

Students' perspectives on the effectiveness of ChatGPT in virtual learning

Isaac Asampana, Henry Akwetey Matey, Ben T. Ocra, Jones Yeboah Nyame

Department of Information Technology, Faculty of Information Technology and Communication Studies,
University of Professional Studies Accra, Accra, Ghana

Article Info

Article history:

Received May 9, 2025

Revised May 26, 2026

Accepted Jun 17, 2026

Keywords:

Attitude

ChatGPT

Perceived ease of use

Perceived usefulness

Technology acceptance model

ABSTRACT

This research investigates how students perceive chat generative pre-trained transformer (ChatGPT) as a learning aid, examining its effects on engagement, usability, and educational achievement. Using the technology acceptance model (TAM) as the conceptual framework, a 24-item survey was designed and administered through simple random sampling. Results reveal that students largely view ChatGPT positively, describing it as an accessible and beneficial tool that promotes flexible and independent learning. The findings confirm TAM predictions, showing that perceived ease of use and favorable attitudes significantly influence adoption. By combining insights from both distance and on-campus learners, the study enriches understanding of how generative artificial intelligence enhances cognitive development and learning adaptability. Overall, the research reflects cautious optimism about ChatGPT's pedagogical value, acknowledging both its educational benefits and challenges while underscoring the essential role of usability and learner attitudes in fostering sustained artificial intelligence utilization in higher education.

This is an open access article under the [CC BY-SA](#) license.



Corresponding Author:

Henry Akwetey Matey

Department of Information Technology, Faculty of Information Technology and Communication Studies

University of Professional Studies Accra

Legon, P.O. Box LG 149, Accra, Ghana

Email: hmateyakwetey@upsamail.edu.gh

1. INTRODUCTION

The digital world necessitates a certain "autodidactic" profile, which includes a strong desire to learn, the capacity to locate and efficiently use online materials, and an interest in taking control of one's educational experience. Autodidactic learning occurs when learning is done without the assistance of a teacher. This style of learning necessitates the learner's autonomy and independence, and it frequently makes use of open educational resources and practices. Learners are not restricted to when to learn and customize their schooling to achieve their goals by taking charge of their education and development [1]. Chat generative pre-trained transformer (ChatGPT) is a chatbot that has created quite a stir in academia. Some lecturers in higher education worldwide are worried that students will be able to use it to produce term papers and essays by simply entering a few key terms and letting artificial intelligence do the rest. It can produce acceptable-quality paragraphs and college-level research papers. It can respond to test questions. Some believe that when ChatGPT learns and grows more sophisticated, novelists and poets will become obsolete. It is capable of producing short stories. It is suitable for writing books, or at least a first draft or outline [2].

According to Firat [3], ChatGPT may increase learners' autonomy while also improving learning experiences by providing individualized and interactive support that is customized to each learner's specific

needs and preferences. ChatGPT can enhance one's educational experience and boost student engagement in online courses by providing personalized, interactive support. Its capacity to provide personalized and interactive assistance is an enabler of self-tutelage [1]. Research shows that when generative artificial intelligence is used in structured curricula, it helps verify that what students do meets certain educational goals and assessment criteria [4]. Large language models (LLMs) can create practice problems and explain ideas in different ways, making sure that a wider range of students can still reach their learning goals [5]. According to Firat [3], the features and resources of ChatGPT are designed not only to enhance self-tutoring but also to ensure that learning objectives are met. ChatGPT now has a variety of applications for self-schooling.

Artificial intelligence language models like ChatGPT offer various benefits for learning in educational settings. They can act as digital learning companions, giving students individualized help with their schoolwork, aiding in tasks, and answering their questions. They also assist with research by helping students find and put together relevant information for their studies. Furthermore, these models can improve writing skills by reviewing and refining essays and papers, providing helpful advice on grammar and the quality of the writing. Beyond academic help, they can support organization by assisting with schedules and creating reminders for assignments and tests. They also encourage customized learning by suggesting suitable learning materials and tasks that match student interests and objectives. Lastly, they can increase student involvement in online learning by enabling engaging and interactive activities that relate to what is being taught.

Previous studies have used a qualitative approach in assessing the effects of ChatGPT on education and public health [1], [3], [6], [7]. This study will employ quantitative techniques to establish learners' perspectives on the effectiveness of ChatGPT in virtual learning in Ghana. The quantitative approach was selected because it is based on quantitative facts and statistical analysis, which reduces the possibility of bias in the study process. It also increases the reliability and reproducibility of the research findings by other researchers.

The primary goal of this research is to examine how the constructs, namely usefulness, ease of use, and attitude, influence students' effectiveness of ChatGPT in virtual learning. A variety of factors impact the successful application of new technologies, including technical, social, cultural, and psychological characteristics that influence attitudes and behaviors toward technological innovations [8], [9]. The technology acceptance model (TAM) concept is used in the findings. According to studies [10], [11], the TAM and its various variants constitute an appropriate approach for supporting the assessment of diverse learning systems. TAM elements, ease of use, and usefulness are antecedent elements impacting educational technology acceptability [10].

