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EXAMINING COLLEGE STUDENTS' PERCEPTIONS REGARDING THE INTEGRATION OF CHATGPT INTO THEIR ACADEMIC ENDEAVORS: IMPACT OF USAGE INTENTIONS, INFORMATION VALIDATION, AND ETHICAL UTILIZATION

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Abstract
Artificial intelligence (AI) has being used in education worldwide more and more recently. Particularly considering its popularity among university students, the introduction of ChatGPT-3 has brought significant difficulties for higher learning. The purpose of this study was to find out how university students felt about including ChatGPTs within their academic activities. 350 people were polled online using a non-experimental, quantitative methodology. The findings showed a strong association with attitudes toward ChatGPT use and a number of variables. Specifically, higher beta values (β=0.806*, β=0.509*, and β=0.441*, respectively) show that responsible usage, frequent usage intent, and acceptance emerged as strong predictors of a good ChatGPT attitude. Furthermore, attitudes were much influenced by happy emotions (β=0.418**), although risk and boredom had less significant but still unfavorable effects (β=-0.104** and β=-0.145*, respectively). These results provide important new information about how students see and use ChatGPTs, which advances our knowledge of user behavior in educational technology settings. Behavioral propensity to use ChatGPT responsibly was influenced by factors including simplicity of use, frequent intent to use, acceptance, and intent to check information. As such, this paper offers ways for higher education institutions (HEIs) to improve their curricula by taking use of AI's possible advantages to promote AI literacy in students.

Keywords: chatgpt, technology adaptation, benefits, perceived usefulness

Introduction

The progress in creating artificial intelligence (AI) applications for education is advancing swiftly. Furthermore, the widespread implementation of artificial intelligence (AI) in the field of education has experienced a substantial rise during the digital age. As a result, the use of AI educational technology in higher education institutions (HEIs) is predicted to rapidly increase, leading to significant changes in teaching and learning (Rodway & Schepman, 2023). In late 2022, OpenAI launched the third iteration of its generative pretrained transformer, ChatGPT. This language model has the ability to comprehend human input and generate text that closely resembles natural human language (Mushtaque et al., 2021). This model is specifically developed to produce text that closely resembles human conversation. It is capable of executing many tasks such as translation, summarization, generating responses, and creating new text. The model is trained on a vast text dataset, which includes books, papers, and websites, using a language modeling assignment (Hassan et al., 2022). This enables it to acquire knowledge of patterns and connections in natural language and produce meaningful responses during a discussion.

The incorporation of artificial intelligence (AI) in education has multiple ramifications, including the attainment of high-quality education (Goal 4), the facilitation of novel methods for evaluation and instruction, and the provision of access to chatbots and virtual assistants for individualized learning (José-Ramón Sanabria-Navarro et al., 2023). Chatbots in Higher Education Institutions (HEIs) can fulfill different advising functions, such as assisting students in enhancing their comprehension through tailored inquiries, delivering responses, and acting as a repository of knowledge on diverse elements of university life, including module timetables and administrative structure.

The number of users of ChatGPT has experienced a rapid and significant increase, particularly in educational environments. Educators and colleges are implementing measures to regulate its utilization in academic settings. ChatGPT has achieved unprecedented growth since its release on November 30, 2022, becoming the most rapidly expanding user application in history. By early 2023, it had amassed a staggering 100 million active users. 55.6% of the participants in Japan indicated a readiness to utilize this chatbot in the future (Ray, 2023).

In the beginning of 2023, 12% of the participants said that they utilized ChatGPT for text generation, whereas 38% had encountered text produced by artificial intelligence. Internationally, ChatGPT has gained significant popularity among individuals aged 25 to 34, while those under 24 constitute the second-largest group of users (Abdullah et al., 2022). Collectively, these cohorts constitute over 60% of ChatGPT users, as younger individuals exhibit a greater propensity to engage with novel technologies.

Current studies have concentrated on the utilization of ChatGPT in educational environments. Research has investigated the attitudes of students and the elements that influence the adoption of these attitudes. University of Jordan students have shown a favorable disposition towards utilizing ChatGPT as an educational tool, notwithstanding reservations over its correctness (Kim et al., 2020). In Poland, the factors that strongly influenced students' plans to use ChatGPT were their regular usage of the platform, their belief in its effectiveness, and their desire for pleasure and enjoyment. Trust, perceived enjoyment, and informativeness had a substantial impact on the attitudes of students regarding ChatGPT in Bangladesh. Perceived utility in South Korea had a significant influence on students' intentions to continue using ChatGPT, both directly and indirectly (Sukhpal Singh Gill et al., 2023). In addition, academics have highlighted the necessity for institutions to establish procedures that guarantee the ethical and responsible utilization of ChatGPT, specifically addressing the possible issue of academic dishonesty (Malik et al., 2023).

