation significantly predicted behavioral intention. Hedonic motivation positively and substantially affects behavioral intention to use ChatGPT in higher education. Hedonic motivation positively and substantially impacts behavioral intention to use ChatGPT for English language learning [30, 31]. So, the following hypothesis is proposed:

H4: Hedonic Motivation (HM) positively and significantly affects Behavioral Intention (BI).

5) Facilitating Conditions (FC)

According to Venkatesh *et al*., facilitating conditions is the extent to which a person believes that organizational and technical infrastructure exists to support system use [16]. Research by García-Murillo *et al*. shows that facilitating conditions influence behavioral intention [32]. The use of technology may not run when there are no supporting facilities, even if there is an intention or desire for and support from the school environment to use the technology. Researchers want to know how students use the ChatGPT application. Previous research has shown that Facilitating conditions have a positive and significant effect on behavioral intention ChatGPT among higher education students in the Philippines [33, 34]. Thus, the following hypothesis is proposed:

H5: Facilitating Conditions (FC) positively and significantly affects Behavioral Intention (BI).

Based on the explanation of the Facilitating Conditions variable, it is then connected to the context of the ChatGPT application for public high school students. Suppose students feel that the conditions that facilitate using the ChatGPT application already exist and are supported by the school. In that case, students tend actually to intend to use the application. Furthermore, in research by Romero-Rodríguez *et al*., facilitating conditions also positively impact using the ChatGPT application (GPTU) [35]. The study found that facilitating conditions positively and significantly affect students' behavioral intention to use ChatGPT [36]. Further research can be conducted to collect data from students evaluating the extent to which school facilities can support using the ChatGPT application. Thus, the following hypothesis is proposed:

H6: Facilitating Conditions (FC) positively and significantly affects ChatGPT Use (GPTU).

6) Habit (H)

According to Venkatesh *et al*., Habit is the extent to which a person tends to use technology automatically due to prior learning with the habit of using technology as an indicator [17]. The effect of habit variables as predictors of usage intention has been analyzed in several studies. The user's willingness to use the application continuously relates to the user's habits while using the service [26]. Based on Strzelecki, this study developed and tested a model to examine the predictors of adoption and use of ChatGPT

among higher education students. Habit has a positive and significant effect on behavioral intention to use ChatGPT in higher education [31]. Habit can be formed when users repeatedly or continuously use the ChatGPT application at school. So, the following hypothesis is proposed:

H7: Habit (H) positively and significantly affects Behavioral Intention (BI).

Based on the explanation of the Habit variable, it is then connected to the context of the ChatGPT application for students. Habit is the tendency of high school students to use the ChatGPT application automatically, which may have been formed from repeated or continuous use in the school environment. If students have a habit of using the ChatGPT application, then this will have a positive effect on student's intention to use the ChatGPT application. In research, Habibi *et al*. stated that the habit of using the ChatGPT application will also positively affect the actual level of use of the application [26]. Recent studies have explored the acceptance and use of ChatGPT in higher education using the UTAUT model. This study examined the factors influencing college students' satisfaction and continued use of the AI chatbot ChatGPT in higher education. The results show that Habit positively affects the continued use intention of ChatGPT in higher education [37]. Thus, the following hypothesis is proposed:

H8: Habit (H) positively and significantly affects ChatGPT Use (GPTU).

7) Behavioral Intention (BI)

According to Venkatesh *et al*., behavioral intention is the extent to which someone wants to use technology in the future [16]. Research conducted by Habibi *et al*. states that a person's intention to use a system has a significant effect [26]. This research is carried out to determine what variables influence the behavior of public high school students using the ChatGPT application. Recent studies have explored the factors affecting students' acceptance and use of ChatGPT in higher education. These studies consistently found that Behavioral Intention significantly predicts ChatGPT Use. The behavioral intention has a positive and significant effect on ChatGPT use by students [11, 38-40]. So, the following hypothesis is proposed:

H9: Behavioral Intention (BI) has a positive and significant effect on ChatGPT Use (GPTU).

III. Materials and Methods

The flow of this research starts from observation and literature study, then identifying problems, developing a conceptual model adopting research by Habibi *et al*., and developing hypotheses [26]. To determine the population and research sample and prepare the instruments. After that, an instrument test was carried out to determine whether the instrument used in the questionnaire was valid and reliable.

Fig. 1 is a conceptual model which contains eight variables used in this research. The model was adopted from Habibi *et al*., using the UTAUT 2 method. There are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Habit (H), Behavioral Intention (BI), and ChatGPT Use (GPTU). This research develops similar studies related to using information technology in learning. The background, problems, and theories of technology acceptance solutions that have been presented provide a hypothesis of the model that will be used in measurement in this study.

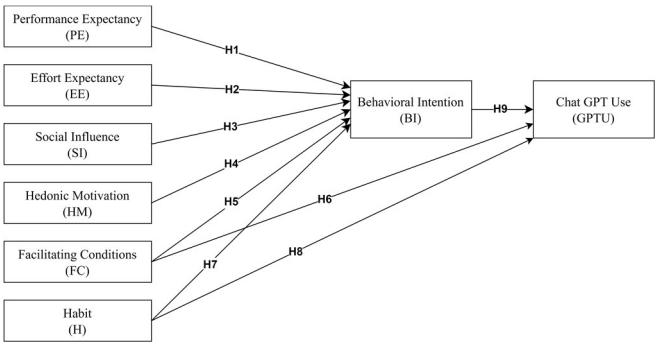

Fig. 1. Proposed technology adoption measurement model.

This model has been widely validated in various contexts but is particularly relevant as it provides a comprehensive framework for understanding technology adoption in educational settings. The constructs were chosen based on their proven significance in predicting technology adoption behaviors. For instance, Performance Expectancy is a critical predictor of Behavioral Intention, as it reflects the degree to which students believe that using ChatGPT will help them achieve their learning goals. Similarly, Social Influence and Hedonic Motivation are essential in driving actual usage, emphasizing the role of social dynamics and intrinsic enjoyment in technology adoption. Moreover, this study incorporates recent findings and extends the UTAUT model by including constructs like Habit, which has shown to be influential in the context of AI tools.