2. LITERATURE REVIEW

2.1. ChatGPT in education

Because of its capacity to enhance students' learning experiences, the use of ChatGPT for educational purposes has sparked substantial interest. This method can target specific student needs, provide fast feedback, and aid in gaining an understanding of complicated concepts by offering quick and customized solutions. As a result, it becomes a potential instrument that encourages active engagement and cognitive advancement in students by responding to their study pace and providing constant help in their information-gathering procedures [12], [13]. Continuing this line of thought, it is a good instrument for encouraging students' growth in writing skills. Students can obtain grammatical corrections, recommendations for advancement, and extensive feedback on their writing by communicating with the system, allowing them to improve their written discourse and attain greater efficacy in their expressed thoughts [14]. As a result, ChatGPT offers itself as a useful tool for scientific writing; nonetheless, it is critical to recognize that it should not be regarded as an all-encompassing solution for intellectual material generation. Authors must use their expertise and skills to validate and supplement the tool's content. It does, however, excel at facilitating discussions among groups and encouraging collaborative involvement by learners in projects and tasks. This promotes a feeling of belonging among students by allowing for communication and the exchange of ideas [12].

ChatGPT is a very useful application for educators, enhancing the development of syllabuses, learning resources, and assessment activities. However, there is a need to address its content reliability. One possibility for ChatGPT is its capability to produce materials and resources for training courses and programs [15]. Technological innovation has taken on a key role in how we survive in a constantly evolving society, and it has left its imprint on the field of higher education. ChatGPT, an innovative product of open artificial intelligence (OpenAI), is changing the way learners and lecturers engage with their education in the learning environment. ChatGPT deployment in schools presents a variety of benefits and problems that

teachers and administrators must be aware of if they want to improve the learning environment's quality [12]. According to Rudolph *et al.* [16], ChatGPT's advanced capabilities provide appealing potential for educators to improve pedagogical practices by designing and implementing interactive classroom activities. Educators are enabled to devise creative teaching strategies with the use of ChatGPT. One example is the use of the flipped classroom approach, in which learning possibilities are not limited to the classroom but extend to remote locations, promoting a culture of autonomous study among students [17].

2.2. Technology acceptance model

According to Natasia *et al.* [18], the TAM summarizes how attitudes, perceived usefulness, and ease of use influence people's positive or negative evaluations of their desire to use a technology. According to Hossain *et al.* [11], Davis introduced TAM in 1986. According to TAM, perceived ease of use can influence perceived usefulness. Furthermore, attitude and perceived usefulness predict behavioral intention to embrace a technology, while intention can influence the actual use of the technology. TAM makes it easier and faster to acquire information on one's attitudes towards using a technology [18], [19]. Hossain *et al.* [11] claim that in 1986, Davis defined perceived usefulness as the extent to which an individual using a particular technology believes that it will enhance their work performance, while perceived ease of use is the degree to which an individual uses a technology effortlessly. The positive or negative emotions people experience while engaging in behavior can also be used to describe attitude [18]. Davis [20] described the purpose of using innovation in one's behavior as a pattern of behavior that continues to employ technology.

3. METHOD

A set of online questionnaires was distributed to 1,104 students who were University of Professional Students Accra (UPSA) in either year 3 or 4 at UPSA. The questionnaire included demographic data such as the age and gender of the participants, students' attitudes towards ChatGPT, its perceived usefulness and perceived ease of use, and its effectiveness in enhancing learning performance. The study model depicted in Figure 1 served as the foundation for the questionnaire's design. The survey data were examined using SPSS software.

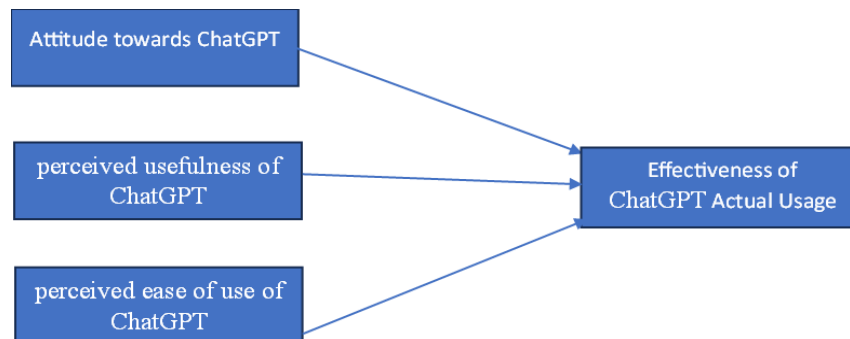


Figure 1. Research model

3.1. Research respondents

According to the researchers [18], [21], a publication in 2002 asserts that all samples are obtained in research if it is anticipated that there will be fewer than 100 responses. However, researchers should consider a sample ratio of 10%–15%, 20%–25%, or more if there are more than 100 respondents. Because there were slightly more than 8,000 respondents in this study, a 10% sample ratio of the population was adopted, with respondents to be considered as participants when selecting the sample. The researchers employed a simple random sampling technique. In all, a total of 1,104 respondents, consisting of third-year and final-year undergraduates at the UPSA, completed the online questionnaire.

3.2. Questionnaire and data collection

This procedure involved creating a questionnaire using a variety of factors suggested by Majid and Hasim [22] and declaration indications from Natasia *et al.* [18], both of which make reference to the TAM model and adjust for the requirements of the investigators. Values ranging from 1 (disagree) to 2 (agree) were used to evaluate the research questionnaire design. Table 1 displays the statement indications.

3.3. Research model

The extended TAM-based constructs research by Majid and Hasim [22] was used as the research framework in this investigation. According to Figure 1, the proposed framework comprises four variables. The model incorporates a supportive condition variable, which turns into an external variable and is part of the TAM's fundamental structure. Another study indicated how enabling factors can predict the ease of use of innovation and technology integration in higher education [18]. Additionally, Hossain *et al.* [11] demonstrate that perceived usefulness and the variable facilitating condition are significantly associated. Two key parts make up the suggested research model: independent variables and dependent variables. The four variables that constitute the independent variable—attitude towards ChatGPT, its perceived usefulness, and its perceived ease of use—show how it may have a significant impact on the effectiveness of virtual learning systems.