The study utilized the abbreviated version of the Pupils' Attitudes Toward Technology model (PATT-SQ-SE) to assess the emotional aspects of attitudes towards technology, categorizing feelings and evaluating levels of interest, boredom, and significance. The Mitcham score questionnaire items were modified to assess cognitive, emotive, and behavioral aspects, based on Mitcham's technological dimensions: knowledge, volition, activity, and object. Utilizing Mitcham's conceptual framework of

technology is warranted due to its ability to serve as a comprehensive benchmark for assessing attitudes (Cotton et al., 2023).

The UTAUT2 model was employed due to its capacity to evaluate user acceptance and attitudes towards technology, taking into account factors such as perceived risk, ease of use, and intention to use. This paradigm is especially applicable for assessing the implementation of generative artificial intelligence, such as ChatGPT, during its first stage (Svenningsson, 2019). The main aim of this study is to examine the perceptions of university students towards ChatGPT. The objective of the project is to enhance the UTAUT2 and PATT-SQ-SE models through the inclusion of additional factors for assessing attitudes towards generative AI technologies in the Peruvian setting. Furthermore, it investigates the impact of the desire to utilize and the verification of information on the practice of responsible usage.

The precise aims of this investigation are:

1. Assess the relationship between cognitive component constructs and the behavioral component.
2. Assess the predictive relationship between affective component components and the behavioral component.
3. Analyze the impact of intended use and information verification on the responsible utilization of ChatGPT.

Although ChatGPT is increasingly popular in educational settings and has the potential to revolutionize learning and technology interaction, there is a dearth of empirical research on college students' perceptions towards this tool. Examining the variables that impact the desire to use, verification of information, and responsible use is essential for the ethical integration of ChatGPT in academic endeavors. This project seeks to solve the existing knowledge gap by establishing a basis for future research on the influence of ChatGPT in higher education. It aims to investigate how higher education institutions (HEIs) can incorporate this technology, tackle ethical concerns, and enhance students' digital literacy abilities. The findings will be applicable to educators, administrators, and policymakers who are interested in utilizing ChatGPT in higher education while minimizing hazards and encouraging responsible usage.

Rationale of Study

The rationale for doing this study is warranted due to the growing prevalence of generative AI tools such as ChatGPT, particularly in the field of education, which emphasizes the need of comprehending student perspectives. Examining these attitudes is crucial for efficient integration and application in academic endeavors, while also resolving any emerging difficulties. The study emphasizes the significance of advocating for ethical and responsible utilization, adding to the discussion on the influence of AI tools on higher education, and offering valuable perspectives on college students' perceptions about ChatGPT.

Literature Review

An attitude is a cognitive assessment of a psychological entity, distinguished by qualities such as positive versus negative and enjoyable versus unenjoyably. It denotes an individual's psychological inclination to cultivate specific behaviors. Traditionally, attitudes are categorized into affective, cognitive, and behavioral elements. A person's beliefs shape their attitudes towards technology, which subsequently impact their behavior. Consequently, the development of attitudes towards technology is influenced by these fundamental ideas, which in turn shape patterns of behavior (Mushtaque et al., 2022).

This study posits that attitude encompasses cognitive components, which include beliefs, experiences, and opinions concerning ChatGPT, as well as affective elements, which involve emotions towards ChatGPT, and behavioral aspects, which involve predispositions towards utilizing ChatGPT. The UTAUT2 is a comprehensive and flexible framework that may effectively evaluate the attitudes of university students towards generative AI (Singh et al., 2020). The UTAUT2 model, which builds

upon the original UTAUT, incorporates further factors such as hedonic motivation, price value, habit, and usage intention, in addition to fundamental components like performance expectancy, effort expectancy, social impact, and enabling conditions. This enlargement improves its ability to make accurate predictions. Researchers commonly employ the UTAUT2 model to assess user acceptance and attitudes towards different technologies (Zhao et al., 2022).

A study conducted with the UTAUT2 model revealed that performance expectancy and conducive conditions had a considerable impact on the behavioral intentions of higher education students towards AI. However, the influence of effort expectancy was shown to be less significant. The UTAUT2 model has demonstrated its efficacy in capturing attitudes towards AI in several contexts, including the Peruvian environment (Nikolopoulou et al., 2021). This is seen in research conducted on medical students, where positive attitudes towards AI were observed despite their little training. This indicates that UTAUT2 is effective in specific domains where AI is becoming more essential, such as healthcare (Thakur & Srivastava, 2014).

