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# From the Consumers' Side: Determining Students' Perception and Intention to Use ChatGPT in Ghanaian Higher Education

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## Abstract

The advent and development of technologies such as artificial intelligence have created benefits and challenges for educational stakeholders. Artificial intelligence, such as OpenAI's Chat Generative Pre-trained Transformer (ChatGPT), has brought new benefits, challenges and pressures for higher educational institutions. There are relatively few reports of how students perceive and intend to use ChatGPT. Taking cognizance of these, the research explored students' perceptions and intentions to use ChatGPT in their higher education. Guided by two hypotheses and a mixed-method approach, the analysis revealed no statistical relationship between perception and intention to use ChatGPT. Despite this statistical relationship, the study reported students' positive perceptions towards ChatGPT, and intentions to use ChatGPT and advocated its adoption in education. Based on these findings, the study offers implications for educational practices and further research.

**Keywords:** *Ghana, higher education, intention, perceptions, OpenAI, ChatGPT*

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## 1. Introduction

The advent of digital technologies and artificial intelligence (AI) has revolutionalized several industries such as marketing, health, agriculture, and education. Digital transformation is becoming indelible in higher education. These transformations such as using mobile technologies and online meeting platforms became inevitable post the COVID-19 period (Agbaglo & Bonsu, 2022). Quite recently, a new AI tool, Chat Generative Pre-trained Transformer, has attracted critical concerns based on its use in educational and non-educational settings. OpenAI's Chat Generative Pre-trained Transformer (ChatGPT), a 175-billion parameter, forms part of a nexus of natural language processing (NLP) models designed to enable computers to interact with human language (Hosseini et al., 2023; OpenAI, 2022). ChatGPT generates several conversation-style responses based on user input. Its dialogic design in responding to several topics across various fields and industries makes it a useful tool (Gilson et al., 2023). There are emerging concerns about the credibility, acceptability, and relevance of ChatGPT in academia. The concerns revolve around the capabilities of ChatGPT (Grant & Mets, 2022; Patel & Lam, 2023), in developing academic papers (Hu, 2023; Khalil & Er, 2023), composing higher-discharge summaries (Grant & Mets, 2022;) and more. This affects the integrity of research conducted in educational and other industrial contexts. Davis (2023) noted that it lacks commonsense in reasoning tasks and its language coverage is questionable (Jiao et al., 2023). Albeit the shortcomings, there is evidence demonstrating the impressive performance of ChatGPT across several fields, mainly education.

The benefits of ChatGPT in education have been reported in preprints and numerous blog posts and media outlets (Zhai, 2022); others have provided guidelines for its use in the classroom to support research (Lieberman, 2023; Mollick & Mollick, 2022). However, given the currency of the technology and topic in general, there are relatively minimal studies that have investigated the perceptions of students and their intention to use ChatGPT. The contentions around the topic are worthwhile to investigate since they would provide prospects for further explorations. Moreover, the increasing attention on ChatGPT has been related to experts in education and academic field other than undergraduate, graduate, and learner-researchers. Additionally, this

study provides some reflections on this innovative technology in Ghanaian higher education. The research is positioned in the context of Artificial Intelligence in Education (AIEd) (Rudolph et al., 2023) which discusses opportunities and threats of technologies in education. Based on these rationales, this study examines the perceptions and (intentions of) use of ChatGPT by Ghanaian university students.

## 2. Revision of the speciality literature

This section reviews previous studies related to the topic and establishes a relationship between the previous studies and present research. The review focuses on studies (predominantly preprints) on ChatGPT and its related models. We dovetail our attention to the use of such AI tools in education. The second part considers the relationship between previous studies and present research.

### *2.1 Prospects and effects of using ChatGPT and other related AI generatives*

Although ChatGPT was released to the general public in November 2022, scholars have expressed critical concerns about it. Most of these concerns are opinion-based (Hosseini et al., 2023; Hu, 2023; Pavlik, 2023) and empirical-based (Gilson et al., 2023; Khalil & Er, 2023; Tlili et al., 2023). Yeo-The and Tang (2023) suggested some technical points for the editorial to develop new policies to detect and disregard AI-generated papers. They added that such generated manuscripts should not be listed as authors. On this note, authors could be held responsible for inaccurate and unethical practices. Similarly, in Hu's (2023) opinion, counter AI-detectors should be developed to detect ChatGPT contents. That notwithstanding, he pointed out the deficiencies of such models such as accuracy and misclassification. Hosseini et al.'s (2023) practical approach to testing ChatGPT revealed that it had accuracy, bias, reasoning, and relevance issues. Their results concur with some opinions levelled by Hu (2023), Yeo-The and Tang (2023), and Pavlik (2023). Hosseini et al. (2023) deduced that the identified issues are because ChatGPT cannot relate language to the external world. Also, Lametti (2022) and Frieder et al. (2023) expressed that AI systems failed to solve mathematical problems. Consequently, Bang et al. (2023) comprehensively confirmed the performance of ChatGPT based on a 64.33% accuracy and interactive feature for human collaboration. Bang et al.'s (2023)

research coincide with Wang et al. (2023) and Gozalo-Brizuela et al. (2023).