This approach allows for a more nuanced understanding of the factors that drive high school students' adoption of ChatGPT, providing insights that can inform targeted interventions and support mechanisms in educational institutions. In summary, this research contributes to the existing literature by applying a well-established theoretical model to a novel context, thereby offering new insights into the factors influencing the adoption of AI tools in education. This approach validates the selected constructs' relevance and underscores their importance in enhancing the learning experience through AI. The flow of this research starts from observation and literature study, then identifying problems, developing a conceptual model adopting research by Habibi *et al*., and developing hypotheses [26]. To determine the population and research sample and prepare the instruments. After that, an instrument test was carried out to determine whether the instrument used in the questionnaire was valid and reliable. The study significantly contributes to understanding the UTAUT framework, which is used to understand the factors influencing high school students' use of ChatGPT for learning. The research reveals that Social Influence, Hedonic Motivation, and Habit are critical in driving usage.

A. Data Collection

This study explores the factors influencing students' behavioral intention to use ChatGPT, an AI-based tool, in educational settings. The context is rooted in the increasing integration of AI technologies in education, which can potentially enhance learning experiences and outcomes.

Specifically, the study investigates how various constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) model, including Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, affect students' intentions to use ChatGPT.

Through a Google form survey, respondents choose one of the alternative answers that have been provided. The population in this study were public high school students in Pasuruan City who used the ChatGPT application with a population of 3,405. Who use the ChatGPT application and have a total population of 3,405 students. The sample for this study was selected using a simple random sampling method. This research uses probability sampling techniques of simple random sampling type to ensure representation across different demographics, including age, gender, and academic discipline. This method was chosen to minimize selection bias and ensure that the sample accurately reflects the broader student population. Furthermore, the minimum number is calculated using the Slovin Formula. Furthermore, calculating the minimum number required using the Slovin Formula as below: $n \frac{N}{1+N.e^2}$

Description:

n = Number of samples

N = Total population

e = Error tolerance limit (margin of error) 5%

Based on the Slovin formula, The population consisted of students from four public high schools, with 385 respondents participating.

B. Likert Scale

The Likert scale measures the respondents' attitudes on the questionnaire sheet. Rensis Likert developed it based on a book written by Hermawan and Amirullah [41]. Five categories or ranks indicate the degree of agreement or disagreement with each statement relating to the assessed object. The scale used in this thesis, namely a scale of 1-5 where number 1 represents the statement "Strongly disagree," number 2 represents the statement "Disagree," number 3 represents the statement "Neutral," number 4 represents the statement "Agree." Number 5 represents the statement "Strongly Agree."

C. Data Presentation

The demographic data of respondents in this study consisted of gender, school origin, and intensity of ChatGPT use. The number of respondents was 358 students with the characteristics in Table 1 below:

Table 1. Respondent demographics

Characteristics	Group	Qty	%
Gender	Female	212	59.2
	Male	146	40.8
School Origin	SHS 1	90	25.1
	SHS 2	90	25.1
	SHS 3	89	24.9
	SHS 4	89	24.9
ChatGPT Usage Intensity	Rarely Use	152	42.4
	One week 1 time	46	12.8
	One week 2 times	71	19.8
	One week more than 2 times	63	17.6

Based on Table 1, it is known that 358 students consist of 212 female students and 146 male students. Each school has an equal distribution, 90 students from Senior High School 1 and Senior High School 2, while 89 students from Senior High School 3 and Senior High School 4. The intensity of ChatGPT use by students is also known. A total of 152 students rarely use it, 46 students use it one week 1 time, 71 students use it one week 2 times, 63 students use it one week more than 2 times, and the remaining 26 students claim to use it daily. Based on student interviews on the use of ChatGPT show that there is variation in its acceptance and utilization in the daily learning process. ChatGPT helped them complete assignments more efficiently and improved the quality of their assignment results. Students felt comfortable using ChatGPT and considered the tool a valuable addition to existing learning materials. However, some students expressed difficulty accessing ChatGPT due to infrastructure limitations such as unstable internet connection and inadequate devices. In addition, some students felt that ChatGPT sometimes made them too dependent on this technology, thus reducing their ability to think critically and independently. In addition, the interviews also revealed that although ChatGPT can provide more in depth and quicker explanations, students still need guidance in using this tool optimally. Many students felt they needed more training and advice on effectively utilizing ChatGPT in their learning process. Some students also highlighted the importance of integrating ChatGPT with traditional learning methods to get more balanced and in depth results. These students' experiences of using ChatGPT colored their perceptions of the effectiveness and usefulness of this technology in supporting their learning.

D. Dataset Analysis Method

SEM, or Structural Equation Modeling, can be used to answer various research questions in a structured and comprehensive series of analyses. According to Hair *et al.*, SEM represents a second-generation model of multivariate analysis techniques. This model allows researchers to test complex relationships between variables, whether they are recursive or non-recursive, aiming to provide a comprehensive picture of a model [42]. According to Gaston, as cited in a book by Yamin & Kurniawan, Partial Least Squares (PLS) can be utilized for confirmatory purposes, such as hypothesis testing and exploratory purposes. Although PLS tends to be used more as an exploratory tool than an affirmative one, it can also predict whether relationships between variables exist and then formulate propositions for further testing. Its main objective is to explain the interrelationships between constructs and to emphasize a deep understanding of the value of these relationships. In this context, it is crucial to consider the presence of a theory that provides a basis for describing the model, the selection of variables, the analysis methods applied, and the interpretation of results [43].

The benefits of using SEM for researchers include the ability to explain complex variable relationships and the direct or indirect effects of one or several variables on others. SEM also offers higher flexibility for researchers to connect theory with data. Meanwhile, according to Petter & Hadavi, several benefits come with using partial least squares (PLS) as a composite based structural equation modeling (SEM)

method. PLS frequently involves fewer assumptions than factor-based SEM approaches, allowing researchers to concurrently investigate the measurement and structural models. PLS is quite powerful for researchers who want to assess a research model using an SEM-based methodology for all of the reasons mentioned above. But, PLS's immense power also carries a great deal of responsibility [44].