Furthermore, the UTAUT2 model has been utilized to evaluate instructors' attitudes towards artificial intelligence (AI) in education, uncovering favorable tendencies but restricted implementation in instructional methodologies. This illustrates the ability of UTAUT2 to recognize obstacles and enablers of artificial intelligence (AI) implementation among various user groups in higher education. Research has indicated that students pursuing higher education demonstrate a strong desire to acquire knowledge about artificial intelligence (AI), emphasizing the necessity for education and training in the field of AI. Furthermore, the study revealed disparities in the adoption of AI among preservice teachers based on gender. It highlighted that the simplicity of use and usefulness of AI were significant variables, underscoring the need to tailor AI education initiatives accordingly.

This study utilized customized measures of ease of use, perceived risk, and intention to use to evaluate university students' views towards ChatGPT. The findings highlighted the versatility and predictive power of these variables. The field of technology attitudes, known as PATT, has a lengthy background. It was established in the 1980s by Roat and de Vries with the aim of investigating students' enthusiasm and opinions toward technology. The PATT questionnaire has undergone extensive validation and reliability testing and has been utilized with students from several countries. The PATT-SQ, a revised version, specifically tackled challenges related to linguistic adaptation and reporting obstacles arising from students' inclination towards selecting the midway option. The PATT-SQ-SE instrument has been designed to enhance the measurement of students' attitudes by incorporating items from earlier versions and focusing on constructs such as interest and boredom. Enthusiasm for technology can inspire active participation, while boredom, a condition of low stimulation, can diminish engagement and motivation.

OpenAI, the entity responsible for generative AI initiatives such as ChatGPT, has created multiple iterations (GPT-1 to GPT-4). GPT-3, which is highly favored by college students, possesses 175 billion parameters and is capable of producing writing that is of exceptional quality, logically connected, and convincingly lifelike. GPT-4 is the next version of the model and it can process both images and text as input and generate text as output. It has shown performance comparable to that of humans on many benchmarks. ChatGPT, a language model, has progressed from GPT-1, which was introduced in 2018 and utilized transformer architecture for tasks related to natural language processing. GPT-2 enhanced its predecessor's performance by producing lengthier and more coherent text sequences. GPT-3 significantly improved these abilities by successfully executing several natural language processing tasks, including text categorization, sentiment analysis, and intricate question answering. GPT-4 enhances ChatGPT's applicability in educational and professional contexts by incorporating sophisticated multimodal capabilities.

Methodology

The study utilized a quantitative technique and employed a nonexperimental, applied research design. A study was done to empirically assess the research hypotheses provided in the literature review about students' opinions towards a generative AI system. In order to accomplish this, a survey was created

and given to college students who had expressly stated that they had using ChatGPT in their academic endeavors.

Participants

A study was done with 350 university students from 10 public and private universities in Pakistan using non-probabilistic convenience sampling. All participants willingly agreed to participate. The selection of this sample strategy was based on limitations in both time and resources. Although it did not guarantee statistical representativeness, the study included a wide range of students from different academic disciplines, resulting in a sufficiently big and diverse sample. This increased the credibility of the findings and provided useful insights into student attitudes towards ChatGPT.

The sociodemographic data, as presented in Table 1, demonstrate significant diversity and inclusivity within the student population, with a slightly higher percentage of women (52%) compared to men (48%) participating. The study specifically examined individuals between the ages of 17 and 22, who displayed a notable preference for modern technologies such as ChatGPT, highlighting its significance in the age of digital advancements. The participants' ages spanned from 19 to 22, suggesting that they were in the middle of their academic education.

Instruments of the study

In light of the literature review and theoretical construct identification, a set of 45 items was developed utilizing a 5-point Likert scale that encompassed the responses of "strongly disagree" to "strongly agree." The rationale for selecting this scale was its applicability and flexibility in assessing attitudes. The utilization of a 5-point Likert scale was favored over a 7-point scale due to its straightforwardness, capacity to alleviate respondent fatigue, and ease of comprehension. The reduced scale facilitates comprehension, enabling participants to arrive at prompt and unambiguous judgments; this contributes to the preservation of interest and precision, particularly in extensive or intricate surveys. The quality of responses and the overall efficacy of data acquisition were influenced by the aforementioned factors.

There were thirteen constructs evaluated. The tedium, perceived interest, and importance scales were modified from prior investigations. The UTAUT2 model provided the inspiration for the constructs of convenience of use, perceived risk, and intention to use frequently. The values assigned to opportunities, positive emotions, and negative emotions were modified using responses obtained from the General Attitudes Toward Artificial Intelligence Scale. Additionally, the constructs of tedium, interest, and significance were extracted from the abbreviated PATT-SQ-SE questionnaire. The intention to verify information and acceptance of AI were modified from the generic attitudes toward AI scale. Finally, the responsible use construct was modified from the IT use scale, with reference to the guidelines for ChatGPT implementation in higher education.