Aside from the reviewed studies above, Tlili et al. (2023) examined ChatGPT in education using a case study at three different stages. The stages revealed that (1) people are positive and enthusiastic regarding the use of ChatGPT, (2) ChatGPT transforms education, and (3) there were issues about cheating, truthfulness, honesty, and manipulation. Their findings suggested some directions for the secured adoption and implementation of ChatGPT in education. Likewise, Pavlik (2023) demonstrated the capacities and limitations of ChatGPT and how it implicates media and journalism education. Interestingly, he conditioned his research as coauthored with ChatGPT where it answered questions concerning AI models, journalism and media. Pavlik (2023) proposed that educators should train students in the effective use of generative AI. Similarly, Khalil and Er (2023) explored the originality of the content generated by ChatGPT. Using two plagiarism detection tools and 50 academic essays, they found that ChatGPT could create original content hard to distinguish from human-written ones. This confirms Hu's (2023) concern about the elusive nature of ChatGPT which challenges the roles of gatekeepers. Khalil and Er (2023) indicated that this results in students' increasing use of the software as a shortcut to writing academic essays. Similarly, Aydin and Karaarslan (2022) found a 40% rate of plagiarism in a literature review paper written by ChatGPT. While Khalil and Er (2023) present students escaping plagiarism, Aydin and Karaarslan (2022) observed an otherwise report. Based on these reports, we argue that plagiarism detection tools should be re-visioned to check the origin and originality of the content of writing.

Bommarito and Katz (2022) reported that GPT-3 passed a United States of America Bar Exams which usually requires a seven-year post-secondary education. Zhai's (2022) pilot study confirmed that ChatGPT could write a coherent, informative, and organised paper. He proposed that teachers and other educational stakeholders should encourage creativity and critical thinking skills to engage students. Qadir (2022) explored the advantages and disadvantages of ChatGPT in engineering education. Quite related to Aydin and Karaarslan's (2022) research, Fyfe (2022) questioned the concept of plagiarism and asked university students to 'cheat' on essays by using generative

software. Opposedly, Anson and Straune (2022) described language models such as ChatGPT and GPT-3 and offered recommendations for instructors to meet the challenges faced by students. Interestingly, Tack and Piech (2022) showed a positive impression of the pedagogical capabilities of GPT-3 in educational dialogues on online platforms.

### *2.2 Relationship between the present study and previous studies*

The plethora of reviewed studies and reports on ChaptGPT and other AI language learning models focused on evaluating the model directly (Bang et al., 2023; Hosseini et al., 2023; Yeo-The & Tang, 2023), using it to generate content to test its effective (Aydin & Karaarslan, 2023; Khalil & Er, 2023), expressing concerns about the impending threats it poses (Hu, 2023; Lametti, 2022). The studies (Anson & Straune, 2022; Essel et al., 2022; Pavlik, 2023; Tlili et al., 2023) within the educational context evidence the criticality of ChatGPT in education. While we acknowledge the relevance of these studies in providing a basis for the present research, none of the studies has evaluated the perceptions of students and their intention to use ChatGPT in education. We evaluate the perceptions and intentions of usage which serve as a lens through which educational stakeholders could devise measures and strategies for the secure adoption, rejection or controlled use of ChatGPT in university education. Moreover, the reviewed studies are generalized except for Bommarito and Katz (2022) who focused on USA Bar Exams, and Qadir (2022) who explored engineering education. Essel et al.'s (2022) work is closely related to this research based on the context and topic of investigation. Given the dearth of studies on the topic, we complement the discussion with studies that have used digital technologies in higher education. To contribute to the emerging literature on ChatGPT in education, we consider a Ghanaian university which fulfils the geographical gap identified. Furthermore, none of the studies was guided by a theoretical approach which increases the limitations of their research. Hence, we adopt the Technology Acceptance Model framework that serves the research's purpose and caters for possible limitations.

## 3. Theoretical framework

The growing research within the area of technology acceptance references some conditions for technology's adoption in education

(Al-Emran et al., 2018; Scherer & Teo, 2019). To accept a technology, several conditions and attitudes explain a person's attitudes and intentions to use it (Davis, 1989). A key framework that has dominated such studies is Technology Acceptance Model (TAM). TAM was originally developed to predict the acceptance of information technology systems, which presently includes ChatGPT, and hint at possible problems to be encountered upon using such technologies (Davis, 1989).