3.4. Construct validity and reliability assessment

To evaluate the construct validity and reliability of the measurement instrument, an exploratory factor analysis (EFA) was conducted using statistical package for the social sciences (SPSS) version 27. Prior to analysis, the data were examined for suitability through two standard tests. The Kaiser–Meyer–Olkin (KMO) measure exceeded the recommended threshold of 0.70, confirming sampling adequacy, while Bartlett's test of Sphericity was statistically significant ($p < 0.001$), indicating that the correlation matrix was factorable [23], [24]. These results validated the appropriateness of the dataset for factor analysis.

The EFA employed principal axis factoring with varimax rotation to identify and refine the underlying factor structure. Factors were retained based on established statistical and theoretical criteria; specifically, items with factor loadings ≥ 0.50 and communalities above 0.40 were preserved, while those with substantial cross-loadings were excluded [25]. The extracted components displayed clear, interpretable loading patterns consistent with the hypothesized theoretical framework, thereby supporting construct validity. Reliability analysis using Cronbach's alpha further confirmed the internal consistency of the constructs. All variables recorded alpha values above the conventional 0.70 threshold, demonstrating strong internal reliability [26]. These findings collectively affirm that the measurement instrument was both valid and reliable, providing dependable results for subsequent analyses.

4. RESULTS AND DISCUSSION

This section analyses the findings of our research on students' perceptions of the effective use of ChatGPT in virtual learning based on factors such as the attitude of the student, the perceived usefulness of ChatGPT, and the perceived ease of use of the ChatGPT application.

4.1. Demographic characteristics

Out of the 1,104 respondents, the survey reveals a predominantly young student body, with over 81% aged 18 to 23, which is characteristic of undergraduate populations in Ghanaian universities. The nearly equal distribution between those aged 18–20 and 21–23 suggests consistent enrollment across academic years, with minimal attrition. The number of respondents per age is shown in Figure 2.

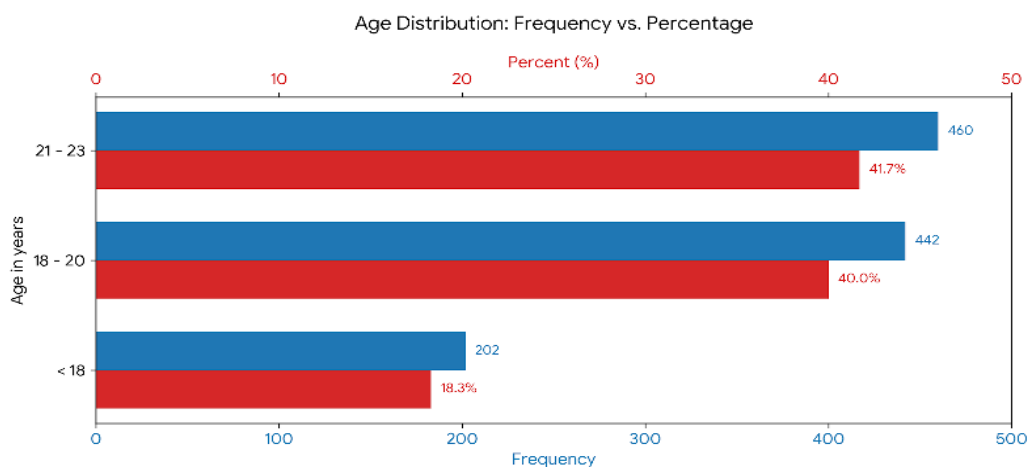


Figure 2. Age in years of respondents

A higher proportion of male students (61.5%) is observed, consistent with trends in Ghanaian universities, particularly in technology-focused fields. However, the presence of female students (38.5%) points towards increasing gender balance in higher education. The number of respondents per gender is shown in Figure 3.

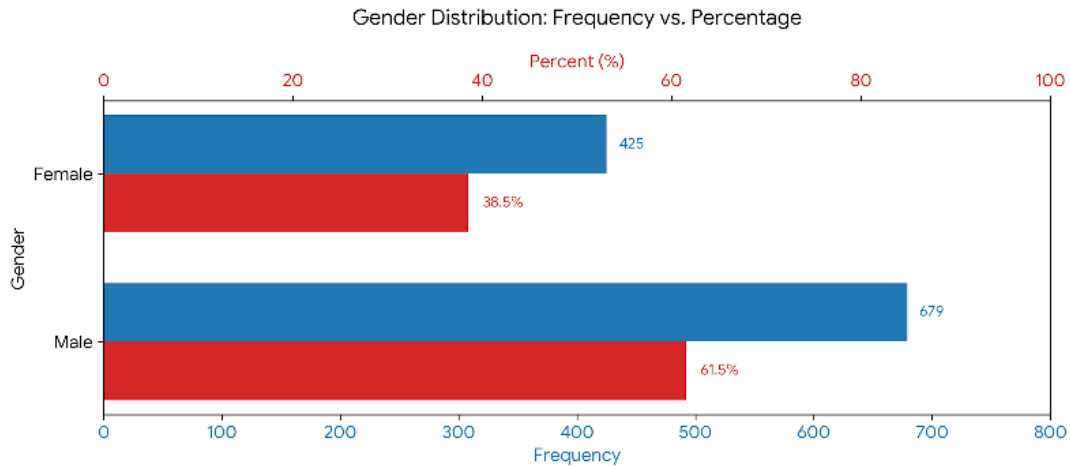


Figure 3. Gender of respondents

The survey sample consists entirely of students in their third (54.3%) and fourth (45.7%) years of study. The even distribution implies consistent student retention through to the final year, reflecting program stability and effective academic progression structures. The number of respondents per academic year is shown in Figure 4.