The survey data was compiled into a solitary online form, which comprised socio-demographic inquiries including age, gender, university affiliation, and current major; as well as a filter question concerning the extent to which ChatGPT was integrated into the academic pursuits of the respondents. Prior to survey administration, the instrument underwent an assessment conducted by six domain experts. The evaluation aimed to ascertain the items' coherence, consistency, representativeness, relevance, and clarity.

Data Analysis

In the current study descriptive statistics and inferential statistics were applied on the collected data.

Results

Table 1 demographic Information of participants (N=350)

Variable	(%)	M(SD)
Gender		
Male	48%	
Female	52%	
Age of Participants		20 (3.45)
Public Universities	4 (40%)	
Private Universities	6 (60%)	

Table 1 presents the demographic information of the 350 participants. The sample consisted of 48% male and 52% female participants. The average age of the participants was 20 years, with a standard deviation of 3.45 years. Among the institutions represented, 40% of participants were from public universities, while 60% were from private universities.

Figure 01 Which purpose do you use ChatGPT for?

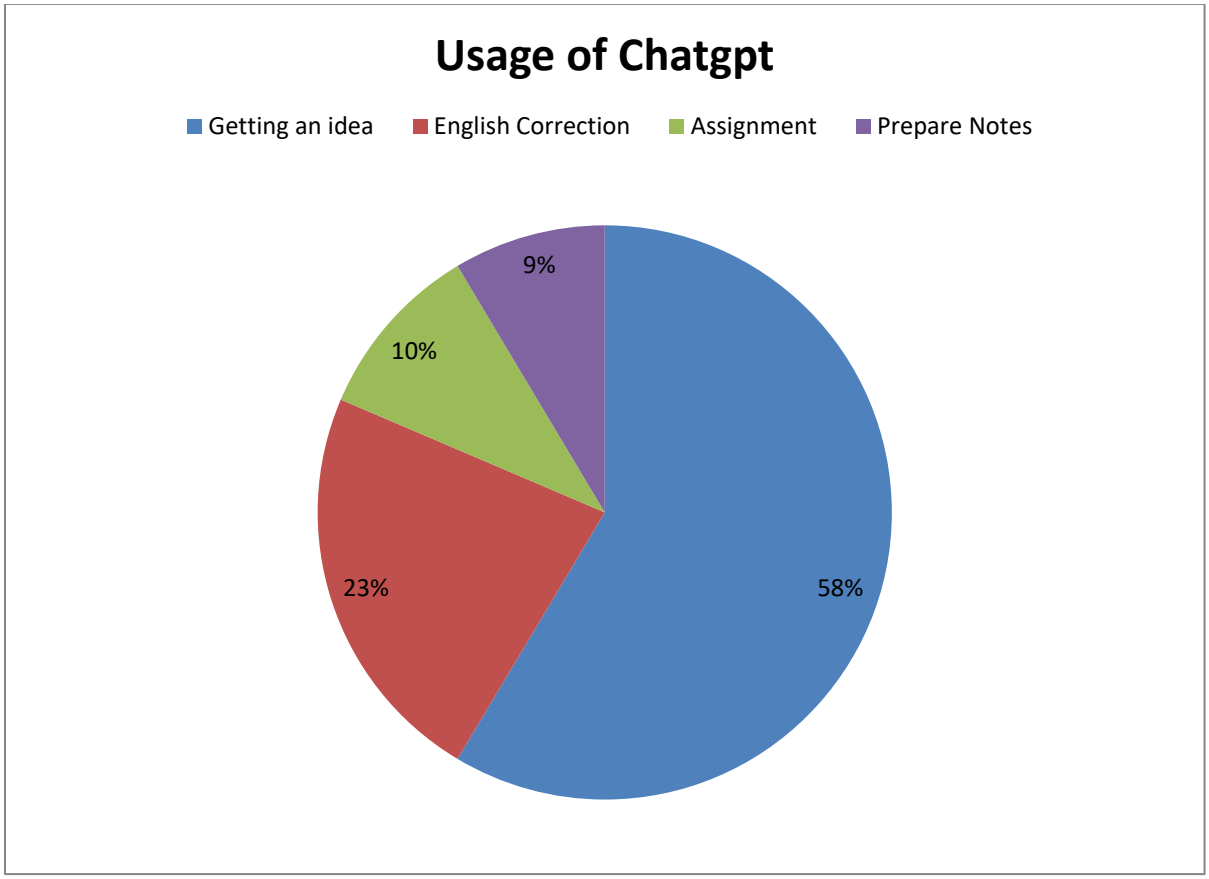

Figure 1 revealed the various purposes for which students use ChatGPT. The most common usage was getting an idea, with 8.2% of students indicating this purpose. English correction was the next most frequent use at 3.2%, followed by using ChatGPT for assignments at 1.4%, and preparing notes at 1.2%.