E. Variable Construct

In examining modern technologies such as ChatGPT, several vital variables are crucial in understanding user behavior and intention to use these technologies. These variables include Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, ChatGPT Use, Behavioral Intention, Hedonic Motivation, and Habit. Each variable offers unique insights into the factors influencing individuals' adoption and use of ChatGPT. These include expectations of performance and desired outcomes, supportive conditions for technology use, social influences, and habits formed through repeated use. This article will explore these variables to understand how they contribute to the acceptance and usage of ChatGPT. Variables and questionnaire items can be reviewed in Table 2.

Table 2. Variables and questionnaire items

Code	Variable Construct	Items	Questionnaire Items	Sources
PE	Performance Expectancy	PE1	Using ChatGPT will help me complete my assignments.	[17, 45]
		PE2	Using ChatGPT will increase my efficiency in completing assignments.	
		PE3	Using ChatGPT will improve the quality of my assignments.	
		PE4	Using ChatGPT will make me feel more comfortable when working on assignments.	
EE	Effort Expectancy	EE1	I find it easy to access the ChatGPT page.	[17, 45]
		EE2	I find it easy to interact with ChatGPT via mobile devices.	
		EE3	I find ChatGPT easy to use.	
		EE4	I find it easy to become proficient in using ChatGPT.	
FC	Facilitating Conditions	FC1	I have the necessary resources (laptop, internet connection, mobile device, desktop, etc.) to use ChatGPT.	[17, 45]
		FC2	I have enough knowledge to use ChatGPT.	
		FC3	My operating system (Windows et al.) is compatible with ChatGPT.	
		FC4	I can get help from others if I experience difficulties using ChatGPT.	
SI	Social Influence	SI1	My friends think that I should use ChatGPT.	[17, 45]
		SI2	My family thinks that I should use ChatGPT.	
		SI3	People who influence my behavior also use ChatGPT.	
GPTU	ChatGPT Use	GPTU1	I frequently use ChatGPT.	[46–48]
		GPTU2	I rely on ChatGPT for studying.	
		GPTU3	I use all the functions in ChatGPT.	
HM	Hedonic Motivation	HM1	I feel happy using ChatGPT.	[46–48]
		HM2	I feel comfortable using ChatGPT.	
		HM3	I feel entertained using ChatGPT.	
BI	Behavioral Intention	BI1	I intend to use ChatGPT during learning activities.	[17, 45]
		BI2	I enjoy using ChatGPT.	
		BI3	I plan to continue using ChatGPT.	
		BI4	I recommend that my friends use ChatGPT.	
H	Habit	H1	I feel accustomed to using ChatGPT.	[17, 49, 50]
		H2	I don't think twice before using ChatGPT.	
		H3	I feel that using ChatGPT in learning is natural.	
		H4	I feel spontaneous using ChatGPT in learning.	
		H5	I am more likely to use ChatGPT for research or school assignments.	

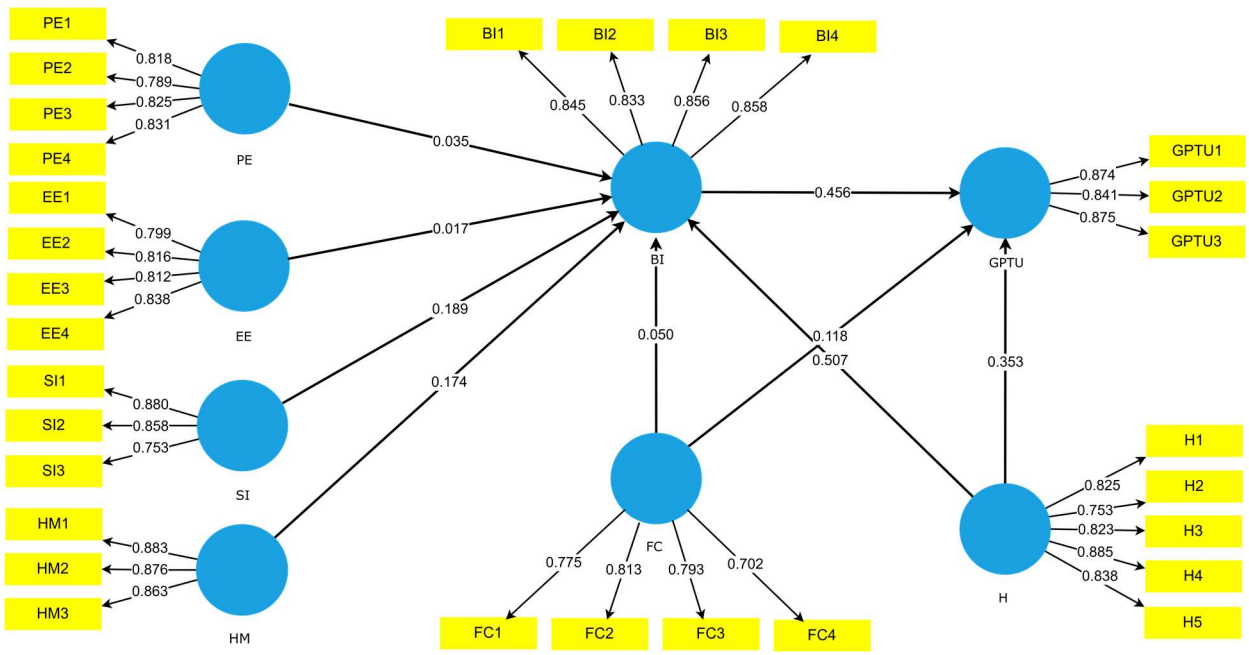

Fig. 2. Outer loadings.

IV. Result and Discussion

Furthermore, the instruments that have been prepared must be tested for validity and reliability. At this stage, it is used to measure the outer and inner models and hypothesis testing on the data obtained from as many as 358 students who have used ChatGPT. This analysis process is carried out using SmartPLS software version 3.2.9.