TAM has the core assumption that the perceived usefulness (PU) of technology and the perceived ease of use (PEOU) influence a person's attitude concerning the use of technology (Davis et al., 1989). The perceived usefulness component evaluated the degree to which a person believes that using technology would enhance their performance and produce a better outcome (Agbaglo & Author, 2022; Davis, 1989; Scherer et al., 2019). PEOU component considers the extent to which a person perceives the use of technology to be effortless (Davis et a., 1989). TAM indicates that PU and PEOU predict the intention to use a particular technology. Interestingly, the intention to use technology determines the actual use of technology (Agbaglo & Bonsu, 2022). Conversely, technology acceptance and use currently appear problematic for most higher educational institutions (Noble et al., 2022). Concerning the weakness of TAM, it does not specifically conceptualize what accepting technology means (Scherer et al., 2019). It is unclear whether mass use or actual integration into higher education determines the acceptance and usage. Despite this weakness, the theory has been widely tested and adopted in educationally inspired studies (Agbaglo & Bonsu, 2022; Fathema et al., 2019; Gyamfi, 2016; Scherer et al., 2019; Tlili et al., 2023; Williams et al., 2022). There is a growing interest in adopting several technologies in higher educational institutions in developing countries, such as Ghana (Afari, & Achampong, 2010; Anamoah-Mensah, 2011; Buabeng-Andoh, 2018). This study, through TAM, evaluates how best ChatGPT could be accepted and used in higher education. The recent adoption by Tlili (2023) evidences the prowess of the theory to serve the purpose of this research. Thus, TAM can determine the perceptions and intentions to use ChatGPT amongst students in higher education. The theory further supports this study given that two core aspects of the theory serve as variables in the study. We acknowledge

that TAM focuses on technology generally; hence, we do not fully apply the theory to satisfy the circumstances for using ChatGPT. That is, the successful adoption of ChatGPT should be based on complete acceptance by stakeholders, or else it will be rejected despite the many advantages students report. This notwithstanding, the theory controls the necessary aspects of the study.

From the ensuing review, we explain how TAM is adopted in this study. We combine the PU and PEOU as 'perceptions' which predict or influence the 'intention to use' ChatGPT. That is, we interpret the usefulness and ease of use of ChatGPT from the students' perspectives and how such factors model their intentions to use ChatGPT. As such the easiness and convenience of ChatGPT are significant to its use and acceptance. In this regard, the study is guided by the following hypotheses:

$H_0$ There is no statistically significant relationship between the perceptions of Ghanaian university students towards ChatGPT and their intentions of use in higher education.

$H_1$ There is a statistically significant relationship between the perceptions of Ghanaian university students towards ChatGPT and their intentions of use in higher education.

## 4. Research methodology

### *4.1 Institutional context*

This research was carried out at the University of Cape Coast (UCC), established in October 1962. Primarily, the institution was commissioned to train teachers for second-cycle institutions in Ghana. However, given the global advancements, the institution has expanded to include other schools (such as School of Business, and School of Medical Sciences), faculties (such as Faculty of Law), and departments (such as Department of Oil and Gas) to meet the demands of industries and ministries other than education ministry (UCC History, 2023). Aside from offering undergraduate programs, the University has a School of Graduate Studies which offers master's and doctoral degrees (Afful & Tetteh, 2022; Ankrah & Atuase, 2018). The university encourages students, faculty, and administrative staff to participate in research activities. UCC's five colleges (Education Studies, Distance Education, Humanities and Legal Studies, Agriculture and Natural Sciences, and Health and Allied Sciences) engage in well-integrated teaching and research activities with

adequate research facilities, well-known faculty, and an ethnically diverse graduate student population (Agbaglo & Author, 2022).

### *4.2 Research design*

We adopted the sequential explanatory mixed-method approach. Generally, the affordances of the mixed-method approach make up for the limitations associated with quantitative and qualitative studies. The sequential explanatory approach facilitated the collection of quantitative data and its analysis, followed by the collection of qualitative data and its analysis to support the previous phase (Creswell & Plano Clark, 2007). That is, we used qualitative data to explain the quantitative analysis.

### *4.3 Data collection*

The participants included students from the university. We prepared an online survey using Google forms. We used a close-ended five-point Likert scale which provides a higher level of impartiality and it is suitable discrimination for the research and also facilitates the understanding of the participants (Brace, 2004). According to Billings and Halstead (2005), asking closed-ended questions about an individual is the best way to discover their beliefs, behaviour, views, and perceptions. Given the electronic approach to collecting the data, responses from the participants were automatically recorded and stored for ready analysis. The convenience, fast response rate, and cheap process fast-tracked the collection process. Brace (2004) notes that using an online questionnaire provides the researcher with the opportunity to be creative in drafting questions, adopting scales, and ensuring consistency in responses. The variables used for the questionnaire were perceptions and intentions of use. Each of the variables had seven (7) statements. The questionnaire was administered within two weeks. To ensure the accuracy of the data, the first question served as a criterion for determining the suitability of the respondents in this research. The first question is known as the exclusion question which ensures that the data is not affected, and keeps intact the confidentiality of the content of the survey. The first question sought to ask whether the respondents know or use ChatGPT. If the respondents answered 'Yes', they qualified to answer the remaining questions.

After this, we purposively and conveniently sampled ten (10) participants for the qualitative aspect of the research. The purposive

sampling was based on participants who have used ChatGPT at least once in their education. The convenience aspect of the sampling sought to engage the students who were willing and were relatively free. The semi-structured interview interaction aimed at getting insights into how they got to know about ChatGPT, perceived advantages and disadvantages of ChatGPT, their reasons for using it, knowledge of other technologies, and possible policy resolutions for its ethical use by students. After verifying the face and content validity of the interview questions, we notified the interviewees of the purpose of the research and carried out the interview. Each interview lasted approximately four (4) minutes. On ethical consideration of the research, while we received informed consent from the participants, we ensured that their anonymity was kept confidential.