Figure 02 What do you think about using ChatGPT for educational purposes?

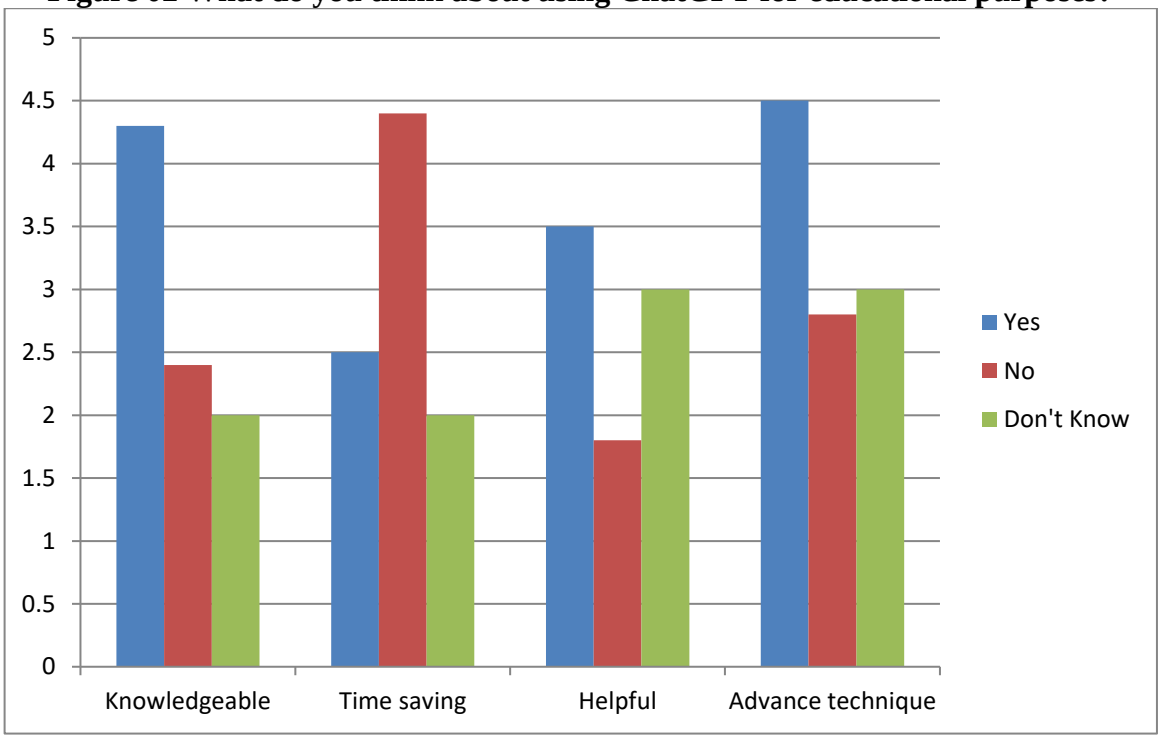

Figure 2 presents students' opinions on using ChatGPT for educational purposes. When asked if they found it knowledgeable, 4.3 said yes, 2.4 said no, and 2 were unsure. Regarding time-saving benefits, 2.5 agreed, 4.4 disagreed, and 2 were undecided. In terms of helpfulness, 3.5 students found it helpful, 1.8 did not, and 3 were unsure. Finally, when considering if ChatGPT is an advanced technique, 4.5 students responded positively, 2.8 negatively, and 3 were uncertain.

Table 2 Path Analysis

Interaction	β	SE	t	P
Perceived usefulness towards use of chatgpt	0.806*	2.11	2.54	0.023
Perceived Risk towards use of chatgpt	0.509*	1.45	3.65	0.021
Positive Emotions towards use of chatgpt	0.441	3.1	2.19	0.041
Easy to use	0.32**	0.23	3.21	0.01
Acceptance to use	0.46**	0.32	5.4	0.01

Table 2 presents the results of the path analysis examining various factors influencing the use of ChatGPT. The perceived usefulness towards the use of ChatGPT had a significant positive interaction ($\beta = 0.806$, SE = 2.11, $t = 2.54$, $p = 0.023$). Similarly, perceived risk towards the use of ChatGPT also showed a significant positive interaction ($\beta = 0.509$, SE = 1.45, $t = 3.65$, $p = 0.021$). Positive emotions towards using ChatGPT were positively associated, though with slightly lower significance ($\beta = 0.441$, SE = 3.1, $t = 2.19$, $p = 0.041$). Additionally, ease of use demonstrated a significant positive effect ($\beta = 0.32$, SE = 0.23, $t = 3.21$, $p = 0.01$), and acceptance to use showed a strong significant positive interaction ($\beta = 0.46$, SE = 0.32, $t = 5.4$, $p = 0.01$).