A. Result

1) Outer model

Outer model analysis is carried out to assess the validity and reliability of the model, which is used to define the relationship between latent variables and their indicators. At this stage of the analysis, the validity and reliability of the model used are tested, including determining the relationship between latent variables and their indicators. As in Fig. 2, all indicators have met the requirements to be considered valid, namely the value of outer loadings > 0.7. Table 3 contains all outer loadings values, AVE (Average Variance Extracted) values, and Composite Reliability. The outer loadings of all indicators have shown > 0.7 so that all indicators can be considered valid. Then, to measure convergent validity, it can be reviewed through the AVE value, where the AVE value must be > 0.5 and the Composite Reliability value must be> 0.7. In Table 2, all AVE values are > 0.5, Cronbach's Alpha > 0.7, and Composite Reliability value > 0.7, so it can be considered valid and reliable overall.

Discriminant validity is assessed through cross-loadings and the Fornell-Lecker Criterion values. A variable is considered to meet discriminant validity if the cross-loading value of each indicator for the variable is the highest in its row. The square root of the AVE values or the Fornell-Lecker criterion values can also assess discriminant validity. It can be seen that the top value in the Fornell-Lecker Criterion is the highest in its column. The Fornell-Lecker values can be found in Table 4.

Table 3. Validity and reliability test results

Code	Cronbach's Alpha	AVE	Composite Reliability	Indicator	Outer Loadings
PE	0.833	0.666	0.888	PE1	0.818
				PE2	0.818
				PE3	0.825
				PE4	0.831
EE	0.835	0.667	0.889	EE1	0.799
				EE2	0.816
				EE3	0.812
				EE4	0.838
FC	0.774	0.596	0.855	FC1	0.775
				FC2	0.813
				FC3	0.793
				FC4	0.702
SI	0.777	0.692	0.870	SI1	0.880
				SI2	0.858
				SI3	0.753
GPTU	0.829	0.746	0.898	GPTU1	0.874
				GPTU2	0.841
				GPTU3	0.875
HM	0.845	0.764	0.907	HM1	0.883
				HM2	0.876
				HM3	0.863
BI	0.870	0.719	0.911	BI1	0.845
				BI2	0.833
				BI3	0.856
				BI4	0.858
H	0.883	0.682	0.915	H1	0.825
				H2	0.753
				H3	0.823
				H4	0.885
				H5	0.838

Table 4. Fornell-Lacker discriminant validity

	PE	EE	SI	HM	FC	H	BI	GPTU
PE	**0.816**							
EE	0.692	**0.817**						
SI	0.675	0.573	**0.832**					
HM	0.748	0.665	0.682	**0.874**				
FC	0.642	0.758	0.594	0.647	**0.772**			
H	0.72	0.656	0.771	0.75	0.632	**0.826**		
BI	0.702	0.636	0.762	0.753	0.631	0.851	**0.848**	
GPTU	0.656	0.581	0.733	0.718	0.628	0.816	0.831	**0.863**

Table 4 shows that the Fornell-Larcker Criterion values for each independent variable are more significant than the correlations between independent variables in the same column. This indicates that the discriminant validity criteria using the Fornell-Larcker Criterion approach have been met.

2) Inner model

At this stage of the analysis, the R square value is used to determine whether the variable has a direct influence or not. This can be seen in Table 5.

Table 5. R square

Code	R Square
BI	0.774
GPTU	0.741

The results are in Table 5. They show several 0.774 for the Behavioral Intention variable, meaning that the Performance Expectation, Effort Expectation, Social Influence, Hedonic Motivation, Facilitating Conditions, and Habit variables influence behavioral intention by 77.4%. The ChatGPT Use variable is 0.741, meaning that the Behavioral Intention variable affects ChatGPT Use by 74.1%.

3) Hypothesis test

Table 6. Results of path coefficients analysis

Code	Original Sample (O)	T-Statistics	P-Value	Influence
PE ≥ BI	0.035	0.802	0.423	Not Sig.
EE ≥ BI	0.017	0.331	0.741	Not Sig.
SI ≥ BI	0.189	3.475	0.001	**Sig**
HM ≥ BI	0.174	2.807	0.005	**Sig**
FC ≥ BI	0.050	1.079	0.281	Not Sig.
FC ≥ GPTU	0.118	3.004	0.003	**Sig**
H ≥ BI	0.507	7.745	0.000	**Sig**
H ≥ GPTU	0.353	7.064	0.000	**Sig**
BI ≥ GPTU	0.456	9.634	0.000	**Sig**

From Table 6. three variables do not have a significant influence because the T Statistics value < 1.9, namely

Performance Expectancy (PE), Effort Expectancy (EE), and Facilitating Conditions (FC) on Behavioral Intention (BI). Meanwhile, the variables Social Influence (SI), Hedonic Motivation (HM), and Habit (H) have a significant influence on Behavioral Intention (BI). Then, the variables Facilitating Conditions (FC), Habit (H), and Behavioral Intention (BI) also have a significant influence on ChatGPT Use (GPTU).

B. Discussion

The findings of the SEM PLS analysis indicate that ChatGPT can effectively assist high school pupils in enhancing their learning. Several factors, such as Social Influence, Hedonic Motivation, and Habit, impact the extent of State High School pupils' inclination to utilize ChatGPT. The factors influencing the usage of ChatGPT among State High School students are Behavioral Intention, Habit, and Facilitating Conditions.

The analysis and correlation test results show that the first hypothesis cannot be accepted because the T Statstic value is <1.9 but declared positive because the original sample value is positive namely 0.041. Therefore, Performance Expectancy (PE) does not significantly affect Behavioral Intention (BI). This means that the use of ChatGPT in learning has yet to achieve optimal benefits or advantages for State High School students. Therefore, the level of use of ChatGPT in high school students is not based on ChatGPT performance expectations.