## 5. Analysis and interpretation of the research data

We analysed the quantitative data using SPSS version 25. We used descriptive and inferential statistics such as means, standard deviation, skewness, kurtosis, and Spearman co-efficient.

### *5.1 Demographic features of respondents*

We collected three demographic information from the participants: their gender, age, and level of education. The results are presented in Figures 1 and 2, and Table 1.

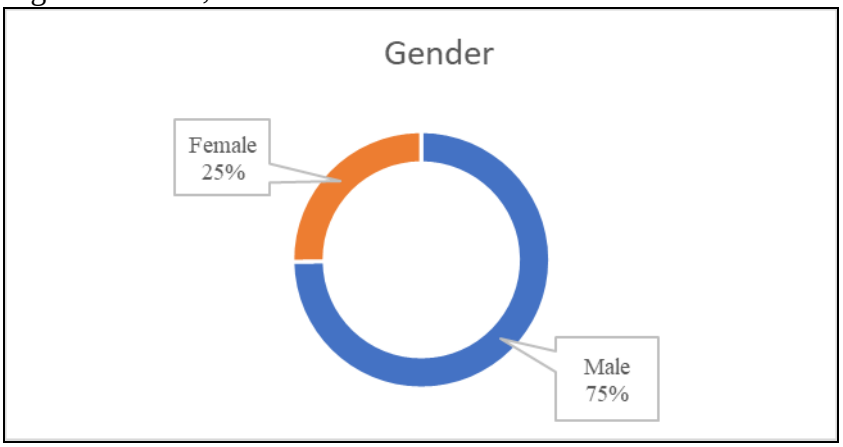



**Figure 1: Gender of respondents**
**Source: Authors (2023)**

Figure 1 represents the biographic data of respondents in respect of gender. Regarding the gender distribution of respondents, it was found

that 27 of them were females (n= 27; 25%) while the remaining 80 (75%) were found to be males. This indicates that males were more aware of the ChatGPT.

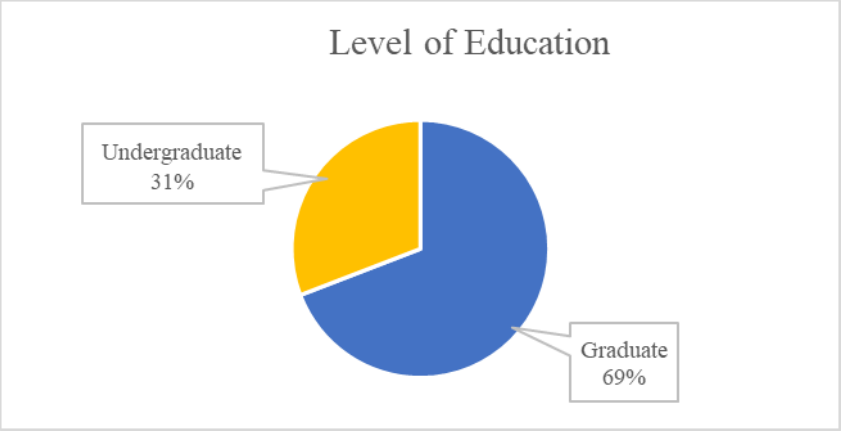



**Figure 2: Level of education of respondents**
**Source: Authors (2023)**

Figure 2 illustrates the respondent's level of education. It was found that the majority of the respondents, 74, representing 69% indicated that they are graduate students while the remaining respondents (n=33; 31%) were found to be undergraduate students. This indicates that graduate (or postgraduate) students have engaged with ChatGPT more than their undergraduate counterparts. We believe that the nature of graduate school requires extra work from students might have necessitated their interaction with ChatGPT.

**Table 1**: Age of respondents

| Age range | Frequency | Percentage |
|---|---|---|
| Less than 25 | 13 | 12.1 |
| 26-30 | 34 | 31.8 |
| 31-35 | 27 | 25.3 |
| 36-40 | 20 | 18.7 |
| Above 40 | 13 | 12.1 |
| **Total** | **107** | **100.0** |

**Source: Authors (2023)**

Table 1 shows the ages of respondents used in the study. Regarding the age distribution of the respondents which ranges from less than 25 years to 40 years and above, we found that 34 (31.8%) and 27 (25.3%)

of the respondents were within the age bracket of 26-30 years and 31-35 years respectively. This was followed by 20 (18.7%) who were found within the age range of 36-40. 13 of the respondents representing 12.1% indicated less than 25 and above 40 as their age bracket respectively.

### *5.2 Descriptive statistics of perceptions and intentions to use ChatGPT*

Descriptive statistics were conducted on the variables. Table 2 indicates respondents' responses to their perceptions and their intentions to use ChatGPT. Seven questionnaire items were generated for each construct of which the mean, SD, skewness and kurtosis are provided in Table 2 for each item in the construct.