Discussion

The purpose of this study was to investigate the factors that lie under the surface and shape the perspectives of college students regarding ChatGPT. In order to analyze the study hypotheses that were developed from the literature review, a structural equation model (SEM) was constructed. This model was constructed to ensure that it had adequate validity and reliability indicators throughout the evaluation process. In the context of relevant theories, such as UTAUT2, the PATT-SQ-SE model,

and Mitcham's philosophical framework of technology, the findings are located. During the course of the conversation, the practical repercussions for higher education institutions (HEIs) are the primary focus. The significance of enhancing curricula to make the most of the benefits of artificial intelligence and to encourage AI literacy is also emphasized. A comparison is being made between the most important findings and the outcomes of past investigations.

In terms of the cognitive element, the research discovered that the perceived importance (PIM) of ChatGPT has a positive influence on the intention to use (INTU) of the platform. In light of this, it can be deduced that students who see the value of ChatGPT as a learning tool are more likely to make consistent use of it. This is in line with the findings of other studies that were carried out on people who utilize technology in a variety of different environments. It is also important to note that the amount of user-friendliness, also known as ease of use or EUS, has a significant impact on the user's intention to use ChatGPT (INTU). Given this information, it appears that those who perceive ChatGPT to be simple to navigate are more likely to make frequent use of the platform. This demonstrates how important it is to incorporate user-friendly design into chat systems in order to ensure that they are ultimately successful. Concerns about privacy have a negative influence on INTU, which highlights the necessity for developers to place a high priority on data protection in order to maintain the trust of users and protect their security. On the other hand, the impact of the perception of opportunity (POP) on INTU was not statistically significant, which suggests that the incentives that customers have for making use of a product or service can vary substantially from one another.

The findings of the study demonstrated that interest plays a significant role in the utilization of ChatGPT. This finding suggests that students who have a greater interest in ChatGPT are more likely to make regular use of the aforementioned platform. Additionally, the level of boredom that a someone is experiencing has an effect on the amount of technology that they use. To be more specific, students who have a lower level of ennui are more likely to make regular use of technology. Those who experience positive emotions (POSEMO) have a positive impact on INTU, but those who experience negative emotions (NEGEMO) do not have a substantial impact. When it comes to the utilization of technology, this underscores the need of having pleasant emotional experiences. This conclusion is in line with previous study that was conducted, which indicated that users had a more favorable opinion of artificial intelligence tools like ChatGPT when these products create good sensations in them.

In terms of behavior, the research found that the level of acceptance (ACCEP) of ChatGPT has an effect on INTU. This leads to the conclusion that users who are comfortable with the platform are more likely to make frequent use of it. This highlights how important it is to prioritize the user experience when it comes to embracing educational innovations. Furthermore, INTU has a significant influence on the intention to verify information (INVERINFO), which suggests that students who intend to use ChatGPT on a frequent basis are also aware of the significance of verifying the accuracy of the information that it provides. This conclusion confirms the findings of previous research that highlights the significance of accuracy and dependability in the information obtained through the use of artificial intelligence systems.

The findings of the study also demonstrated that the usage of INVERINFO and responsible use (RESPONUSE) has a significant impact on the academic performance of students. This suggests that the utilization of AI tools such as ChatGPT has the potential to enhance the outcomes of learning. Consequently, this highlights the importance of digital literacy in providing students with the ability to apply electronic technologies in their educational and occupational efforts in a manner that is both proficient and moral.

This research is significant for higher education because it provides excellent insights into the factors that influence students' intentions to use ChatGPT as a learning tool. These findings are noteworthy because they offer valuable insights. It is important to note that the study highlights the role of cognitive and emotional aspects in affecting persons' intentions to use ChatGPT. These findings provide a foundation for the development and implementation of educational technology in higher education institutions (HEIs), with the intention of enhancing teaching and learning strategies, as well as increasing student involvement and satisfaction of their educational experience.

These findings can be utilized by higher education institutions (HEIs) to develop strategies that encourage the utilization of ChatGPT in a manner that is both ethical and principled, address concerns regarding the privacy of data, and promote positive attitudes and enthusiasm for the utilization of the technology. Furthermore, we may be able to further enhance the educational experience by introducing ChatGPT into institutional platforms such as virtual classrooms and tutoring systems, taking into consideration the perceived significance of the platform as well as its user-friendliness.