Furthermore, the analysis and correlation test cannot accept the second hypothesis because the T statistic value is <1.9. Still, it is declared positive because the original sample value is positive, namely 0.016. Effort Expectancy (EE) does not substantially impact Behavioral Intention (BI). Consequently, State High School pupils still need to improve in utilizing ChatGPT. It is necessary to assess the accessibility of the features and appearance to ensure ease of use for pupils. Thus, this will facilitate their future interaction with ChatGPT. Hence, the extent to which State High School students utilize ChatGPT is not determined by something other than ChatGPT's effort expectancy.

Then, in the analysis and correlation test, the third hypothesis can be accepted because the T Statstic value >1.9 and the original sample value is positive. So, Social Influence (SI) significantly positively affects Behavioral Intention (BI). This means that students' social influence influences the use of ChatGPT in learning. They tend to use ChatGPT based on recommendations from their surroundings, such as friends, relatives, and even teachers at school. Therefore, social influence is one of the factors supporting the level of use of ChatGPT.

The analysis and correlation test can accept the fourth hypothesis because the T Statistic value >1.9 and the original sample value are positive. So, Hedonic Motivation (HM) has a significant positive effect on Behavioral Intention (BI). This means state high school students feel satisfied using ChatGPT to support learning. They are happy with the answers or solutions ChatGPT provides to complete school assignments. Therefore, satisfaction is one factor supporting the level of use of ChatGPT.

Furthermore, the fifth hypothesis cannot be accepted in the analysis and correlation test because the T statistic value is < 1.9. However, it is declared positive because the original sample value is positive, namely 0.053. Therefore, Facilitating Conditions (FC) do not significantly affect Behavioral Intention (BI). This means that the facilities owned by schools and individuals have yet to support students using ChatGPT. One of them is the internet to access ChatGPT. This can be an evaluation of schools to support the use of ChatGPT at school by improving internet facilities so that they can be used for the public and are evenly distributed. Therefore, the condition of the facility is not a factor in the level of use of ChatGPT by State High School students.

A comparison between the findings of this study and existing literature, specifically Habibi's research, reveals significant differences, particularly in the role of facilitating conditions (FC) on behavioral intentions to use ChatGPT. The result shows that students who believe they have sufficient resources to use ChatGPT do not significantly impact students' behavioral intention because the T Statistics value < 1.9. This indicates that access to resources alone cannot influence students' intent. Instead, supportive school policies that promote equitable access to technology have a more substantial effect, enabling students to engage with ChatGPT independently of their access conditions. This collective encouragement mitigates the direct impact of facilitating conditions on students' behavioral intentions, underscoring the role of institutional support in fostering technology adoption.

In contrast, the literature presents a robust relationship between facilitating conditions and actual ChatGPT usage, as observed in Habibi's study. This relationship likely arises from the free availability of essential infrastructure, particularly internet access, which significantly influences student adoption of ChatGPT. Habibi's findings align with previous studies that identified FC as a strong predictor for using various technological systems. Furthermore, while both studies corroborate the role of Habit (H) in influencing ChatGPT usage, their perspectives on Behavioral Intention (BI) differ. Habibi identifies BI as the most significant predictor of ChatGPT usage in learning, emphasizing the importance of user intention. In this study, however, behavioral intention appears to be less directly influenced by available resources, highlighting instead the critical role of school policies in encouraging students' engagement with technology. These contrasting insights suggest that while resource accessibility can indeed impact usage, supportive school policies and institutional encouragement are essential in shaping students' behavioral intentions toward technology use in educational contexts.

On the other hand, in the analysis and correlation test, the sixth hypothesis, namely that Facilitating Conditions (FC) has a positive effect on ChatGPT Use (GPTU), can be accepted. This was found during interviews with students. Teachers at school have conducted counseling sessions on the use of AI applications. Although 42.4% of students admitted that they rarely used ChatGPT, they were used to using other AI applications. Therefore, facility conditions can be a factor supporting the intensity of ChatGPT.

The analysis and correlation test can accept the seventh hypothesis because the T statistic value > 1.9 and the original sample value is positive. So, Habit (H) positively affects Behavioral Intention (BI). This means that students' habits influence the use of ChatGPT in learning. They tend to use

ChatGPT to help with research or schoolwork, which causes them to become accustomed to using it for schoolwork.

Therefore, habit is one of the factors supporting the level of use of ChatGPT. The analysis and correlation test can accept the eighth hypothesis because the T statistic value > 1.9 and the original sample value is positive. So, Habit (H) positively affects ChatGPT Use (GPTU). This is due to their familiarity with utilizing ChatGPT as an educational aid in the academic setting. Therefore, the habit can act as a stimulant for the frequency of ChatGPT usage among students at State High School.

Furthermore, the ninth hypothesis's last analysis and correlation test can be accepted because the T Statistic value > 1.9 and the original sample value is positive. So, Behavioral Intention (BI) positively affects ChatGPT Use (GPTU). The State High School students' continued usage of ChatGPT is primarily influenced by social influence, level of satisfaction, and habit. Research has established a strong correlation between the satisfaction level with ChatGPT and the extent of the positive effect utilized. Additionally, state high school students accustomed to using ChatGPT will likely increase their frequency or intensity of usage. Hence, the extent of ChatGPT utilization is a contributing element that can amplify the frequency of ChatGPT usage among high school students.

Schools need to increase awareness and social support for the use of ChatGPT. This can be done through intensive socialization of the benefits and how to use ChatGPT among students and teachers. ChatGPT should be promoted within the school environment through various activities such as seminars, training, and workshops for students, teachers, and parents. The findings from Tlili *et al*. indicate that although ChatGPT is a valuable tool in education, its usage should be approached with greater caution, necessitating the establishment of more precise guidelines for its safe implementation in educational settings [51].

To improve the quality of facilities and access to technology, schools should ensure that technology facilities, such as fast and stable internet access, are available to all students. The addition of computer or tablet devices that can be used to access ChatGPT should also be considered.

To improve the design and ease of use of ChatGPT, schools can provide feedback to the app developers regarding features that can improve ChatGPT's ease of use for students. Training and tutorials on using ChatGPT should be offered to students and teachers [38].

In developing positive technology use habits, schools must encourage regular use of ChatGPT in teaching and learning activities, such as daily assignments, research projects, and extracurricular activities. By doing so, students will get used to using this technology in their daily academic activities [52].