**Table 2: Responses on perceptions and intentions to use ChatGPT**

| **Perceptions** | **N** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
|---|---|---|---|---|---|
| Fear and discomfort using ChatGPT | 107 | 2.94 | 1.331 | .153 | -1.096 |
| Incorporation in higher education | 107 | 3.52 | 1.334 | -.646 | -.762 |
| Satisfaction with speed and accuracy with ChatGPT | 107 | 3.90 | 1.140 | -.962 | .154 |
| Better results in subjects | 107 | 3.75 | 1.318 | -.906 | -.355 |
| Comfortable based on ChatGPT convenience | 107 | 3.96 | 1.281 | -1.082 | .005 |
| Concerned about privacy and security | 107 | 3.05 | 1.475 | -.064 | -1.410 |
| Excellent user experience | 107 | 3.83 | 1.342 | -.951 | -.317 |
| **Intentions to use** | | | | | |
| Contribution to students' development in education | 107 | 3.77 | 1.293 | -.914 | -.282 |
| Usage for academic activities | 107 | 3.91 | 1.263 | -.909 | -.379 |
| Usage of a traditional method than ChatGPT | 107 | 2.80 | 1.342 | .224 | -1.157 |
| Involvement with technology-inclined courses | 107 | 2.83 | 1.514 | .142 | -1.470 |
| Resources to aid the use of ChatGPT | 107 | 2.83 | 1.342 | .266 | -1.123 |
| Interference with the ability to think and concentrate on courses | 107 | 2.65 | 1.408 | .391 | -1.108 |
| Computer-related experience and use of ChatGPT. | 107 | 3.67 | 1.287 | -.744 | -.418 |

**Source: Authors (2023)**

From Table 2, on perceptions, the first item was to find out the fear and discomfort of using ChatGPT. A mean of 2.94 on the item indicates that students are unsure whether they have fear or any discomfort with the use of ChatGPT with an SD of 1.331 indicating that students' responses are spread around the mean. The skewness of .153 indicates the distribution is slightly positively skewed as the kurtosis value indicates the distribution is platykurtic. On the satisfaction and accuracy of ChatGPT responses (M= 3.90; SD= 1.140), the results indicate that students strongly agree to the AI generating accurate responses to their queries as they agree that the generation of satisfied and accurate responses leads to them getting better results in their subjects (M=3.75; SD= 1.318). However, the kurtosis value of .154 and -.355 indicates that the distribution of responses is mesokurtic and platykurtic respectively. On the comfortability of usage based on convenience (M= 3.96; SD= 1.281), the results indicate that the students find it convenient using ChatGPT which creates a sense of comfort for them. Its usage comfortability leads to students having an overall better experience as they adopt the use of ChapGPT in academic activities (M=3.83; SD=1.342). On the distribution of responses based on kurtosis value, a value of .005 on the comfortability of usage based on convenience indicates that the responses are evenly distributed around the mean however the kurtosis distribution of responses on experience is said to be platykurtic.

On the construct of intentions to use, the results indicate a mean of 3.77 and an SD of 1.293 which interprets that students are inclined to agree that ChatGPT contributes to students' development in education. By this, the results indicate a strong agreement of students' intentions to use ChatGPT for their academic activities (M=3.91; SD=1.263), however, the kurtosis distribution of responses indicates that a value of -.282 and -.379 suggests that there is a platykurtic distribution in students' responses as responses are dispersed in a relatively narrow range around the mean. Again, the results indicate that students' computer-related experience using ChatGPT (M=3.67; SD=1.287) reflects their active participation in courses that use technology (M=2.83; SD=1.514). The results indicate that students have the technical know-how to use ChatGPT in their academics and as a result, they have an interest and intentions to be active in courses

that adopt the use of technology in its instruction. The distribution of responses per the kurtosis value seems to suggest that there is a dispersed range of responses as they appear to be platykurtic. Irrespective of students' intentions to use ChatGPT, there appears to be uncertainty on whether the use of ChatGPT interferes with their ability to concentrate and think deeply about subjects (M=2.65; SD=1.408) and their preferred use of traditional methods to the use of ChatGPT (M=2.80, SD=1.342). This indicates that students are unsure whether their intention to use ChatGPT will limit their ability to develop deep and critical thinking skills on subjects or whether they would prefer the traditional method of learning to use ChatGPT.

To test the hypotheses, we checked for the mean of the responses on all the statements into a different as P (Perceptions) and I (Intentions). We explored the new data by using factor levels based on normality tests. Table 3 illustrates the results.

**Table 3: Tests of normality**

| | **Kolmogorov-Smirnov[a]** | | |
|---|---|---|---|
| | **Statistic** | **Df** | **Sig.** |
| **P** | .104 | 107 | .007 |
| **I** | .090 | 107 | .032 |

**Source: Authors (2023)**

From Table 3, we used the Kolmogorov-Smirnov because the participants were more than 100. The values obtained based on the significance (Sig.) show that the data is not normally distributed hence they were all statistically significant. Based on this, we adopted a normal regression analysis for further statistics. From the goodness-of-fit, the non-significant results of Pearson (.302) and Deviance (1.000) showed the model fit the data for the research.