Conclusion

In summary, with the increasing adoption of generative AI tools in higher education, it is imperative to analyze the determinants that shape students' perspectives on these technologies in the context of their scholarly engagements. By enhancing the predictive capability of the PATT-SQ-SE model and UTAUT2, this research reinforces Mitcham's philosophical framework and contributes to the unified theory of attitude toward ChatGPT (UTAC). The primary aim of the study was to examine the perspectives of college students regarding ChatGPT. After examining thirteen constructs from the proposed hybrid model, twelve hypotheses were generated, of which nine were accepted. Frequent intention to use ChatGPT has a substantial effect on both the intention to verify information and the responsible utilization of ChatGPT, according to the findings of the analysis. Consistent utilization of ChatGPT cultivates a discerning evaluation of the data it presents, plausibly attributable to heightened acquaintance with its functionalities and constraints. Moreover, the observed correlation between the intention to utilize this technology frequently and the practice of responsible usage suggests that students possess an increased consciousness regarding the ethical and accountable application of this technology. Furthermore, the research revealed that the frequency of ChatGPT usage is significantly influenced by students' perceptions of its utility and significance. Their intentions are adversely affected by privacy concerns, which emphasizes the necessity for solutions that safeguard user data. Positive affect and interest have a substantial impact on the intentions of students to utilize ChatGPT. It is critical to prioritize the development of digital literacy among students so that they can proficiently employ generative AI tools such as ChatGPT in academic and professional contexts. Overall, this study provides a comprehensive framework for how academic institutions can enhance the student experience by integrating generative AI tools into the teaching and learning process. An important finding of this study is the modification and verification of established theoretical frameworks, including UTAUT2 and PATT-SQ-SE, with regard to the implementation of ChatGPT in tertiary education. Furthermore, by including concepts such as responsible use and the intention to verify information, one can gain a deeper comprehension of how regular usage impacts a more critical attitude towards artificial intelligence. The results of this study establish a strong basis for further investigation into the effects of ChatGPT in tertiary education and the optimal strategies that institutions can employ to utilize this technology.

Theoretical and Practical Implications of the Study

- The pragmatic ramifications of this study indicate that higher education institutions (HEIs) could contemplate integrating AI adoption into their curricula to augment AI literacy. The user-friendly nature and perceived significance of ChatGPT make it suitable for incorporation into institutional platforms, including virtual classrooms and AI-powered tutoring systems. In addition, higher education institutions (HEIs) should tackle perceived hazards by building strong personal data management systems to alleviate worries around the utilization of AI tools.
- This study enhances the comprehension of student attitudes towards technologies such as ChatGPT, allowing Higher Education Institutions (HEIs) to create more captivating and efficient teaching experiences. HEIs may optimize their strategies for integrating AI tools like ChatGPT with students' needs and expectations by identifying the elements that impact students' acceptance and utilization of ChatGPT.
- This work has practical significance in terms of integrating ChatGPT and other AI technologies strategically into courses and designing targeted interventions to enhance students' AI literacy.

Higher education institutions (HEIs) have the potential to provide workshops, seminars, and optional courses on artificial intelligence (AI) to provide students with the necessary abilities to evaluate and employ these technologies proficiently.

- This study theoretically contributes to the Unified Theory of Acceptance toward ChatGPT (UTAC) by incorporating 13 constructs: significance, opportunity, ease of use, perceived risk, intention to use frequently, interest, boredom, acceptance, perceived utility, positive and negative emotions, intention to verify information, and responsible use of ChatGPT. These constructions are based on the attitude components of Mitcham's philosophical framework of technology, the PATT-SQ-SE model, and the UTAUT2 model.
- This theory enhances the domain of educational technology and acts as a point of reference for future research that assesses the attitudes of university students towards particular educational technologies. Furthermore, the incorporation of concepts such as the conscientious utilization of ChatGPT and the desire to authenticate information underscores the increasing significance of critical digital literacy among students, highlighting the ethical and responsible utilization of AI opportunities to their fullest potential. This study enhances the comprehension of the cognitive and emotional processes involved in the adoption of technological tools by analyzing how these factors impact the acceptance and usage of such tools.

Limitations and Future Suggestion of the Study

The main constraints of this work, which offer guidance for future research, are as follows. Initially, an incidental convenience sample was employed, which may not accurately reflect the overall population of higher education students. Furthermore, the participants were selected from universities located in prominent urban locations that have excellent internet connectivity and advanced technological resources. This may restrict the relevance of the results to institutions located in rural areas where such resources are scarce. In addition, as there were no pre-existing scales available to measure views towards ChatGPT, the study included items from earlier research. Although pretests were conducted to assess the validity and reliability, certain constructs within the scale may still exhibit biases. This study can provide a basis for future research in designing specialized scales to assess attitudes towards generative AI technologies such as ChatGPT. Future research endeavors may incorporate additional variables, such as effort-performance expectation, social impact, hedonic motivation, and price value. By encompassing the perspectives of all stakeholders in higher education, including instructors, students, and administrators, this approach would yield a more thorough comprehension of their attitudes. Furthermore, it would facilitate the optimization of the advantages offered by AI technology while mitigating any adverse effects it may have.