In evaluating and monitoring technology use, schools need to conduct regular evaluations of the effectiveness of ChatGPT in the teaching and learning process. Feedback from students and teachers should be collected and analyzed to improve the use of this technology continuously [53]. The Education Office should oversee and evaluate the programs implemented in schools. They can create clear policies and guidelines on using technology in education and reward schools and students who demonstrate innovative and effective use of technology.

Experts in education and technology recognize ChatGPT's potential to enhance self-learning and deepen students' understanding across various subjects. However, they emphasize the importance of addressing information accuracy, data privacy, and ethical use. To ensure effective and responsible AI integration, schools must overcome challenges like infrastructure limitations and system compatibility while also implementing clear policies and providing comprehensive training for both teachers and students.

ChatGPT can be integrated into the curriculum to support learning in subjects like English, History, Science, and Mathematics. For instance, in English, it can assist with essay writing, idea generation, and grammar refinement, while teachers help students critically assess AI-generated content. In History, ChatGPT can summarize texts, create study questions, and simulate historical debates, enhancing student engagement. In Science and Math, AI tools can simplify complex concepts and generate practice problems for students. Moreover, ChatGPT can facilitate research, report writing, and presentations in project-based learning, fostering collaboration as students evaluate and refine AI-suggested ideas.

Integrating AI tools like ChatGPT in education raises essential ethical issues, including data privacy, security, and potential bias in AI outputs. This study highlights concerns about how AI-generated content may inadvertently reinforce biases, shaping student perspectives and leading to a less inclusive learning environment.

While AI offers significant learning benefits, students must recognize its limitations. Over-reliance on ChatGPT could undermine critical thinking if treated as a shortcut rather than a learning aid. Unlike previous studies, such as Habibi's, which focus on behavioral intentions and infrastructure, this research emphasizes the need for ethical guidelines that address AI's impact on student autonomy and integrity. This study thus broadens the literature by advocating for responsible and thoughtful use of AI, encouraging students to view it as a tool that supports rather than replaces their learning efforts.

By considering these implications, students can create a more modern, supportive, and effective learning environment by utilizing technology such as ChatGPT, thus improving the quality of education and students' readiness to face future challenges.

C. Implications

This research contributes to understanding how to overcome performance and effort expectations and the role of habit in technology adoption. Despite the low impact of these factors on behavioral intention, future studies should explore ways to enhance students' perceptions of ChatGPT's benefits and ease of use by identifying barriers such as user interface complexity and feature accessibility. Strategies like simplifying interfaces, offering tutorials, and creating personalized learning experiences can improve usability. Additionally, habit's significant role in influencing intention and usage suggests the need to cultivate regular, meaningful interactions with ChatGPT, potentially through daily academic routines or gamification elements that motivate consistent use.

Teachers' perspectives on students' use of ChatGPT vary, with some seeing it as a helpful tool to deepen subject understanding. In contrast, others express concern about students' over-reliance on technology, fearing it might weaken critical thinking skills. Teachers also emphasized the importance of clear policies and infrastructure support, including stable internet and proper devices, to ensure effective integration of ChatGPT into the learning process. Comprehensive guidance and training for students and teachers are essential to optimize ChatGPT's educational benefits.

This study's findings suggest that while AI tools like ChatGPT can enhance learning, ethical considerations must guide their use. Schools should implement AI in ways that promote critical thinking and responsible use, encouraging students to explore topics independently rather than relying on AI for quick answers. This approach prevents over-reliance on AI, helping students maintain solid analytical and independent thinking skills.

Comprehensive ethical guidelines are essential for the responsible use of AI. Schools should ensure data privacy and security by using secure platforms and educating students on data protection practices, such as avoiding sharing sensitive information with AI tools. School policies should also include guidelines on ethically using AI-generated content, parental consent for younger students, and monitoring usage to uphold academic integrity. Additionally, equitable access to AI tools is crucial. Partnerships with technology companies and government programs can help under-resourced schools secure reliable internet and devices. Providing mobile-friendly or offline-accessible AI tools can further bridge the gap for students without consistent internet access, ensuring all students can benefit responsibly from AI enhanced learning.

By understanding and applying these implications, educators, and policymakers can create a more supportive and effective learning environment that leverages the benefits of AI technologies like ChatGPT. Table 7 outlines the key results and practical recommendations from this study, highlighting areas such as enhancing learning efficiency, developing positive technology use habits, and addressing ethical concerns.

Table 7. Result and implications

No.	Aspect	Result and Implications
1.	Enhancing Learning Efficiency	This research found that students who regularly used ChatGPT experienced quicker and more efficient completion of assignments and writing tasks.
		Schools should integrate ChatGPT into daily academic routines, such as homework assignments and project-based learning, to help students manage their workload more effectively. This can lead to improved time management and productivity among students.
2.	Developing Positive Technology Use Habits	The chronic use of ChatGPT influenced students' behavioral intentions and actual usage positively.
		Schools should incorporate ChatGPT into various educational activities to encourage regular and meaningful interactions. This could involve gamification elements like rewards and challenges to motivate consistent use.
3.	Addressing Ethical and Privacy Concerns	Concerns about data privacy, security, and potential misuse of AI-generated content were highlighted.
		Schools need to establish clear guidelines and policies to ensure the ethical use of ChatGPT. This includes obtaining parental consent for students under 18, protecting student data, and educating students about the responsible use of AI tools.
4.	Improving Access and Infrastructure	Access to stable internet connections and adequate devices was crucial for using ChatGPT effectively.
		Schools must invest in digital infrastructure, including reliable internet access and sufficient computer or tablet devices. This ensures that all students have equal opportunities to benefit from AI technologies.
5.	Training and Support	Both students and teachers benefited from training sessions on how to use ChatGPT effectively.
		Continuous professional development for teachers and comprehensive tutorials for students are essential. Schools should provide ongoing support to help users navigate and utilize ChatGPT's features optimally
6.	Monitoring and Evaluation	Regular monitoring and feedback collection were necessary to assess the effectiveness of ChatGPT in the learning process.
		Schools should implement a system for evaluating the impact of ChatGPT on student learning outcomes. Feedback from both students and teachers should be used to make iterative improvements to the integration of AI tools in education

AI technology, such as ChatGPT, has great potential to support student learning. However, students need to understand and apply ethics when using AI to ensure it aligns with academic standards and personal integrity, as in Fig. 3. First, AI should be seen as a learning aid, not a shortcut to completing assignments. Students should use this technology to deepen their understanding of the material and strengthen their knowledge rather than relying on AI to complete tasks automatically. This is also related to the principle of intellectual honesty, where students must be truthful in using the information generated by AI, including citing the source when referencing AI in their work.