We used the Spearman correlation to check for the relationship because the data were not normally distributed. The calculated values of the correlation are summarized in Table 4.

**Table 4: Correlation between perceptions and intention of use**

| | | **P** | **I** |
|---|---|---|---|
| **P** | Correlation Coefficient | | .063 |
| | Sig. (2-tailed) | | .521 |
| | N | 107 | 107 |
| **I** | Correlation Coefficient | .063 | |
| | Sig. (2-tailed) | .521 | |

| | | |
|---|---|---|
| N | 107 | 107 |

**Source: Authors (2023)**

From Table 4, the findings indicate that there was a weak positive correlation ($r_s$ (107) = .063) between perceptions about ChatGPT and university students' intention to use it in higher education. Nonetheless, there was no statistically significant relationship (p>.05) between perceptions and intentions. As such, the researchers accept the null hypothesis that "there is no statistically significant relationship between the perceptions of Ghanaian university students towards ChatGPT and their intentions of use in higher education" and reject the hypothesis that "there is a statistically significant relationship between the perceptions of Ghanaian university students towards ChatGPT and their intentions of use in higher education". While the data barely supports the relationship between the two variables, the results are inconclusive and require the use of more data from larger samples. This means that the perceptions of the students do not influence their intention to use or actual use of ChatGPT in higher education.

### *5.3 Findings from the interview data*

For the qualitative aspect, we attentively read the transcripts of the interview data and identified emerging themes to support the findings. We used the directed qualitative content analysis approach to interpret the interview data. We enhanced the trustworthiness of the qualitative data through member checking and peer debriefing (Thomas, 2011) with an expert in qualitative studies. Generally, the content analysis pointed out that ChatGPT could revolutionalize higher education in Ghana, although other concerns were raised. The views are structured according to the themes of the interview questions.

#### 5.3.1 Awareness of ChatGPT

The first interview questions aimed at seeking where the students got to know about ChatGPT. The students provided varied responses which most dominantly related to social media software such as YouTube, TikTok, and Instagram. Others indicated that their relatives introduced them. Some responses are provided in Extracts 1 to 3.

> Extract 1
> "Oh, I got to know about it on Instagram. It is a page I followed which shared the ad of ChatGPT" (Respondent 1)
> Extract 2

> "I heard about ChatGPT through a YouTube recommendation of a channel. The YouTuber explained the benefits of the programme which interested me to use." (Respondent 4)
>
> Extract 3
>
> "I heard about ChatGPT before I came to this institution. My brother introduced me to it" (Respondent 5)

Extracts 1 to 3 show that the students got to know about ChatGPT mainly through social media and relatives as well as friends. The other interview responses concur with these: *my brother*, *YouTube*, and *TikTok*. Conspicuously, these instances support the influence of social media in diffusing innovative technologies for public use. The significance of relatives and peers is evident. The next question aimed at revealing the advantages and disadvantages of ChatGPT to the students.

### 5.3.2 Advantages and disadvantages of ChatGPT

Although there are several debates around the benefits and threats of ChatGPT, the students expressed their concerns as well. The responses of the students favoured the advantages of ChatGPT to them. The responses are presented in Extracts 4 to 6

> Extract 4
>
> The advantages so far are that it makes me work easier and faster and I don't have to stress anymore. For the disadvantage, I think it makes me lazy sometimes. But for others, I think they will be reluctant. (Respondent 3)
>
> Extract 5
>
> Well, for the advantages, it helps me do my research since I'm doing computer science, gets more information, and makes me work easier. The disadvantage is that it does not have information from 2022 forward. Its information is from 2021 backwards. (Respondent 1)
>
> Extract 6
>
> I think it helps students to have an idea about a question and get to understand the question before they answer it. It provides something like a framework for students to also add their knowledge to it by explaining. The disadvantages go for the lecturers because they won't see the students' strengths and weaknesses because they will all be excelling. (Respondent 4)

The pros and cons of using ChatGPT from the students' perspective are varied. The advantages are personalized to the students. For instance, in Extract 4, the respondent noted that *it makes me work easier and faster,* and in Extract 5, *it helps me do my research since I'm doing computer science, get more information, and makes me work easier*. Thus, we deduce that ChatGPT helps students in their academic-related activities. These responses concur with their perception and intention to use ChatGPT based on its usefulness and convenience. For the disadvantages, the respondents stated that it makes them lazy, and also hinders teachers' assessment and evaluation of students' performance. This is because there would be a uniform excellent performance which would make it difficult to trace performance over time. Another disadvantage is that ChatGPT is limited based on the currency of information because *its information is from 2021 backwards* which affects the currency of some research works. Conversely, another opposing view to the advantage which was shared was that it could demotivate students to learn.

### 5.3.3 Reasons for using ChatGPT

We also asked questions concerning reasons for using ChatGPT. This question is related to the advantages of ChatGPT. Insightful responses were given. Extracts 7 and 9 illustrate the responses which support the analysis.