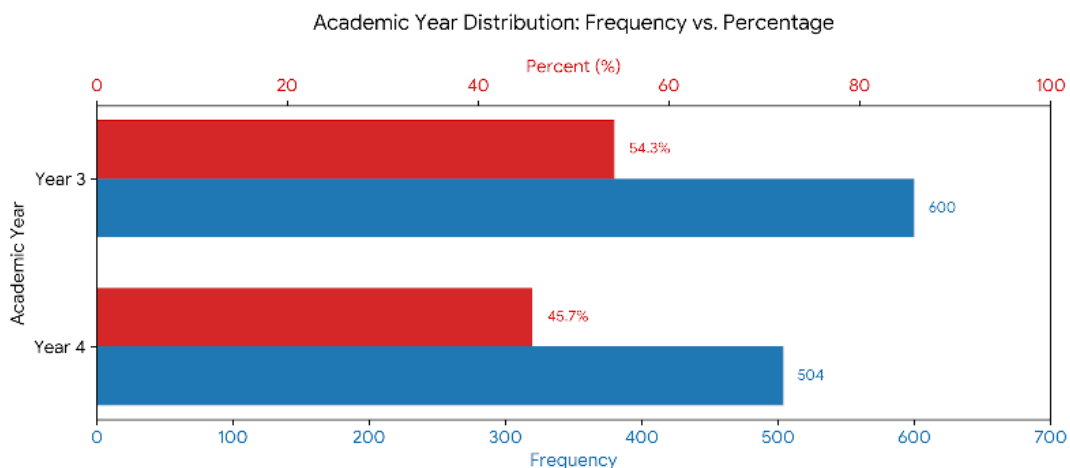


Figure 4. Academic year of respondents

The most popular academic programs are Bachelor of Business Administration (BBA) (18.1%) and B.Sc. Accounting and Finance (17.2%), collectively representing over a third (35.3%) of the surveyed students. B.Sc. Information Technology (16.5%), B.Sc. Accounting (13.8%), BA Public Relations (13.3%), and B.Sc. Real Estate (12.8%) are also significant, each comprising between 12.8% and 16.5% of the student population. B.Sc. Marketing is the least represented program at 8.3%. The academic mix is largely centered around business-related fields (over 70%), alongside substantial representation from information technology, public relations, and real estate. This combination signifies a university environment that values diverse

disciplines and the growing convergence of technology and business studies. The number of respondents per academic programs is shown in Figure 5.