References

1. Abdullah, M., Madain, A., & Jararweh, Y. (2022). ChatGPT: Fundamentals, Applications and Social Impacts. *2022 Ninth International Conference on Social Networks Analysis, Management and Security (SNAMS)*. https://doi.org/10.1109/snams58071.2022.10062688
2. Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, *61*(2), 228–239. https://doi.org/10.1080/14703297.2023.2190148
3. Ellis, A. R., & Emma Louise Slade. (2023). *A New Era of Learning: Considerations for ChatGPT as a Tool to Enhance Statistics and Data Science Education*. 1–10. https://doi.org/10.1080/26939169.2023.2223609
4. Hassan, M., Malik, A. S., Sang, G., Rizwan, M., Mushtaque, I., & Naveed, S. (2022). Examine the parenting style effect on the academic achievement orientation of secondary school students: The moderating role of digital literacy. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1063682

5. José-Ramón Sanabria-Navarro, Yahilina Silveira-Pérez, Digna-Dionisia Pérez-Bravo, & de-Jesús-Cortina-Núñez, M. (2023). *Incidences of artificial intelligence in contemporary education*. *31*(77). https://doi.org/10.3916/c77-2023-08
6. Kim, J., Merrill, K., Xu, K., & Sellnow, D. D. (2020). My Teacher Is a Machine: Understanding Students' Perceptions of AI Teaching Assistants in Online Education. *International Journal of Human–Computer Interaction*, *36*(20), 1902–1911. https://doi.org/10.1080/10447318.2020.1801227
7. Malik, A. A., Hassan, M., Rizwan, M., Mushtaque, I., Lak, T. A., & Hussain, M. (2023). Impact of academic cheating and perceived online learning effectiveness on academic performance during the COVID-19 pandemic among Pakistani students. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1124095
8. Mushtaque, I., Awais-E-Yazdan, M., & Waqas, H. (2022). Technostress and medical students' intention to use online learning during the COVID-19 pandemic in Pakistan: The moderating effect of computer self-efficacy. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186x.2022.2102118
9. Mushtaque, I., Waqas, H., & Awais-E-Yazdan, M. (2021). The effect of technostress on the teachers' willingness to use online teaching modes and the moderating role of job insecurity during COVID-19 pandemic in Pakistan. *International Journal of Educational Management*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/ijem-07-2021-0291
10. Nikolopoulou, K., Gialamas, V., & Lavidas, K. (2021). Habit, hedonic motivation, performance expectancy and technological pedagogical knowledge affect teachers' intention to use mobile internet. *Computers and Education Open*, *2*, 100041. https://doi.org/10.1016/j.caeo.2021.100041
11. Ray, P. P. (2023). ChatGPT: a Comprehensive Review on background, applications, Key challenges, bias, ethics, Limitations and Future Scope. *Internet of Things and Cyber-Physical Systems*, *3*(1), 121–154. https://doi.org/10.1016/j.iotcps.2023.04.003
12. Rodway, P., & Schepman, A. (2023). The impact of adopting AI educational technologies on projected course satisfaction in university students. *Computers & Education: Artificial Intelligence*, *5*, 100150–100150. https://doi.org/10.1016/j.caeai.2023.100150
13. Singh, N., Sinha, N., & Liébana-Cabanillas, F. J. (2020). Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence. *International Journal of Information Management*, *50*, 191–205. https://doi.org/10.1016/j.ijinfomgt.2019.05.022
14. Sukhpal Singh Gill, Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K., Fuller, S., Singh, M., Arora, P., Ajith Kumar Parlikad, Vlado Stankovski, Abraham, A., Ghosh, S. K., Hanan Lutfiyya, Kanhere, S. S., Rami Bahsoon, Rana, O., Schahram Dustdar, Sakellariou, R., & Uhlig, S. (2023). Transformative effects of ChatGPT on modern education: Emerging Era of AI Chatbots. *Transformative Effects of ChatGPT on Modern Education: Emerging Era of AI Chatbots*, *4*(4). https://doi.org/10.1016/j.iotcps.2023.06.002
15. Svenningsson, J. (2019). The Mitcham Score: quantifying students' descriptions of technology. *International Journal of Technology and Design Education*. https://doi.org/10.1007/s10798-019-09530-8
16. Thakur, R., & Srivastava, M. (2014). Adoption readiness, personal innovativeness, perceived risk and usage intention across customer groups for mobile payment services in India. *Internet Research*, *24*(3), 369–392. https://doi.org/10.1108/intr-12-2012-0244
17. Zhao, J., Awais-E-Yazdan, M., Mushtaque, I., & Deng, L. (2022). The Impact of Technology Adaptation on Academic Engagement: A Moderating Role of Perceived Argumentation Strength and School Support. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.962081