Fig. 3. Ethical guide for students using AI.

In addition, safeguarding privacy is crucial. Students must avoid entering personal or sensitive information into AI systems to protect their privacy and that of others. Students should also use AI responsibly, ensuring that the content produced is not harmful, misleading, or inappropriate. On the other hand, while AI can provide quick answers, students must continue to rely on their critical thinking skills to analyze information and solve problems. Over-reliance on AI can hinder personal growth in the learning process.

If students are unsure about the proper use of AI, they should seek guidance from their teachers. This ensures that AI usage remains in line with school policies and academic standards. Moreover, avoiding plagiarism is of the utmost importance. Students should create original work and use AI only as a reference, not as a direct copy without understanding.

AI has its limitations, and students need to be aware of this. They should always verify the accuracy of information provided by AI and ensure that the sources used are credible. Furthermore, students must maintain digital security by using AI properly without compromising the school's technological systems. Reporting technical issues or violations is also part of their responsibility.

Lastly, maintaining integrity in the classroom is critical. Students should ensure that AI is only used in class activities, exams, or assessments if permitted by the teacher. This is important to uphold fairness and integrity in the learning process.

Integrating AI tools like ChatGPT in high schools brings significant benefits and highlights socio-economic challenges, especially in under-resourced areas. Students in these schools often lack access to reliable internet and devices, which can widen the digital divide and limit their exposure to technology-enhanced learning. These resources are necessary for students to fully benefit from AI tools, impacting their overall learning experience and technological readiness.

Schools can partner with government programs, tech companies, and local businesses to address these disparities and secure funding for improved infrastructure, including better internet and shared devices. Non-profit organizations and volunteer groups might also provide free training and technical support to ensure all students can effectively use tools like ChatGPT. Implementing mobile friendly or offline accessible versions of AI tools could further support students who lack internet access at home. Schools can create a more equitable learning environment by focusing on these solutions, ensuring all students can benefit from AI in education.

By applying these ethical principles, students can maximize the benefits of AI technology while upholding academic values and personal responsibility. This approach enhances educational outcomes and prepares students for a future where AI plays a significant role in various aspects of life. It's very possible to become material for future research.

As shown in Fig. 4, the implementation of ChatGPT in schools follows a structured process that begins with assessing needs and resources, proceeds through teacher training and curriculum integration, and culminates in monitoring and ethical guidelines. In a pilot program at an under-resourced rural school, ChatGPT was deployed on shared devices to support English language learning. Teachers used it to design interactive exercises, while students accessed it for personalized grammar corrections and vocabulary building. Within three months, students reported increased confidence in language skills, and teachers saved an average of five hours per week on lesson preparation.

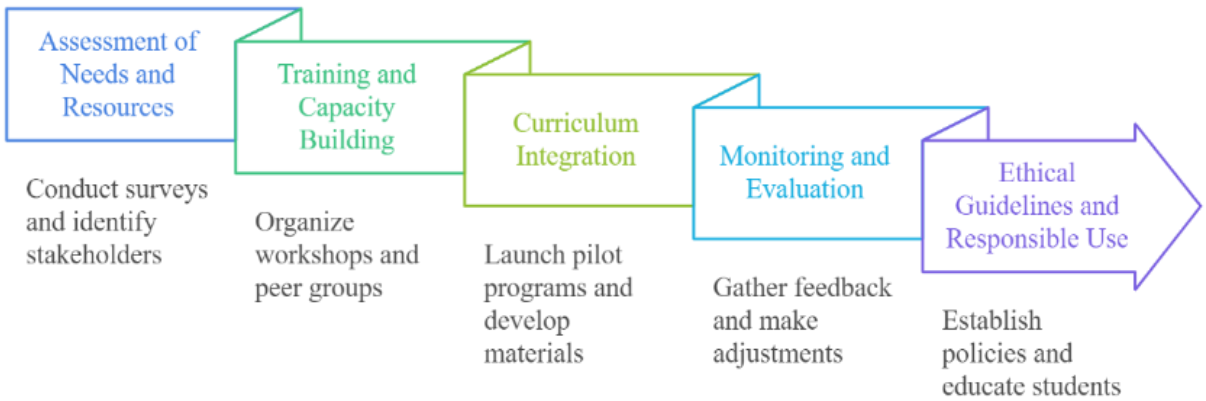

Fig. 4. Practical recommendations for implementing ChatGPT.

So, to implement ChatGPT in schools, start by assessing needs through surveys on infrastructure and educational requirements and involve stakeholders like teachers, students, and parents to address concerns. Provide teacher training through workshops and peer learning groups to build skills in using ChatGPT for lesson planning and engagement. Begin with pilot programs in selected classes, focusing on subjects like language learning or STEM, and create inclusive, student-centred materials. Regularly collect feedback from students and teachers to refine the approach. Finally, ethical guidelines should be established, and students should be educated on using ChatGPT responsibly as a learning tool to support critical thinking.

The pilot implementation of ChatGPT in an under-resourced rural school highlighted several challenges that informed the development of effective integration strategies. Among these, technological limitations posed significant barriers, such as insufficient access to devices and unreliable internet connectivity. To overcome these issues, the school organized a structured schedule for shared use of available desktop computers and tablets, ensuring equitable access for all students. Additionally, offline resources generated with ChatGPT were prepared in advance to facilitate continued learning during connectivity issues. These adaptive measures

demonstrate how AI tools can be tailored to function effectively in low-resource environments.