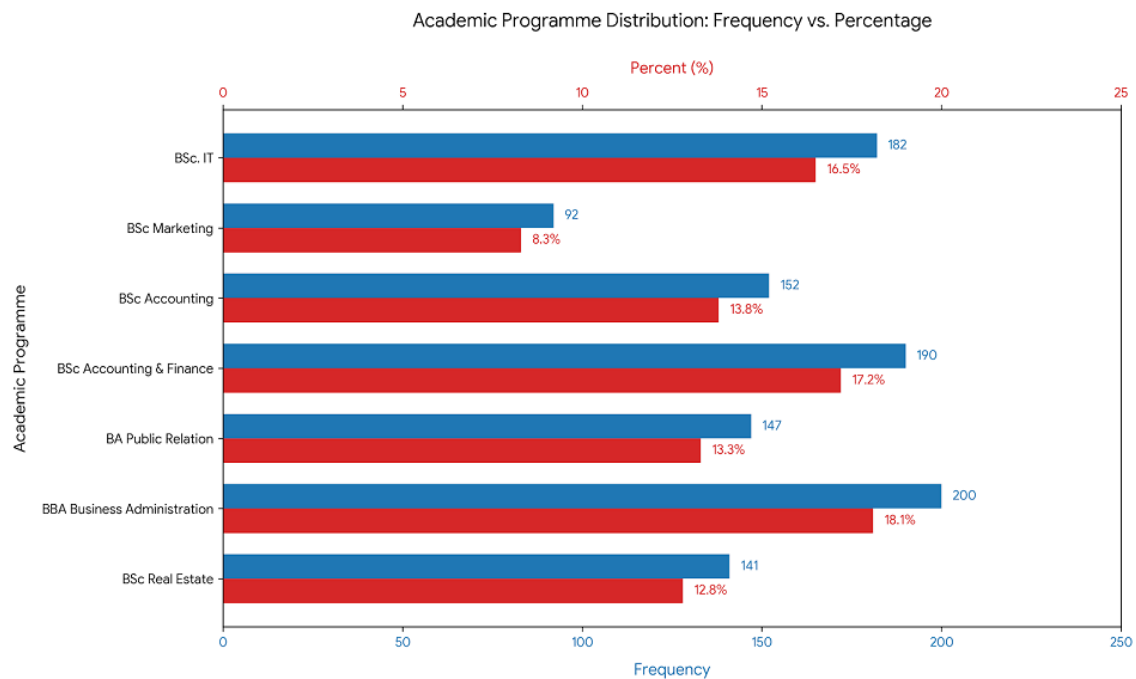


Figure 5. Academic programme of respondents

4.2. Descriptive analysis of technology acceptance model variables

4.2.1. Students' attitude towards ChatGPT

The result displayed in Table 1 depicts the students' attitude towards the ChatGPT application. The results reveal a generally positive attitude toward ChatGPT use in distance learning. Mean (M) scores ranged from 1.25 to 1.68 on a two-point scale (1 = disagree and 2 = agree), indicating that students largely agreed with statements reflecting favorable attitudes. The highest mean (M = 1.68, standard deviation (SD) = 0.47) for “ChatGPT will be compatible with smart devices I use in distance learning” suggests strong confidence in its technological adaptability. Similarly, agreement that “the use of ChatGPT is a trend during distance learning” (M = 1.62, SD = 0.49) and that “ChatGPT is a good idea to use” (M = 1.60, SD = 0.49) demonstrates widespread acceptance and perceived relevance of ChatGPT in the digital learning environment.

Table 1. Students' attitude towards ChatGPT

Question	M	SD
Incorporating ChatGPT into remote education seems like a beneficial approach.	1.6	0.489
The adoption of ChatGPT appears to be a growing pattern within online learning environments.	1.62	0.485
ChatGPT is expected to function seamlessly across the digital devices I utilize for virtual studying.	1.68	0.466
Engaging with ChatGPT as a learning tool makes remote education more enjoyable.	1.56	0.497
My interaction and cooperation with peers and instructors have improved through ChatGPT.	1.54	0.498
I rely on ChatGPT to help me fulfil academic tasks given by my instructors.	1.43	0.495
Using ChatGPT as a study medium has enhanced my ability to grasp course content.	1.35	0.478
ChatGPT holds little appeal to me, as I find it lacks engaging qualities.	1.28	0.451
I am unfamiliar with the proper way to operate ChatGPT.	1.25	0.432

Moderate means for “learning through ChatGPT is interesting” ($M = 1.56$) and “ChatGPT increases collaboration with friends and teachers” ($M = 1.54$) indicate positive engagement. Though the lower mean for “I complete assignments with ChatGPT” ($M = 1.43$) reflects that while students appreciate its usefulness, they may limit its use to support rather than replace personal effort. The lowest means, “I can understand better by learning via ChatGPT” ($M = 1.35$), “I am not interested in using ChatGPT because it’s not interesting” ($M = 1.28$), and “I do not know how to use ChatGPT” ($M = 1.25$), show that disinterest and lack of knowledge are minimal barriers.

These findings align with recent studies reporting that students perceive ChatGPT as a beneficial and accessible learning tool that enhances engagement and efficiency [22], [27]. Similarly, Saif *et al.* [28] found that positive attitudes toward ChatGPT correlate strongly with improved learning perceptions and performance outcomes. Sevnarayan [29] further observed that distance learners view ChatGPT as an innovative, interactive platform supporting flexible learning. Kim *et al.* [30] also found that artificial intelligence tools with credible features foster better engagement and learning outcomes due to perceived social presence. Collectively, the evidence confirms that students’ attitudes are largely favorable, characterized by enthusiasm, perceived usefulness, and technological readiness, consistent with the TAM’s premise that positive attitudes enhance adoption intentions.

4.2.2. Perceived usefulness of ChatGPT

The result displayed in Table 2 depicts the students perceived usefulness of the ChatGPT application. With a sample size of 1,104, descriptive analyses indicated generally favorable perceptions of ChatGPT within the context of remote education. The M scores on a two-point scale, where 1 represented disagreement and 2 represented agreement, were clustered tightly between 1.65 and 1.66. This suggests that a majority of students concurred that ChatGPT improves academic outcomes ($M = 1.66$, $SD = 0.47$), boosts productivity ($M = 1.65$, $SD = 0.48$), reduces time expenditure ($M = 1.65$, $SD = 0.48$), and provides educational benefit ($M = 1.66$, $SD = 0.48$). The small standard deviations imply a considerable degree of agreement amongst the participant group.

Table 2. Students perceived usefulness of ChatGPT

Questions	M	SD
The integration of ChatGPT into virtual education is expected to enhance my overall academic outcomes.	1.66	0.474
Utilizing ChatGPT within an online learning setup is anticipated to boost my productivity levels.	1.65	0.478
ChatGPT has the potential to reduce the amount of time I spend completing tasks during remote studying.	1.65	0.478
I consider ChatGPT to be a highly valuable resource throughout my virtual learning experience.	1.66	0.475

In sum, the collected data illustrate a moderately optimistic viewpoint regarding ChatGPT’s pedagogical worth. Students seem assured of ChatGPT’s capacity to support their academic endeavors, but maintain some degree of reservation concerning its impact on productivity and temporal efficiency. This observation is consistent with extant research indicating that students acknowledge ChatGPT’s ability to facilitate comprehension and efficiency while simultaneously advocating for prudence regarding excessive dependency and ethical considerations [27], [29], [31]. Parallel outcomes from a meta-analysis substantiated that the ChatGPT application has a moderate effect on educational perspectives and complex cognitive processes [31]. The documented mean trend, therefore, mirrors prevalent perspectives of measured optimism pertaining to generative artificial intelligence in tertiary education, highlighting both an understanding of its academic advantages and an acknowledgment of its functional constraints.