> Extract 7
> Okay, so it's basically like searching Google, but this simplifies the information you need to the precise thing you want. It just makes things easy for me. (Respondent 10)
> Extract 8
> Obviously because it's time saving and less stressful to me. And I think that sometimes I have to impress the lecturer mainly in research activities. (Respondent 6)
> Extract 9
> Well, for this, well it gives me ideas when I'm blocked. So, it makes the learning process easy a bit. It is simply efficient. (Respondent 8)

From Extracts 7 to 9, the reasons for using ChatGPT are based on its simplicity, precision, impressing lecturers, and generating ideas for research. In Extract 1, the respondent compares Google with ChatGPT and ascertains the efficiency of the latter over the former. These

reasons liaise with the intention to use ChatGPT. The nature of higher education lures students to find reasons to find shortcuts to acquire knowledge and reproduce with ease. The next question sought to find out how ChatGPT could be adopted in higher education given its relative relevance.

### 5.3.4 Strategies to adopt ChatGPT in education

The advent and advancement of technologies have found their way into educational institutions. Although relatively no clear empirical study has reported on ChatGPT adoption in education, its use is evidenced among students. We sought to inquire how ChatGPT could be adopted into education. The responses are provided in Extracts 10 to 12.

> Extract 10
> Yeah, I think we can adopt this in higher education. I think the institution could adapt this just like other management systems which would provide a framework for students to fix in their knowledge. I think it's doable, they just need to accept it. (Respondent 3)
> Extract 11
> I think we should encourage the use and stuff. If everyone starts using ChatGPT it'll be easier for everyone. (Respondent 9)
> Extract 12

It could be adopted in the educational system. I think it should be run like student portal system where the school regulates students' access to this innovative technology. Because it is addictive. (Respondent 2)

The students provided some succinct suggestions for the adoption of ChatGPT which supported their perception and use of it. From the responses, respondent 3 stated that universities could adopt it alongside their management systems to guide students in acquiring knowledge. The respondent 'certainly' acknowledged the possibility of this happening. This is supported by the response from respondent 2 who indicated that it could be adapted and implemented like a *portal system* to regulate students' access. Respondent 9 stated that the wide use of ChatGPT will encourage universities to adopt it, *making it easier for everyone*.

### 5.3.5 Knowledge of other AI-related operations

The final question focused on the respondents' knowledge or awareness of other AI-related generative or operations. The reports were insightful because they highlighted the proliferation of innovative technologies which has influenced their education. This concurs with the rapid diffusion of technologies which are less complicated and function efficiently and effectively. The responses are shown in Extracts 13 to 15.

> Extract 13
> Yeah, I know that the company who brought ChatGPT has other AIs with similar functions. Some are DALL-E2 and Whisper. The Whisper is like text-to-speech transformation something. (Respondent 1)
> Extract 14
> Yeah, I know HyperWrite. (Respondent 10)
> Extract 15
> I know some AIs like that. I have forgotten the names but I remember Publicity.AI. The rest I have forgotten. (Respondent 6)

From Extracts 13 to 15, the AI software common among the students are *Whisper* (which is used for transcribing voice-to-text), *DALL-E2*, *HyperWrite*, and *Publicity.AI*. Others mentioned *Quilbot* and *Grammarly* as AI operations. Interestingly, the respondent had a fair knowledge of other AIs from OpenAI which developed ChatGPT.

The purpose of this research is to find out the perception and intentions of the use of ChatGPT by students in a Ghanaian university. The results from the analysis and findings support the framework adopted in this study. We discuss the findings from the analysed quantitative and qualitative data.

For the demographic features, males were more than females which indicated their awareness of ChatGPT relative to their female counterparts. From a general perspective, Atuahene and Owusu-Ansah (2013) reported a higher representation of males in higher education than females. Kwapong (2007) and Atuahene (2014) provided similar accounts. Concerning this study, Tagoe (2012) noted that male students were more likely to use the internet and other technologies in their higher education than females. The mode of the participants' level of education was at the graduate level. The nature of graduate

education requires additional momentum for students (Andoh et al., 2020). This has necessitated their use of convenient technologies as a way to ease their pressure. The majority of the students were between the age of 26-30. This age range indicates that the students are mostly Generation Z (Gen Z). Gen Zs are in fine-tune with their environment, ensuring that they stay adept with innovations. With their widespread internet use (Zhang et al., 2021), they are technologically savvy and spend more time online aspiring to be different while belonging to their cohort (Smith, 2012). According to Shin and Lee (2021), such age cohorts are first-generation born and raised in the digital age, hence, their inclination to technological innovation.