Another notable challenge was the reluctance among teachers to adopt ChatGPT, largely due to a lack of familiarity with the technology and concerns about its accuracy. To address this, the school organized targeted professional development workshops to equip educators with the skills and confidence to utilize ChatGPT for lesson planning and classroom engagement. The formation of peer mentoring groups further supported this effort, enabling experienced teachers to guide their colleagues through the adoption process. This collaborative approach successfully reduced hesitancy and created a more supportive environment for integrating AI technology into teaching practices.

Engaging students was also a key focus, as initial perceptions of ChatGPT as a formal and complex tool hindered its acceptance. To make the experience more approachable and enjoyable, the school integrated gamified elements such as AI-generated quizzes and vocabulary games into the curriculum. A student-led "ambassador" program was also introduced, where selected students supported their peers in navigating and utilizing the tool effectively. These initiatives led to tangible benefits, including increased student confidence in language skills and a significant reduction in teacher workload, with educators reporting an average of five hours saved per week on lesson preparation.

For example, Table 8 provides practical prompts for educators during the needs assessment phase. These prompts help ensure comprehensive planning and stakeholder involvement.

Table 8. Example Prompts for Implementing ChatGPT in Schools

Aspect	Example Prompts
Needs Assessment	*"What questions should I include in a survey to evaluate the technological needs of our school?"*
	"Suggest ways to involve parents and teachers in discussions about integrating ChatGPT in schools."
Training Programs	*"Create a step-by-step guide for training teachers to use ChatGPT for lesson planning."*
	"Design a workshop agenda for introducing ChatGPT in classroom settings."
Curriculum Integration	*"Generate a personalized lesson plan using ChatGPT for a STEM class with limited resources."*
	"How can ChatGPT be used to create language learning materials for students with diverse needs?"
Monitoring & Evaluation	*"Develop a feedback form to assess the effectiveness of ChatGPT in improving student learning outcomes."*
	"Suggest a system for monitoring teacher and student engagement with ChatGPT tools."
Ethical Guidelines	*"Draft guidelines for ensuring academic integrity when using ChatGPT in schools."*
	"How can we educate students about responsible use of ChatGPT in their studies?"

These guidelines can guide educators, administrators, and stakeholders in effectively utilizing ChatGPT to address the challenges of human resource shortages in schools. With a structured approach, ChatGPT can be an innovative solution to support teaching and learning activities, reduce teacher workload, and improve educational accessibility, especially in areas with limited infrastructure. Through proper implementation, such as teacher training, curriculum integration, and the implementation of ethical use policies, ChatGPT not only helps address educational gaps but also encourages the creation of more inclusive and adaptive learning experiences for students.

This study, which primarily addresses challenges faced by under-resourced schools, presents strategies that can be adapted for urban or better-equipped schools, which typically have greater access to infrastructure, technology, and resources. In these environments, ChatGPT can be more easily integrated into classroom activities with the availability of high-speed internet, dedicated devices, and digital learning platforms. These schools can utilize ChatGPT for personalised learning and to foster collaborative projects, where students can work together on AI-driven research or solve real-world problems in subjects such as STEM, humanities, or social sciences.

ChatGPT's ability to provide individualized feedback and support differentiated instruction can be particularly beneficial in urban schools with larger and more diverse student populations. Teachers can tailor lesson plans to meet the needs of students with varying proficiency levels within the same class. For instance, some students might use ChatGPT to deepen their understanding of challenging topics or receive instant grammar corrections. In contrast, others may engage in more creative tasks, such as developing AI-driven simulations or producing content-based projects. This flexibility allows ChatGPT to be adapted to a broad spectrum of teaching approaches and learning goals.

In capital city schools, where educators may already possess higher technological expertise, professional development for ChatGPT integration can be more advanced. The focus can shift to using AI for data analysis to track student progress and assess learning outcomes. Rather than simply covering the basics, training programs in these schools could emphasize how AI tools like ChatGPT can enhance teaching strategies, such as automating the creation of quizzes, generating lesson summaries, and producing advanced instructional materials. Additionally, urban schools could incorporate ChatGPT into project-based learning, enabling students to take more responsibility for their learning, conduct research, collaborate on presentations, and explore new ways to engage with content.

Finally, urban schools are in a position to develop more comprehensive ethical guidelines for AI usage. Since students in these environments will likely encounter AI tools earlier in their academic careers, the guidelines can include teaching digital citizenship, fostering responsible use of AI, and enhancing critical thinking skills. By integrating ChatGPT into digital literacy curricula, these schools can promote discussions around the societal impacts of AI, such as privacy, bias, and misinformation. This proactive approach not only empowers students to use AI ethically but also prepares them for the growing role that AI will play in their future academic and professional lives.

V. Conclusion

The research highlights that Social Influence, Hedonic Motivation, and Habit significantly impact the intention to use ChatGPT. Facilitating Conditions, Habit, and Behavioral Intention drive actual usage among high school students. To optimize the benefits of ChatGPT, there needs to be a focus on improving its performance expectancy, ease of use, and supporting facilities. The findings underscore the importance of social dynamics and user satisfaction in adopting educational technologies. Furthermore, numerous challenges

must be discussed: First, technological infrastructure is critical that all students have a dependable internet connection and the required gadgets. Schools must invest in digital infrastructure to provide an egalitarian learning environment. Second, training and support provide extensive training for instructors and students on how to utilize ChatGPT efficiently. This involves creating easy-to-follow lessons and hosting frequent seminars. Third, privacy and security, which establish clear data privacy and security criteria, are critical for protecting students' information and maintaining trust in technology.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

A. Pratita formulates research objectives and methodology, collects and analyzes data, and composes the research report for publication; T.LM. Suryanto and A. Pratama are academic advisors. They provide guidance on writing the article by educational standards and ensure the quality of the analysis and data used. A. Wibowo is the research supervisor, who monitors the progress of the research, provides feedback on the analysis and writing, and ensures that the research meets academic quality and ethical standards; All authors read and approved the final manuscript.

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