4.2.3. Perceived ease of use of ChatGPT

The result displayed in Table 3 depicts the students’ perceived ease of use of the ChatGPT application. Analysis of the data ($N = 1104$) indicates generally positive perceptions of ChatGPT’s ease of use in distance learning. The M scores ranged from 1.56 to 1.73 on a two-point scale (1 = disagree and 2 = agree), suggesting that most respondents agreed that ChatGPT is easy to use. The highest M score ($M = 1.73$, $SD = 0.44$) for the item “The use of ChatGPT in the distance learning process will become clear and easy to understand” reflects strong confidence in the platform’s learnability and intuitive design. Conversely, the lowest mean ($M = 1.56$, $SD = 0.50$) for “Interactions using ChatGPT are more flexible during distance learning” indicates slightly lower endorsement of its flexibility, though still positive overall.

Table 3. Students perceived the ease of use of ChatGPT

Questions	M	SD
Incorporating ChatGPT into academic tasks is anticipated to simplify the overall remote learning experience.	1.57	0.495
As its application within virtual education grows, ChatGPT is expected to become more straightforward and accessible to comprehend.	1.73	0.444
Engaging with others through ChatGPT offers greater adaptability and convenience within an online learning environment.	1.56	0.497
Throughout my remote academic journey, I believe achieving proficiency in navigating ChatGPT will come with relative ease.	1.59	0.492

The relatively low standard deviations (0.44–0.50) reveal a high degree of agreement among students, reinforcing that ChatGPT is widely regarded as a user-friendly technology. These findings are consistent with prior studies highlighting that students perceive ChatGPT as a tool that simplifies learning tasks and enhances usability in digital environments [27]. Similarly, Saif *et al.* [28] found that perceived ease of use significantly predicts students' behavioral intention to adopt generative artificial intelligence tools for learning. Sevnarayan [29] also noted that distance-learning students consider ChatGPT interactions easy to navigate and conducive to autonomous learning. Collectively, the results suggest that the system's simplicity and accessibility contribute to positive user experiences, aligning with the TAM's assertion that perceived ease of use fosters technology adoption in educational contexts.

4.3. Regression analysis on the effectiveness of ChatGPT actual usage

The result displayed in Table 4 depicts the effects of attitude, perceived usefulness, and perceived ease of use on the effectiveness of ChatGPT's actual usage in improving learning performance. The regression model examined the influence of perceived usefulness, ease of use, and attitude on the effectiveness of ChatGPT's actual usage during distance learning. The model produced an $R = 0.178$ and $R^2 = 0.032$, indicating that approximately 3.2% of the variance in ChatGPT's effectiveness is explained by three predictors. Although modest, this explanatory power is statistically significant ($F(3,1100) = 11.995$, $p < 0.001$), confirming that the predictors jointly contribute to explaining variations in ChatGPT usage effectiveness.

Table 4. The Effectiveness of ChatGPT to improve learning performance

Model	Dependent variable: effectiveness of ChatGPT actual usage					
	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% confidence interval for B
	B	Std. Error	Beta			Lower bound Upper bound
(Constant)	9.019	0.504		17.905	0.000	8.030 10.007
Usefulness	-0.129	0.046	-0.088	-2.796	0.005	-0.220 -0.039
Ease of use	0.220	0.050	0.139	4.414	0.000	0.122 0.317
Attitude	0.092	0.024	0.114	3.839	0.000	0.045 0.140
$R = 0.178^a$	$R^2 = 0.032$	Adjusted $R^2 = 0.029$		$F(3, 1100) = 11.995$		$P = 0.000$

Despite the relatively low R^2 , the model should be accepted because the F-test demonstrates overall model significance ($p < 0.001$), confirming that the predictors collectively influence ChatGPT's effectiveness [20]. The low standard error of the estimate and narrow confidence intervals indicate parameter stability and reliability [21]. The statistically significant beta coefficients align with the TAM frameworks, where ease of use and attitude are primary determinants of system effectiveness [28].

Among the predictors, ease of use ($\beta = 0.139$, $p < 0.001$) emerged as the strongest positive determinant, implying that students who find ChatGPT user-friendly are more likely to use it effectively. Attitude ($\beta = 0.114$, $p < 0.001$) also had a significant positive influence, suggesting that favorable perceptions directly enhance the quality and productivity of ChatGPT use. Conversely, Usefulness ($\beta = -0.088$, $p = 0.005$) exhibited a small but negative effect, implying that while students recognize ChatGPT's benefits, higher expectations of its usefulness may not necessarily translate into effective usage, possibly due to overreliance or inconsistent application.

These findings align with the TAM, which posits that perceived ease of use and positive attitude are key drivers of technology adoption [20]. Recent studies reinforce this pattern, showing that user-friendly artificial intelligence tools foster sustained engagement and effective application in learning contexts [27], [28]. Sevnarayan [29] similarly found that in distance-learning settings, students' attitudes and

perceived simplicity of ChatGPT strongly predict its productive use. Overall, the results confirm that while usefulness alone may not guarantee effectiveness, students' attitudes and ease of use perceptions are critical to achieving meaningful educational outcomes with ChatGPT.

5. CONCLUSION

The findings substantiate the TAM's assumptions by confirming that positive attitudes and perceived ease of use underpin students' willingness to adopt ChatGPT for academic purposes. Theoretically, it expands TAM's explanatory scope to encompass generative artificial intelligence-mediated learning, highlighting affective and cognitive determinants of technology adoption. Practically, the findings suggest that educators and institutions can leverage ChatGPT's intuitive interface to promote student engagement and autonomous learning while remaining cautious about overreliance. Despite its contributions, the study is constrained by self-report bias and contextual boundaries within a single institutional setting. Future research should triangulate quantitative findings with qualitative insights, examine cross-cultural variations, and test causality between ChatGPT usage and learning outcomes. Investigations into ethical literacy, digital competence, and instructor facilitation would further enrich understanding. Collectively, these insights affirm ChatGPT's emerging pedagogical promise and encourage evidence-based strategies for responsible integration in tertiary education.