Concerning the perceptions, the students were nonchalant about whether they had a fear or discomfort using ChatGPT. There is supporting literature which has reported students' fear and discomfort with using new technologies in education (Liang et al., 2022; Siddique et al., 2022). To make up for this uncertainty, a statement concerning their comfort showed positive reactions indicating their perceptions towards ChatGPT. Contrary to the literature indicating the fear of using technologies in education, others reported otherwise (Essel et al., 2022; Tlili et al., 2023). It is confirmable that the satisfaction of using new technologies (Fathema et al., 2015; Tlili et al., 2023), the improved results associated with them (Pavlik, 2023), and the excellent user experience (Biswas, 2023; Tlili et al., 2023) models students' advocacy for incorporating ChatGPT into higher education.

Given the indifference of students towards using the traditional method rather than ChatGPT, the intentions to use it was based on its contribution to students' development and improving academic activities. Furthermore, participants recognized that ChatGPT provided a comprehensive understanding of diverse (complex) topics in an easily understood manner. Therefore, ChatGPT is driving learning reform in the future and a paradigm shift in traditional methods of instruction delivery. Using TAM, Tlili et al. (2023) confirmed the perceived usefulness of ChatGPT in education. Unlike our findings, there were no instances where students expressed the importance of the dialogic and fun aspect of using ChatGPT as Tlili et al. (2023) revealed. The present study found that involvement with other related technologies and the availability of resources increased the chances of ChatGPT. Similar studies revealed how intentions to

use new technology are facilitated by experience (Almaiah et al., 2022; Haleem et al., 2022). Contrary to other studies which indicated technologies as improving performance and concentration (Lee, & Fanguy, 2022; Muñoz, 2022), this study found an uncertain response.

From the qualitative responses, social media has influenced the spread of information and knowledge amongst the mean age which is Gen Zs. Asomah et al. (2022) and Edumadze and Demuyakor (2022) confirmed the influence of social media in Ghanaian higher education. Also, it was found that ChatGPT made learning simpler, easier, more effective and more efficient, and produced better results. That is, students could access a wide range of information from an open past to 2021. Such advantages expand the frames of education and knowledge acquisition (Goh & Sigala, 2020). Interestingly, other relevant studies have noted that such technologies provided students with incalculable information which supported their learning (Essel et al., 2022; Papadakis, 2018; Zakaria & Khalid, 2016). Blackwell et al. (2013) shared similar insights on the benefits of technologies in education. Evidently, the research skills and information-seeking skills had improved significantly as put forth by the respondents. These advantages concurred with the reasons for using ChatGPT as Tlili et al. (2023) confirmed from their research.

Although extant literature has noted the need for technologies in schools (Agbaglo & Bonsu, 2022; Fearnley & Amora, 2020; Siyam, 2019), the innovativeness of ChatGPT presently challenges the traditional educational system significantly. Despite these threats, the study revealed that students would want this technology to be adopted in the educational system through mass use and controlling its use through management systems. Although the study reports the adoption of ChatGPT in higher education, more research is needed to justify how this technology could be implemented in higher institutions (Bennet et al., 2017; Deeley, 2018). The findings indicate that there is a need for the acceptance of this technology despite the criticisms levelled by scholars (Hu, 2023; Hosseini et al., 2023; Yeo-The & Tang). The study reported available AIs including Whisper, DALL-E2, Quilbot and others. These examples support the rate of diffusion of technologies in the 21$^{st}$ century.

## Conclusions

This study set out to examine the perceptions and intentions to use ChatGPT by students in a Ghanaian university. Motivated by the relatively scarce studies and the need to report from a specific context through the perspective of students, this research used the theoretical advantages of TAM to test the research hypotheses. The correlation analysis revealed that there was no statistically significant relationship between students' perceptions and their intention or use of ChatGPT in higher education studies. Despite this finding, the study revealed that the students had the intention to use ChatGPT and advocated its adoption in education since their experience facilitated their use. Likewise, the study reported a positive perception of the students towards ChatGPT based on its convenience, accuracy, and generation of better results. The content analysis revealed that social media was a dominant source of students' knowledge about ChatGPT and they had more viable advantages of it than disadvantages. In addition, they expressed individual and collective reasons for using it, provided strategies for its adoption, and listed other AI-related to ChatGPT.

Given the novelty of this research, several implications can be derived for educational practices and further research. Before providing the implications, the limitation of this study was related to the data. Although the participants were more than 100, the quantitative data was not enough to establish a clear relationship between perceptions and intentions to use ChatGPT in education. We propose that further studies after ours could increase their sample size or use two different universities for a broader overview. Furthermore, the findings of the research serve as a platform to provide a benchmark for other educators and researchers to explore the future directions of education using ChatGPT as a conditioning variable. Moreover, we support the recommendation by Essel et al. (2022) that universities should endeavor to establish Educational Technology Centers to manage such innovations permeating higher education. While the benefits were acknowledged, educational stakeholders should strategize measures to control the ChatGPT's use which challenges the creativity and critical thinking skills of students. Additionally, higher education institutions could collaborate with other AI companies to develop detective tools for identifying AI-generated content. This recommendation follows the suggestion by Hu (2023) and Hosseini et al. (2023). Such a

measure would curtail the mass use of ChatGPT among students in higher education. Finally, we propose individual quantitative and qualitative studies of the present topic to report the breadth and depth of concerns about ChatGPT in education.

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