FUNDING INFORMATION

Authors state no funding involved.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Isaac Asampana	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Henry Akwetey Matey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ben T. Odra		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Jones Yeboah Nyame		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓

C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nvestigation

R : **R**esources

D : **D**ata Curation

O : Writing - **O**riginal Draft

E : Writing - Review & **E**ditng

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding acquisition

CONFLICT OF INTEREST STATEMENT

The author declares that there are no known conflicts of interest associated with this publication. There are no financial or personal relationships that could inappropriately influence or bias the content of this work.

INFORMED CONSENT

Participants were informed about the aims and procedures of the study, confidentiality protections, and their right to withdraw at any time. All participants signed a consent form prior to participation and thus provided informed consent.

ETHICAL APPROVAL

Not applicable. This research did not involve human subjects, human biological materials, or experimental procedures on animals. The work was conducted solely on computational models, publicly available datasets, or non-sensitive data that did not require intervention with living organisms. Therefore, ethical approval from an institutional review board or animal ethics committee was not necessary for this study.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [HAM], upon reasonable request.

REFERENCES

- [1] S. Biswas, "Role of ChatGPT in education," *Journal of ENT Surgery Research*, vol. 1, no. 1, pp. 1–3, 2023.
- [2] R. W. McGee, "Is ChatGPT biased against conservatives? an empirical study," *SSRN Electronic Journal*, 2023, doi: 10.2139/ssrn.4359405.
- [3] M. Firat, "How ChatGPT can transform autodidactic experiences and open education?" *OSF preprints*, Jan. 12, 2023, doi: 10.31219/osf.io/9ge8m.
- [4] E. Kasneci *et al.*, "ChatGPT for good? on opportunities and challenges of large language models for education," *Learning and Individual Differences*, vol. 103, Apr. 2023, doi: 10.1016/j.lindif.2023.102274.
- [5] X. Zhai, "ChatGPT user experience: implications for education," *SSRN Electronic Journal*, 2022, doi: 10.2139/ssrn.4312418.
- [6] S. S. Biswas, "Role of ChatGPT in public health," *Annals of Biomedical Engineering*, vol. 51, no. 5, pp. 868–869, May 2023, doi: 10.1007/s10439-023-03172-7.
- [7] D. B.-Anu and L. O. Ansah, "Education in the era of generative artificial intelligence (AI): understanding the potential benefits of ChatGPT in promoting teaching and learning," *Journal of AI*, vol. 7, no. 1, pp. 52–62, Dec. 2023, doi: 10.61969/jai.1337500.
- [8] W. Zou, S.-S. Man, W. Hu, S. Zhou, and H.-S. Chan, "Factors influencing the acceptance of Industry 4.0 technologies in various sectors: a systematic review and meta-analysis," *Applied Sciences*, vol. 15, no. 9, Apr. 2025, doi: 10.3390/app15094866.
- [9] M. Sallam *et al.*, "Assessing health students' attitudes and usage of ChatGPT in Jordan: validation study," *JMIR Medical Education*, vol. 9, Sep. 2023, doi: 10.2196/48254.
- [10] A. Granić and N. Marangunić, "Technology acceptance model in educational context: a systematic literature review," *British Journal of Educational Technology*, vol. 50, no. 5, pp. 2572–2593, Sep. 2019, doi: 10.1111/bjet.12864.
- [11] M. A. Hossain, A. Tiwari, S. Saha, A. Ghimire, M. A. U. Imran, and R. Khatoon, "Applying the technology acceptance model (TAM) in information technology system to evaluate the adoption of decision support system," *Journal of Computer and Communications*, vol. 12, no. 8, pp. 242–256, 2024, doi: 10.4236/jcc.2024.128015.
- [12] M. M.-Rueda, J. F.-Cerero, J. M. F.-Batanero, and E. L.-Meneses, "Impact of the implementation of ChatGPT in education: a systematic review," *Computers*, vol. 12, no. 8, Jul. 2023, doi: 10.3390/computers12080153.
- [13] O. V. G. Sánchez, "Uso y percepción de ChatGPT en la educación superior," *Revista de Investigación en Tecnologías de la Información*, vol. 11, no. 23, pp. 98–107, Jun. 2023, doi: 10.36825/RITI.11.23.009.
- [14] J. A. C.-Osorio, "Explorando el potencial de ChatGPT en la escritura científica: ventajas, desafíos y precauciones," *Scientia et Technica*, vol. 28, no. 01, pp. 3–5, Mar. 2023, doi: 10.22517/23447214.25303.
- [15] C. K. Lo, "What is the impact of ChatGPT on education? a rapid review of the literature," *Education Sciences*, vol. 13, no. 4, Apr. 2023, doi: 10.3390/educsci13040410.
- [16] J. Rudolph, S. Tan, and S. Tan, "ChatGPT: bullshit spewer or the end of traditional assessments in higher education?," *Journal of Applied Learning & Teaching*, vol. 6, no. 1, Jan. 2023, doi: 10.37074/jalt.2023.6.1.9.
- [17] S. Grassini, "Shaping the future of education: exploring the potential and consequences of AI and ChatGPT in educational settings," *Education Sciences*, vol. 13, no. 7, Jul. 2023, doi: 10.3390/educsci13070692.
- [18] S. R. Natasia, Y. T. Wiranti, and A. Parastika, "Acceptance analysis of NUADU as e-learning platform using the technology acceptance model (TAM) approach," *Procedia Computer Science*, vol. 197, pp. 512–520, 2022, doi: 10.1016/j.procs.2021.12.168.
- [19] A. Akanferi, I. Asampana, A. H. Matey, and J. Aminarh, "Building loyalty in Zoom meeting app for teaching and learning environment," *Indian Journal of Science and Technology*, vol. 16, no. 31, pp. 2458–2468, Aug. 2023, doi: 10.17485/IJST/v16i31.1175.
- [20] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, Sep. 1989, doi: 10.2307/249008.
- [21] S. Arikunto, *Prosedur penelitian: suatu pendekatan praktik*. Jakarta, Indonesia: Rineka Cipta, 2002.
- [22] R. A. Majid and J. C. Hasim, "The effectiveness of frog VLE implementation: students' perspective," *Indonesian Journal of Electrical Engineering and Computer Science*, vol. 14, no. 1, pp. 381–387, Apr. 2019, doi: 10.11591/ijeecs.v14.i1.pp381-387.
- [23] D. J. Ketchen, "A primer on partial least squares structural equation modeling," *Long Range Planning*, vol. 46, no. 1–2, pp. 184–185, Feb. 2013, doi: 10.1016/j.lrp.2013.01.002.
- [24] A. Field, *Discovering statistics using IBM SPSS Statistics*, 4th ed. London, United Kingdom: Sage Publications, 2013.
- [25] B. G. Tabachnick and L. S. Fidell, *Using multivariate statistics*, 7th ed. Boston, United States: Pearson, 2018.
- [26] J. D. Hundleby and J. Nunnally, "Psychometric theory," *American Educational Research Journal*, vol. 5, no. 3, May 1968, doi: 10.2307/1161962.
- [27] V. M.-Mengual, O. F.-García, C. Berenguer, J. O.-Barón, M. D. G.-Llario, and V. E.-García, "Characteristics, motivations and attitudes of students using ChatGPT and other language model-based chatbots in higher education," *Education and Information Technologies*, vol. 30, no. 15, pp. 22257–22274, Oct. 2025, doi: 10.1007/s10639-025-13650-1.
- [28] N. Saif, S. U. Khan, I. Shaheen, F. A. ALotaibi, M. M. Alnfai, and M. Arif, "Chat-GPT; validating technology acceptance model (TAM) in education sector via ubiquitous learning mechanism," *Computers in Human Behavior*, vol. 154, May 2024, doi: 10.1016/j.chb.2023.108097.
- [29] K. Sevnarayan, "Exploring the dynamics of ChatGPT: students and lecturers perspectives at an open distance e-learning university," *Journal of Pedagogical Research*, vol. 8, no. 2, pp. 212–226, Apr. 2024, doi: 10.33902/JPR.202426525.
- [30] J. Kim, K. Merrill Jr., K. Xu, and S. Kelly, "Perceived credibility of an AI instructor in online education: the role of social presence and voice features," *Computers in Human Behavior*, vol. 136, Nov. 2022, doi: 10.1016/j.chb.2022.107383.
- [31] S. Shen, K. Xu, M. Sofriadi, and Y. Wang, "Exploring the factors influencing the adoption and usage of augmented reality and virtual reality applications in tourism education within the context of COVID-19 pandemic," *Journal of Hospitality, Leisure, Sport & Tourism Education*, vol. 30, Jun. 2022, doi: 10.1016/j.jhlste.2022.100373.

BIOGRAPHIES OF AUTHORS

Dr. Isaac Asampana    is a senior lecturer in the Department of Information Technology, Faculty of Information Technology and Communication Studies, University of Professional Studies Accra, Accra, Ghana. He has a Ph.D. degree in Computer Science, specializing in information systems. His current research interests are in the areas of data analytics, m-commerce, m-banking, e-learning, distance learning, cybersecurity, cloud computing, project management, and enterprise systems. He can be contacted at email: isaac.asampana@upsamail.edu.gh.



Dr. Henry Akwetey Matey    is a lecturer in the Department of Information Technology, Faculty of Information Technology and Communication Studies, University of Professional Studies Accra, Accra, Ghana. He holds a Ph.D. with a focus on cybersecurity in power generation and an M.Phil. in Information Technology, both from the Open University, Malaysia. His research interests include electronic payment systems, electronic funds transfer, service delivery, IT project management, and cybersecurity in the context of smart grids. He is a member of the Association of Computer Professionals, United Kingdom, and a Certified Cisco Network Associate. He can be contacted at email: hmateyakwetey@upsamail.edu.gh.



Dr. Ben T. Ocra    has over 20 years of teaching experience in information technology, MIS, research methodology, strategic management, business law, marketing, and e-commerce. As a lecturer with international experience, his aim has been to create an intellectual environment in which students can openly engage with each other in a very rewarding manner. He can be contacted at email: teye.ben@upsamail.edu.gh.



Jones Yeboah Nyame    is an adjunct lecturer at the University of Professional Studies, Accra, with research interests in IT project management, digital youth, and sociotechnical information systems. He combines his academic role with active industry involvement, applying his expertise to real-world projects and bridging the gap between theory and practice. He can be contacted at email: jonesyeboah.nyame@upsamail.edu.gh.